

CHAPTER

1

The Evolution of Psychology



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What is psychology? Your initial answer to this question is likely to bear little resemblance to the picture of psychology that will emerge as you work your way through this book. I know that when I ambled into my introductory psychology course more than 30 years ago, I had no idea what psychology involved. I was a pre-law/political science major fulfilling a general education requirement with what I thought would be my one and only psychology course. I encountered two things I didn't expect. The first was to learn that psychology is about a great many things besides abnormal behavior and ways to win friends and influence people. I was surprised to discover that psychology is also about how people are able to perceive color, how hunger is

regulated by the brain, whether chimpanzees can use language to communicate, and a multitude of other topics I'd never thought to wonder about. The second thing I didn't expect was that I would be so completely seduced by the subject. Before long I changed majors and embarked on a career in psychology—a decision I have never regretted.

Why has psychology continued to fascinate me? One reason is that *psychology is practical*. It offers a vast store of information about issues that concern everyone. These issues range from broad social questions, such as how to reduce the incidence of mental illness, to highly personal questions, such as how to improve your self-control. In a sense, psychology is about you and me. It's about life in our modern world.



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Modern psychology ranges widely in its investigations, looking at divergent topics such as work, sleep, stress, trauma, and brain function. As you progress through this book, you will see that the range and diversity of psychology's subject matter are enormous.

The practical side of psychology will be apparent throughout this text, especially in the end-of-chapter Personal Applications. These Applications focus on everyday problems, such as coping more effectively with stress, improving memory, enhancing performance in school, and dealing with sleep difficulties.

Another element of psychology's appeal for me is that *it represents a powerful way of thinking*. We are all exposed to claims about psychological issues. For instance, we hear assertions that men and women have different abilities or that violence on television has a harmful effect on children. As a science, psychology demands that researchers ask precise questions about such issues and that they test their ideas through systematic observation. Psychology's commitment to testing ideas encourages a healthy brand of critical thinking. In the long run, this means that psychology provides a way of building knowledge that is relatively accurate and dependable.

Of course, psychological research cannot discover an answer for every interesting question about the mind and behavior. You won't find the meaning of life or the secret of happiness in this text. But you *will* find an approach to investigating questions that has proven to be fruitful. The more you learn about psychology as a way of thinking, the better able you will be to evaluate the psychological assertions you encounter in daily life.

There is still another reason for my fascination with psychology. As you proceed through this text, you will find that *psychologists study an enormous diversity of subjects*, from acrophobia (fear of heights) to zoophobia (fear of animals), from problem solving in apes to the symbolic language of dreams. Psychol-

ogists look at all the seasons of human life, from development in the womb to the emotional stages that people go through in the process of dying. Psychologists study observable behaviors such as eating, fighting, and mating. But they also dig beneath the surface to investigate how hormones affect emotions and how the brain registers pain. They probe the behavior of any number of species, from humans to house cats, from monkeys to moths. This rich diversity is, for me, perhaps psychology's most appealing aspect.

Mental illness, rats running in mazes, the physiology of hunger, the mysteries of love, creativity, and prejudice—what ties all these subjects together in a single discipline? How did psychology come to be so diverse? Why is it so different from what most people expect? If psychology is a social science, why do psychologists study subjects such as brain chemistry and the physiological basis of vision? To answer these questions, we begin our introduction to psychology by retracing its development. By seeing how psychology grew and changed, you will discover why it has the shape it does today.

After our journey into psychology's past, we will examine a formal definition of psychology. We'll also look at psychology as it is today—a sprawling, multifaceted science and profession. To help keep psychology's diversity in perspective, the chapter concludes with a discussion of seven unifying themes that will serve as connecting threads in the chapters to come. Finally, in the chapter's Personal Application we'll review research that gives insights on how to be an effective student, and in the Critical Thinking Application we'll discuss how critical thinking skills can be enhanced.

> From Speculation to Science: How Psychology Developed

PREVIEW QUESTIONS

- What were Wundt's and Hall's key ideas and accomplishments?
- What were the chief tenets of structuralism and functionalism?
- What did Freud have to say about the unconscious and sexuality, and why were his ideas so controversial?
- How did Freudian theory affect the mainstream of psychology?

Psychology's story is one of people groping toward a better understanding of themselves. As psychology has evolved, its focus, methods, and explanatory models have changed. In this section we'll look at how psychology has developed from philosophical speculations about the mind into a modern science. An Illustrated Overview of the highlights of psychology's history can be found on pages 16–17.

The term *psychology* comes from two Greek words, *psyche*, meaning the soul, and *logos*, referring to the study of a subject. These two Greek roots were first put together to define a topic of study in the 16th century, when *psyche* was used to refer to the soul, spirit, or mind, as distinguished from the body (Boring, 1966). Not until the early 18th century did the term *psychology* gain more than rare usage among

scholars. By that time it had acquired its literal meaning, "the study of the mind."

Of course, people have always wondered about the mysteries of the mind. In that sense, psychology is as old as the human race. But it was only a little over 125 years ago that psychology emerged as a scientific discipline.

A New Science Is Born: The Contributions of Wundt and Hall



Psychology's intellectual parents were the disciplines of *philosophy* and *physiology*. By the 1870s a small number of scholars in both fields were actively ex-

ploring questions about the mind. How are bodily sensations turned into a mental awareness of the outside world? Are people's perceptions of the world accurate reflections of reality? How do mind and body interact? The philosophers and physiologists who were interested in the mind viewed such questions as fascinating issues *within* their respective fields. It was a German professor, Wilhelm Wundt (1832–1920), who eventually changed this view. Wundt mounted a campaign to make psychology an independent discipline rather than a stepchild of philosophy or physiology.

The time and place were right for Wundt's appeal. German universities were in a healthy period of expansion, so resources were available for new disciplines. Furthermore, the intellectual climate favored the scientific approach that Wundt advocated. Hence, his proposals were well received by the academic community. In 1879 Wundt succeeded in establishing the first formal laboratory for research in psychology at the University of Leipzig. In deference to this landmark event, historians have christened 1879 as psychology's "date of birth." Soon afterward, in 1881, Wundt established the first journal devoted to publishing research on psychology. All in all, Wundt's campaign was so successful that today he is widely characterized as the founder of psychology.

Wundt's conception of psychology was influential for decades. Borrowing from his training in physiology, Wundt (1874) declared that the new psychology should be a *science* modeled after fields such as physics and chemistry. What was the subject matter

of the new science? According to Wundt, psychology's primary focus was *consciousness*—the awareness of immediate experience. Thus, *psychology became the scientific study of conscious experience*. This orientation kept psychology focused on the mind and mental processes. But it demanded that the methods psychologists used to investigate the mind be as scientific as those of chemists or physicists.

Wundt was a tireless, dedicated scholar who generated an estimated 54,000 pages of books and articles in his career (Bringmann & Balk, 1992). Studies in his laboratory focused on attention, memory, sensory processes, and reaction-time experiments that provided estimates of the duration of various mental processes (Fuchs & Milar, 2003). Outstanding young scholars, including many Americans, came to Leipzig to study under Wundt. Many of Wundt's students then fanned out across Germany and America, establishing the research laboratories that formed the basis for the new, independent science of psychology. Indeed, it was in North America that Wundt's new science grew by leaps and bounds. Between 1883 and 1893, some 23 new psychological research laboratories sprang up in the United States and Canada, at the schools shown in **Figure 1.1** (Benjamin, 2000). Many of the laboratories were started by Wundt's students, or by his students' students.

G. Stanley Hall (1846–1924), who studied briefly with Wundt, was a particularly important contributor to the rapid growth of psychology in America. Toward the end of the 19th century, Hall reeled off a series of "firsts" for American psychology. To begin



WILHELM WUNDT
1832–1920

"Physiology informs us about those life phenomena that we perceive by our external senses. In psychology, the person looks upon himself as from within and tries to explain the interrelations of those processes that this internal observation discloses."

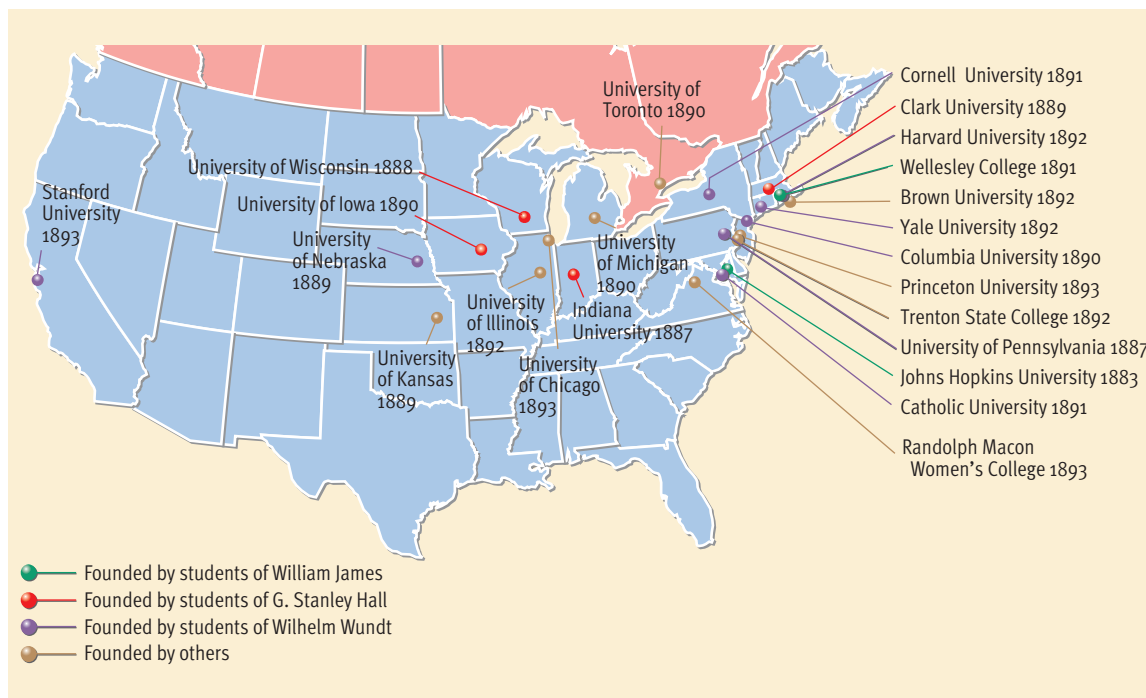


Figure 1.1
Early research laboratories in North America.

This map highlights the location and year of founding for the first 23 psychological research labs established in North American colleges and universities. As the color coding shows, a great many of these labs were founded by the students of Wilhelm Wundt, G. Stanley Hall, and William James. (Based on Benjamin, 2000)

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The establishment of the first research laboratory in psychology by Wilhelm Wundt (far right) marked the birth of psychology as a modern science.

Web Link 1.1



Mind and Body: René Descartes to William James

Designed originally to celebrate psychology's first century as an independent discipline, this online exhibition traces three historical themes: the mind-body problem posed in the 17th century by philosopher René Descartes, the rise of experimental psychology, and the beginnings of psychology in America. **Note: The URLs (addresses) for the Web Links can be found on the website for this text (http://psychology.wadsworth.com/weiten_themes7e), or you can find them using a search engine such as Google.**

with, he established America's first research laboratory in psychology at Johns Hopkins University in 1883. Four years later he launched America's first psychology journal. Furthermore, in 1892 he was the driving force behind the establishment of the American Psychological Association (APA) and was elected its first president. Today the APA is the world's largest organization devoted to the advancement of psychology, with over 155,000 members and affiliates. Hall never envisioned such a vast membership when he and 26 others set up their new organization.

Exactly why Americans took to psychology so quickly is hard to say. Perhaps it was because America's relatively young universities were more open to new disciplines than the older, more tradition-bound universities in Europe. In any case, although psychology was born in Germany, it blossomed into adolescence in America. Like many adolescents, however, the young science was about to enter a period of turbulence and turmoil.

The Battle of the "Schools" Begins: Structuralism Versus Functionalism



While reading about how psychology became a science, you might have imagined that psychologists became a unified group of scholars who busily added new discoveries to an uncontested store of "facts." In reality, no science works that way. Competing schools of thought exist in most scientific disciplines. Sometimes the disagreements among these schools are

sharp. Such diversity in thought is natural and often stimulates enlightening debate. In psychology, the first two major schools of thought, *structuralism* and *functionalism*, were entangled in the field's first great intellectual battle.

Structuralism emerged through the leadership of Edward Titchener, an Englishman who emigrated to the United States in 1892 and taught for decades at Cornell University. Although Titchener earned his degree in Wundt's Leipzig laboratory and expressed great admiration for Wundt's work, he brought his own version of Wundt's psychology to America (Hilgard, 1987; Thorne & Henley, 1997). **Structuralism was based on the notion that the task of psychology is to analyze consciousness into its basic elements and investigate how these elements are related.** Just as physicists were studying how matter is made up of basic particles, the structuralists wanted to identify and examine the fundamental components of conscious experience, such as sensations, feelings, and images.

Although the structuralists explored many questions, most of their work concerned sensation and perception in vision, hearing, and touch. To examine the contents of consciousness, the structuralists depended on the method of **introspection, or the careful, systematic self-observation of one's own conscious experience.** As practiced by the structuralists, introspection required training to make the *subject*—the person being studied—more objective and more aware. Once trained, subjects were typically exposed to auditory tones, optical illusions, and visual stimuli under carefully controlled and systematically varied conditions and were asked to analyze what they experienced.

The functionalists took a different view of psychology's task. **Functionalism was based on the belief that psychology should investigate the function or purpose of consciousness, rather than its structure.** The chief impetus for the emergence of functionalism was the work of William James (1842–1910), a brilliant American scholar (and brother of novelist Henry James). James's formal training was in medicine. However, he did not find medicine to be intellectually challenging and felt he was too sickly to pursue a medical practice (Ross, 1991), so, when an opportunity arose in 1872, he joined the faculty of Harvard University to pursue a less arduous career in academia. Medicine's loss proved to be psychology's gain, as James quickly became an intellectual giant in the field. James's landmark book, *Principles of Psychology* (1890), became standard reading for generations of psychologists and is perhaps the most influential text in the history of psychology (Weiten & Wight, 1992).

James's thinking illustrates how psychology, like any field, is deeply embedded in a network of cultural and intellectual influences. James had been impressed with Charles Darwin's (1859, 1871) concept of *natural selection*. According to the principle of *natural selection*, heritable characteristics that provide a survival or reproductive advantage are more likely than alternative characteristics to be passed on to subsequent generations and thus come to be "selected" over time. This cornerstone notion of Darwin's evolutionary theory suggested that the typical characteristics of a species must serve some purpose. Applying this idea to humans, James (1890) noted that consciousness obviously is an important characteristic of our species. Hence, he contended that psychology should investigate the *functions* rather than the *structure* of consciousness.

James also argued that the structuralists' approach missed the real nature of conscious experience. Consciousness, he argued, consists of a continuous *flow* of thoughts. In analyzing consciousness into its "elements," the structuralists were looking at static points

in that flow. James wanted to understand the flow itself, which he called the "stream of consciousness."



Whereas structuralists naturally gravitated to the laboratory, functionalists were more interested in how people adapt their behavior to the demands of the real world around them. This practical slant led them to introduce new subjects into psychology. Instead of focusing on sensation and perception, functionalists such as James McKeen Cattell and John Dewey began to investigate mental testing, patterns of development in children, the effectiveness of educational practices, and behavioral differences between the sexes. These new topics may have played a role in attracting the first women into the field of psychology (see Figure 1.2).

The impassioned advocates of structuralism and functionalism saw themselves as fighting for high stakes: the definition and future direction of the new science of psychology. Their war of ideas continued energetically for many years. Who won? Most historians give the edge to functionalism. Although both schools of thought gradually faded away, functional-



WILLIAM JAMES
1842–1910

"It is just this free water of consciousness that psychologists resolutely overlook."

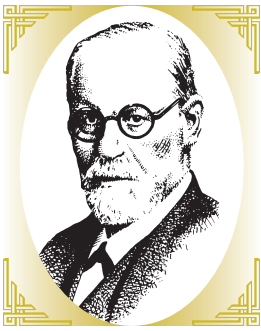
Mary Whiton Calkins (1863–1930)	Margaret Floy Washburn (1871–1939)	Leta Stetter Hollingworth (1886–1939)
		
<p>Mary Calkins, who studied under William James, founded one of the first dozen psychology laboratories in America at Wellesley College in 1891, invented a widely used technique for studying memory, and became the first woman to serve as president of the American Psychological Association in 1905. Ironically, however, she never received her Ph.D. in psychology. Because she was a woman, Harvard University only reluctantly allowed her to take graduate classes as a "guest student." When she completed the requirements for her Ph.D., Harvard would only offer her a doctorate from its undergraduate sister school, Radcliffe. Calkins felt that this decision perpetuated unequal treatment of the sexes, so she refused the Radcliffe degree.</p>	<p>Margaret Washburn was the first woman to receive a Ph.D. in psychology. She wrote an influential book, <i>The Animal Mind</i> (1908), which served as an impetus to the subsequent emergence of behaviorism and was standard reading for several generations of psychologists. In 1921 she became the second woman to serve as president of the American Psychological Association. Washburn studied under James McKeen Cattell at Columbia University, but like Mary Calkins, she was only permitted to take graduate classes unofficially, as a "hearer." Hence, she transferred to Cornell University, which was more hospitable toward women, and completed her doctorate in 1894. Like Calkins, Washburn spent most of her career at a college for women (Vassar).</p>	<p>Leta Hollingworth did pioneering work on adolescent development, mental retardation, and gifted children. Indeed, she was the first person to use the term <i>gifted</i> to refer to youngsters who scored exceptionally high on intelligence tests. Hollingworth (1914, 1916) also played a major role in debunking popular theories of her era that purported to explain why women were "inferior" to men. For instance, she conducted a study refuting the myth that phases of the menstrual cycle are reliably associated with performance decrements in women. Her careful collection of objective data on gender differences forced other scientists to subject popular, untested beliefs about the sexes to skeptical, empirical inquiry.</p>

Photos courtesy of the Archives of the History of American Psychology, University of Akron, Ohio

Figure 1.2

Women pioneers in the history of psychology.

Women have long made major contributions to the development of psychology (Milar, 2000; Russo & Denmark, 1987), and today nearly half of all psychologists are female. As in other fields, however, women have often been overlooked in histories of psychology (Furumoto & Scarborough, 1986). The three psychologists profiled here demonstrate that women have been making significant contributions to psychology almost from its beginning—despite formidable barriers to pursuing their academic careers.



SIGMUND FREUD
1856–1939

"The unconscious is the true psychical reality; in its innermost nature it is as much unknown to us as the reality of the external world."

ism fostered the development of two important descendants—behaviorism and applied psychology—that we will discuss momentarily.

Freud Brings the Unconscious into the Picture



Sigmund Freud (1856–1939) was an Austrian physician who early in his career dreamed of achieving fame by making an important discovery. His determination was such that in medical school he dissected 400 male eels to prove for the first time that they had testes. His work with eels did not make him famous, but his subsequent work with people did. Indeed, his theories made him one of the most controversial intellectual figures of modern times.

Freud's (1900, 1933) approach to psychology grew out of his efforts to treat mental disorders. In his medical practice, Freud treated people troubled by psychological problems such as irrational fears, obsessions, and anxieties with an innovative procedure he called *psychoanalysis* (described in detail in Chapter 15). Decades of experience probing into his patients' lives provided much of the inspiration for Freud's theory. He also gathered material by looking inward and examining his own anxieties, conflicts, and desires.

His work with patients and his own self-exploration persuaded Freud of the existence of what he called the unconscious. According to Freud, **the unconscious contains thoughts, memories, and desires that are well below the surface of conscious awareness but that nonetheless exert great influence on behavior.** Freud based his concept of the unconscious on a variety of observations. For instance, he noticed that

seemingly meaningless slips of the tongue (such as "I decided to take a summer school course") often appeared to reveal a person's true feelings. He also noted that his patients' dreams often seemed to express important feelings they were unaware of. Knitting these and other observations together, Freud eventually concluded that psychological disturbances are largely caused by personal conflicts existing at an unconscious level. More generally, his **psychoanalytic theory attempts to explain personality, motivation, and mental disorders by focusing on unconscious determinants of behavior.**

Freud's concept of the unconscious was not entirely new (Rieber, 1998). However, it was a major departure from the prevailing belief that people are fully aware of the forces affecting their behavior. In arguing that behavior is governed by unconscious forces, Freud made the disconcerting suggestion that people are not masters of their own minds. Other aspects of Freud's theory also stirred up debate. For instance, he proposed that behavior is greatly influenced by how people cope with their sexual urges. At a time when people were far less comfortable discussing sexual issues than they are today, even scientists were offended and scandalized by Freud's emphasis on sex. Small wonder, then, that Freud was soon engulfed in controversy.

In part because of its controversial nature, Freud's theory was slow to gain influence. However, his approach gradually won acceptance within medicine, attracting prominent followers such as Carl Jung and Alfred Adler. Important public recognition from psychology came in 1909, when G. Stanley Hall invited Freud to give a series of lectures at Clark University in Massachusetts (see the photo at left).

By 1920 psychoanalytic theory was widely known around the world, but it continued to meet with considerable resistance in psychology (Fancher, 2000). Most psychologists contemptuously viewed psychoanalytic theory as unscientific speculation that would eventually fade away (Hornstein, 1992). However, they turned out to be wrong. Psychoanalytic ideas steadily gained credence in the culture at large, influencing thought in medicine, the arts, and literature (Rieber, 1998). According to Hornstein (1992), by the 1940s, "Psychoanalysis was becoming so popular that it threatened to eclipse psychology entirely" (p. 258). Thus, the widespread popular acceptance of psychoanalytic theory essentially forced psychologists to apply their scientific methods to the topics Freud had studied: personality, motivation, and abnormal behavior. As they turned to these topics, many of them saw merit in some of Freud's notions (Rosenzweig, 1985). Although psychoanalytic theory continued to generate heated debate, it survived

Image Not Available

A portrait taken at the famous Clark University psychology conference, September 1909. Pictured are Freud, G. Stanley Hall, and four of Freud's students and associates. Seated, left to right: Freud, Hall, and Carl Jung; standing: Abraham Brill, Ernest Jones, and Sándor Ferenczi.

to become an influential theoretical perspective. Today, many psychoanalytic concepts have filtered into the mainstream of psychology (Westen, 1998).

REVIEW OF KEY POINTS

- Psychology's intellectual parents were 19th-century philosophy and physiology, disciplines that shared an interest in the mysteries of the mind.
- Psychology became an independent discipline when Wilhelm Wundt established the first psychological research laboratory in 1879 at Leipzig, Germany. He defined psychology as the scientific study of consciousness.
- The new discipline grew rapidly in North America in the late 19th century, as illustrated by G. Stanley Hall's career. Hall established America's first research lab in psychology and founded the American Psychological Association.
- The structuralists, led by Edward Titchener, believed that psychology should use introspection to analyze consciousness into its basic elements.
- The functionalists, inspired by the ideas of William James, believed that psychology should focus on the purpose and adaptive functions of consciousness. Functionalism paved the way for behaviorism and applied psychology.
- Sigmund Freud was an Austrian physician who invented psychoanalysis. His psychoanalytic theory emphasized the unconscious determinants of behavior and the importance of sexuality.
- Freud's ideas were controversial, and they met with resistance in academic psychology. However, as more psychologists developed an interest in personality, motivation, and abnormal behavior, psychoanalytic concepts were incorporated into mainstream psychology.

Watson Alters Psychology's Course as Behaviorism Makes Its Debut



One reason that psychoanalysis struggled to gain acceptance within psychology was that it conflicted in many basic ways with the tenets of *behaviorism*, a new school of thought that gradually became dominant within psychology between 1913 and the late 1920s. Founded by John B. Watson (1878–1958), **behaviorism is a theoretical orientation based on the premise that scientific psychology should study only observable behavior.** It is important to understand what a radical change this definition represents. Watson (1913, 1919) proposed that psychologists *abandon the study of consciousness altogether* and focus exclusively on behaviors that they could observe directly. In essence, he was trying to redefine what scientific psychology should be about.

Why did Watson argue for such a fundamental shift in direction? Because to him, the power of the scientific method rested on the idea of *verifiability*. In principle, scientific claims can always be verified (or disproved) by anyone who is able and willing to make the required observations. However, this power depends on studying things that can be observed objectively. Otherwise, the advantage of using the scientific approach—replacing vague speculation and personal opinion with reliable, exact knowledge—is

lost. For Watson, mental processes were not a proper subject for scientific study because they are ultimately private events. After all, no one can see or touch another's thoughts. Consequently, if psychology was to be a science, it would have to give up consciousness as its subject matter and become instead the *science of behavior*.

Behavior refers to any overt (observable) response or activity by an organism. Watson asserted that psychologists could study anything that people do or say—shopping, playing chess, eating, complimenting a friend—but

PREVIEW QUESTIONS

- What was the main idea underlying behaviorism?
- How did the emergence of behaviorism influence the evolution of psychology?
- What basic principle of behavior did Skinner emphasize?
- What did Skinner do to stir up controversy?
- What was the impetus for the emergence of humanism?

concept check 1.1



Understanding the Implications of Major Theories: Wundt, James, and Freud

Check your understanding of the implications of some of the major theories reviewed in this chapter by indicating who is likely to have made each of the statements quoted below. Choose from the following theorists: (a) Wilhelm Wundt, (b) William James, and (c) Sigmund Freud. You'll find the answers in Appendix A in the back of the book.

1. "He that has eyes to see and ears to hear may convince himself that no mortal can keep a secret. If the lips are silent, he chatters with his fingertips; betrayal oozes out of him at every pore. And thus the task of making conscious the most hidden recesses of the mind is one which it is quite possible to accomplish."
2. "The book which I present to the public is an attempt to mark out a new domain of science. . . . The new discipline rests upon anatomical and physiological foundations. . . . The experimental treatment of psychological problems must be pronounced from every point of view to be in its first beginnings."
3. "Consciousness, then, does not appear to itself chopped up in bits. Such words as 'chain' or 'train' do not describe it fitly. . . . It is nothing jointed; it flows. A 'river' or 'stream' are the metaphors by which it is most naturally described."



JOHN B. WATSON
1878–1958

"The time seems to have come when psychology must discard all references to consciousness."

Web Link 1.2



History & Philosophy of Psychology Web Resources

Professor Christopher Green of York University in Canada has assembled a wide range of web-based materials relating to psychology's theoretical and historical past, including a collection of sites focused on specific individuals. Pages devoted to key figures mentioned in this chapter (such as Mary Whiton Calkins, William James, B. F. Skinner, and Margaret Floy Washburn) can be accessed here.

they could *not* study scientifically the thoughts, wishes, and feelings that might accompany these observable behaviors. Obviously, psychology's shift away from the study of consciousness was fundamentally incompatible with psychoanalytic theory. Given that many psychologists were becoming uncomfortable with the study of *conscious* experience, you can imagine how they felt about trying to study *unconscious* mental processes. By the 1920s Watson had become an outspoken critic of Freud's views (Rilling, 2000). Proponents of behaviorism and psychoanalysis engaged in many heated theoretical debates in the ensuing decades.

Watson's radical reorientation of psychology did not end with his redefinition of its subject matter. He also staked out a rather extreme position on one of psychology's oldest and most fundamental questions: the issue of *nature versus nurture*. This age-old debate is concerned with whether behavior is determined mainly by genetic inheritance ("nature") or by environment and experience ("nurture"). To oversimplify, the question is this: Is a great concert pianist or a master criminal born, or made? Watson argued that each is made, not born. In other words, he downplayed the importance of heredity, maintaining that behavior is governed primarily by the environment. Indeed, he boldly claimed:

Give me a dozen healthy infants, well-formed, and my own special world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations and race of his ancestors. I am going beyond my facts and I admit it, but so have the advocates of the contrary and they have been doing it for many thousands of years. (1924, p. 82)



B. F. SKINNER
1904–1990

"I submit that what we call the behavior of the human organism is no more free than its digestion."

For obvious reasons, Watson's tongue-in-cheek challenge was never put to a test. Although this widely cited quote overstated and oversimplified Watson's views on the nature-nurture issue (Todd & Morris, 1992), his writings contributed to the strong environmental slant that became associated with behaviorism (Horowitz, 1992).

The gradual emergence of behaviorism was partly attributable to an important discovery made around the turn of the century by Ivan Pavlov, a Russian physiologist. As you'll learn in Chapter 6, Pavlov (1906) showed that dogs could be trained to salivate in response to an auditory stimulus such as a tone. This deceptively simple demonstration provided insight into how stimulus-response bonds are formed. Such bonds were exactly what behaviorists wanted to in-

vestigate, so Pavlov's discovery paved the way for their work. The behaviorists eventually came to view psychology's mission as an attempt to relate overt behaviors (responses) to observable events in the environment (stimuli). Because the behaviorists investigated stimulus-response relationships, the behavioral approach is often referred to as *stimulus-response (S-R) psychology*.

Behaviorism's stimulus-response approach contributed to the rise of animal research in psychology. Having deleted consciousness from their scope of concern, behaviorists no longer needed to study human subjects who could report on their mental processes. Many psychologists thought that animals would make better research subjects anyway. One key reason was that experimental research is often more productive if experimenters can exert considerable *control* over their subjects. Otherwise, too many complicating factors enter into the picture and contaminate the experiment. Obviously, a researcher can have much more control over a laboratory rat or pigeon than over a human subject, who arrives at a lab with years of uncontrolled experience and who will probably insist on going home at night. Thus, the discipline that had begun its life a few decades earlier as the study of the mind now found itself heavily involved in the study of simple responses made by laboratory animals.

Skinner Questions Free Will as Behaviorism Flourishes



The advocates of behaviorism and psychoanalysis tangled frequently during the 1920s, 1930s, and 1940s. As psychoanalytic thought slowly gained a foothold within psychology, many psychologists softened their stance on the acceptability of studying internal mental events. However, this movement toward the consideration of internal states was vigorously opposed by B. F. Skinner (1904–1990), a behaviorist whose work became highly influential in the 1950s. Skinner set out to be a writer, but he gave up his dream after a few unproductive years. "I had," he wrote later, "nothing important to say" (1967, p. 395). However, he had many important things to say about psychology, and he went on to become one of the most influential of all American psychologists.

In response to the softening that had occurred in the behaviorist position, Skinner (1953) championed a return to Watson's strict focus on observable behavior. Skinner did not deny the existence of internal mental events. However, he insisted that they could not be studied scientifically. Moreover, there was no need to study them. According to Skinner, if the stimulus of food is followed by the response of eating, we

Image Not Available

B. F. Skinner created considerable controversy when he asserted that free will is an illusion.

can fully describe what is happening without making any guesses about whether the animal is experiencing hunger. Like Watson, Skinner also emphasized how environmental factors mold behavior. Although he repeatedly acknowledged that an organism's behavior is influenced by its biological endowment, he argued that psychology could understand and predict behavior adequately without resorting to physiological explanations (Delprato & Midgley, 1992).

The fundamental principle of behavior documented by Skinner is deceptively simple: *Organisms tend to repeat responses that lead to positive outcomes, and they tend not to repeat responses that lead to neutral or negative outcomes.* Despite its simplicity, this principle turns out to be quite powerful. Working primarily with laboratory rats and pigeons, Skinner showed that he could exert remarkable control over the behavior of animals by manipulating the outcomes of their responses. He was even able to train animals to perform unnatural behaviors. For example, he once trained some pigeons to play Ping-Pong! Skinner's followers eventually showed that the principles uncovered in their animal research could be applied to complex human behaviors as well. Behavioral principles are now widely used in factories, schools, prisons, mental hospitals, and a variety of other settings (see Chapter 6).

Skinner's ideas had repercussions that went far beyond the debate among psychologists about what

they should study. Skinner spelled out the full implications of his findings in his book *Beyond Freedom and Dignity* (1971). There he asserted that all behavior is fully governed by external stimuli. In other words, your behavior is determined in predictable ways by lawful principles, just as the flight of an arrow is governed by the laws of physics. Thus, if you believe that your actions are the result of conscious decisions, you're wrong. According to Skinner, people are controlled by their environment, not by themselves. In short, Skinner arrived at the conclusion that *free will is an illusion.*

As you can readily imagine, such a disconcerting view of human nature was not universally acclaimed. Like Freud, Skinner was the target of harsh criticism. Much of this criticism stemmed from misinterpretations of his ideas that were disseminated in the popular press (Rutherford, 2000). For example, his analysis of free will was often misconstrued as an attack on the concept of a free society—which it was not—and he was often mistakenly condemned for advocating an undemocratic “scientific police state” (Dinsmoor, 1992). Despite all the controversy, however, behaviorism flourished as the dominant school of thought in psychology during the 1950s and 1960s (Gilgen, 1982). And when 93 psychology department chairpersons were surveyed in 1990 about the field's most important contributors (Estes, Coston, & Fournet, 1990), Skinner was ranked at the top of the list (see **Figure 1.3**).

The Humanists Revolt



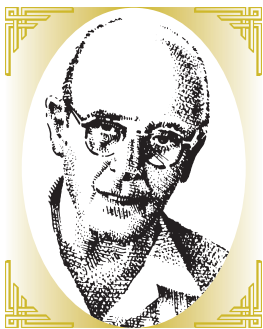
By the 1950s, behaviorism and psychoanalytic theory had become the most influential schools of thought

Figure 1.3
Important figures in the history of psychology. In a 1990 survey, 93 chairpersons of psychology departments ranked psychology's most important contributors (Estes, Coston, & Fournet, 1990, as cited in Korn et al., 1991). As you can see, B. F. Skinner edged out Sigmund Freud for the top ranking. Although these ratings of scholarly eminence are open to considerable debate, the data should give you some idea of the relative impact of various figures in the history of psychology.

Rank	Individual	Rank Points
1	B. F. Skinner	508
2	Sigmund Freud	459
3	William James	372
4	Jean Piaget	237
5	G. Stanley Hall	216
6	Wilhelm Wundt	203
7	Carl Rogers	192
8	John B. Watson	188
9	Ivan Pavlov	152
10	E. L. Thorndike	124

Web Link 1.3

Museum of the History of Psychological Instrumentation
You can examine instruments and complex apparatus used by psychological researchers in the discipline's early decades in this "cybermuseum" maintained at Montclair State University.



CARL ROGERS
1902–1987

“It seems to me that at bottom each person is asking, ‘Who am I, really? How can I get in touch with this real self, underlying all my surface behavior? How can I become myself?’”

in psychology. However, many psychologists found these theoretical orientations unappealing. The principal charge hurled at both schools was that they were “dehumanizing.” Psychoanalytic theory was attacked for its belief that behavior is dominated by primitive, sexual urges. Behaviorism was criticized for its preoccupation with the study of simple animal behavior. Both theories were criticized because they suggested that people are not masters of their own destinies. Above all, many people argued, both schools of thought failed to recognize the unique qualities of *human* behavior.

Beginning in the 1950s, the diverse opposition to behaviorism and psychoanalytic theory blended into a loose alliance that eventually became a new school of thought called “humanism” (Bühler & Allen, 1972). In psychology, **humanism is a theoretical orientation that emphasizes the unique qualities of humans, especially their freedom and their potential for personal growth.** Some of the key differences among the humanistic, psychoanalytic, and behavioral viewpoints are summarized in **Table 1.1**, which compares six influential contemporary theoretical perspectives in psychology.

Humanists take an *optimistic* view of human nature. They maintain that people are not pawns of either their animal heritage or environmental circumstances. Furthermore, they say, because humans are fundamentally different from other animals, research on animals has little relevance to the understanding

of human behavior. The most prominent architects of the humanistic movement have been Carl Rogers (1902–1987) and Abraham Maslow (1908–1970). Rogers (1951) argued that human behavior is governed primarily by each individual’s sense of self, or “self-concept”—which animals presumably lack. Both he and Maslow (1954) maintained that to fully understand people’s behavior, psychologists must take into account the fundamental human drive toward personal growth. They asserted that people have a basic need to continue to evolve as human beings and to fulfill their potentials. In fact, the humanists argued that many psychological disturbances are the result of thwarting these uniquely human needs.

Fragmentation and dissent have reduced the influence of humanism in recent decades, although some advocates are predicting a renaissance for the humanistic movement (Taylor, 1999). To date, the humanists’ greatest contribution to psychology has probably been their innovative treatments for psychological problems and disorders. More generally, the humanists have argued eloquently for a different picture of human nature than those implied by psychoanalysis and behaviorism (Wertz, 1998).

➤ REVIEW OF KEY POINTS

- Behaviorists, led by John B. Watson, argued that psychology should study only observable behavior. Thus, they campaigned to redefine psychology as the science of behavior.

Table 1.1 Overview of Six Contemporary Theoretical Perspectives in Psychology

Perspective and Its Influential Period	Principal Contributors	Subject Matter	Basic Premise
Behavioral (1913–present)	John B. Watson Ivan Pavlov B. F. Skinner	Effects of environment on the overt behavior of humans and animals	Only observable events (stimulus-response relations) can be studied scientifically.
Psychoanalytic (1900–present)	Sigmund Freud Carl Jung Alfred Adler	Unconscious determinants of behavior	Unconscious motives and experiences in early childhood govern personality and mental disorders.
Humanistic (1950s–present)	Carl Rogers Abraham Maslow	Unique aspects of human experience	Humans are free, rational beings with the potential for personal growth, and they are fundamentally different from animals.
Cognitive (1950s–present)	Jean Piaget Noam Chomsky Herbert Simon	Thoughts; mental processes	Human behavior cannot be fully understood without examining how people acquire, store, and process information.
Biological (1950s–present)	James Olds Roger Sperry David Hubel Torsten Wiesel	Physiological bases of behavior in humans and animals	An organism’s functioning can be explained in terms of the bodily structures and biochemical processes that underlie behavior.
Evolutionary (1980s–present)	David Buss Martin Daly Margo Wilson Leda Cosmides John Tooby	Evolutionary bases of behavior in humans and animals	Behavior patterns have evolved to solve adaptive problems; natural selection favors behaviors that enhance reproductive success.

- Emphasizing the importance of the environment over heredity, the behaviorists began to explore stimulus-response relationships, often using laboratory animals as subjects.
- The influence of behaviorism was boosted greatly by B. F. Skinner's research. Like Watson before him, Skinner asserted that psychology should study only observable behavior.
- Working with laboratory rats and pigeons, Skinner demonstrated that organisms tend to repeat responses that lead to positive consequences and not to repeat responses that lead to neutral or negative consequences.
- Based on the belief that all behavior is fully governed by external stimuli, Skinner argued in *Beyond Freedom and Dignity* that free will is an illusion. His ideas were controversial and often misunderstood.
- Finding both behaviorism and psychoanalysis unsatisfactory, advocates of a new theoretical orientation called humanism became influential in the 1950s. Humanism, led by Abraham Maslow and Carl Rogers, emphasized the unique qualities of human behavior and humans' freedom and potential for personal growth.

Psychology Comes of Age as a Profession



The 1950s also saw psychology come of age as a profession. As you know, psychology is not all pure science. It has a highly practical side. Many psychologists provide a variety of professional services to the public. Their work falls within the domain of **applied psychology, the branch of psychology concerned with everyday, practical problems**. This branch of psychology, so prominent today, was actually slow to develop. Although a small number of early psychologists dabbled in various areas of applied psychology, it remained on the fringes of mainstream psychology until World War II (Benjamin et al., 2003).

The first applied arm of psychology to achieve any prominence was *clinical psychology*. As practiced today, **clinical psychology is the branch of psychology concerned with the diagnosis and treatment of psychological problems and disorders**. In the early days, however, the emphasis was almost exclusively on psychological testing and adjustment problems in schoolchildren. Although the first psychological clinic was established as early as 1896, by 1937 only about one in five members of the American Psychological Association reported an interest in clinical psychology (Goldenberg, 1983). Clinicians were a small minority in a field devoted primarily to research.

That picture was about to change with dramatic swiftness. During World War II (1939–1945), many academic psychologists were pressed into service as clinicians. They were needed to screen military recruits and to treat soldiers suffering from trauma. Many of these psychologists (often to their surprise) found the clinical work to be challenging and rewarding, and a substantial portion continued to do clinical work after the war. More significant, some 40,000 American veterans returned to seek postwar treatment in Veterans Administration (VA) hospitals for their psychological scars. With the demand for clinicians far greater than the supply, the VA stepped in to finance many new training programs in clinical psychology. These programs, emphasizing training in the treatment of psychological disorders as well as psychological testing, proved attractive. Within a few years, about half the new Ph.D.'s in psychology were specializing in clinical psychology and most went on to offer professional services to the public (Goldenberg, 1983). Assessing the impact of World War II, Routh and Reisman (2003) characterize it as "a watershed in the history of clinical psychology. In its aftermath, clinical psychology received something

PREVIEW QUESTIONS

- What events stimulated the development of applied psychology and clinical psychology?
- What is the cognitive perspective, and when did it become important?
- What is the biological perspective, and when did it become important?
- Why did psychology ignore cultural variables for many years?
- What events sparked psychology's increased interest in cultural factors?
- What is the basic premise of evolutionary psychology?

concept check 1.2



Understanding the Implications of Major Theories: Watson, Skinner, and Rogers

Check your understanding of the implications of some of the major theories reviewed in this chapter by indicating who is likely to have made each of the statements quoted below. Choose from the following: (a) John B. Watson, (b) B. F. Skinner, and (c) Carl Rogers. You'll find the answers in Appendix A at the back of the book.

1. "In the traditional view, a person is free. . . . He can therefore be held responsible for what he does and justly punished if he offends. That view, together with its associated practices, must be reexamined when a scientific analysis reveals unsuspected controlling relations between behavior and environment."
2. "I do not have a Pollyanna view of human nature. . . . Yet one of the most refreshing and invigorating parts of my experience is to work with [my clients] and to discover the strongly positive directional tendencies which exist in them, as in all of us, at the deepest levels."
3. "Our conclusion is that we have no real evidence of the inheritance of traits. I would feel perfectly confident in the ultimately favorable outcome of careful upbringing of a healthy, well-formed baby born of a long line of crooks, murderers and thieves, and prostitutes."

it had not received before: enormous institutional support” (p. 345). Thus, during the 1940s and 1950s the prewar orphan of applied/professional psychology rapidly matured into a robust, powerful adult.

In the halls of academia, many traditional research psychologists were alarmed by the professionalization of the field. They argued that the energy and resources previously devoted to research would be diluted. Because of conflicting priorities, tensions between the research and professional arms of psychology have continued to grow. Although the American Psychological Association has worked diligently to represent both the scientific and professional branches of psychology, many researchers complained that the APA had come to be dominated by clinicians. In 1988 this rift stimulated some research psychologists to form a new organization, the American Psychological Society (APS), to serve exclusively as an advocate for the science of psychology.

Image Not Available

World War I and World War II played a major role in the growth of applied psychology, as psychologists were forced to apply their expertise to practical problems, such as ability testing and training. The top photo shows military personnel working on one of a series of tests devised to aid in the selection of air crew trainees during World War II. The bottom photo shows a booklet sold to help recruits prepare for the Army General Classification Test and other related tests. Its popularity illustrates the importance attached to the military's mental testing program.

Image Not Available

Despite the conflicts, the professionalization of psychology has continued at a steady pace. In fact, the trend has spread into additional areas of psychology. Today the broad umbrella of applied psychology covers a variety of professional specialties, including school psychology, industrial and organizational psychology, and counseling psychology. Whereas psychologists were once almost exclusively academics, the vast majority of today's psychologists devote their time to providing professional services.

Psychology Returns to Its Roots: Renewed Interest in Cognition and Physiology



While applied psychology blossomed in the 1950s, research in psychology continued to evolve. Ironically, two trends that emerged in the 1950s and 1960s represented a return to psychology's 19th century roots, when psychologists were principally interested in consciousness and physiology. Since the 1950s and 1960s, psychologists have shown a renewed interest in consciousness (now called “cognition”) and the physiological bases of behavior.

Cognition refers to the mental processes involved in acquiring knowledge. In other words, cognition involves thinking or conscious experience. For many decades, the dominance of behaviorism discouraged investigation of “unobservable” mental processes, and most psychologists showed little interest in cognition (Mandler, 2002). During the 1950s and 1960s, however, research on cognition slowly began to emerge (Miller, 2003). The research of Swiss psychologist Jean Piaget (1954) focused increased attention on the study of children's cognitive development, while the work of Noam Chomsky (1957) elicited new interest in the psychological underpinnings of language. Around the same time, Herbert Simon and his colleagues (Newell, Shaw, & Simon, 1958) began influential, groundbreaking research on problem solving that eventually led to a Nobel prize for Simon (in 1978). These advances sparked a surge of interest in cognitive processes.

Since then, cognitive theorists have argued that psychology must study internal mental events to fully understand behavior (Gardner, 1985; Neisser, 1967). Advocates of the *cognitive perspective* point out that people's manipulations of mental images surely influence how they behave. Consequently, focusing exclusively on overt behavior yields an incomplete picture of why individuals behave as they do. Equally important, psychologists investigating decision making, reasoning, and problem solving have shown that

methods *can* be devised to study cognitive processes scientifically. Although the methods are different from those used in psychology's early days, modern research on the inner workings of the mind has put the *psyche* back in psychology. In fact, many observers maintain that the cognitive perspective has become the dominant perspective in contemporary psychology—and some interesting data support this assertion, as can be seen in **Figure 1.4** (Robins, Gosling, & Craik, 1999).

The 1950s and 1960s also saw many important discoveries that highlighted the interrelations among mind, body, and behavior (Thompson & Zola, 2003). For example, Canadian psychologist James Olds (1956) demonstrated that electrical stimulation of the brain could evoke emotional responses such as pleasure and rage in animals. Other work, which eventually earned a Nobel prize for Roger Sperry (in 1981), showed that the right and left halves of the brain are specialized to handle different types of mental tasks (Gazzaniga, Bogen, & Sperry, 1965). The 1960s also brought the publication of David Hubel and Torsten Wiesel's (1962, 1963) Nobel prize-winning work on how visual signals are processed in the brain.

These and many other findings stimulated an increase in research on the biological bases of behavior. Advocates of the *biological perspective* maintain that much of human and animal behavior can be explained in terms of the bodily structures and biochemical processes that allow organisms to behave. In the 19th century the young science of psychology had a heavy physiological emphasis. Thus, the recent interest in the biological bases of behavior represents another return to psychology's heritage.

Although adherents of the cognitive and biological perspectives haven't done as much organized campaigning for their viewpoints as the proponents of the older schools of thought, these newer perspectives have become important theoretical orientations in modern psychology. They are increasingly influential regarding what psychology should study and how. The cognitive and biological perspectives are compared to other contemporary theoretical perspectives in **Table 1.1** (see page 10).

Psychology Broadens Its Horizons: Increased Interest in Cultural Diversity



Throughout psychology's history, most researchers have worked under the assumption that they were seeking to identify general principles of behavior that would be applicable to all of humanity. In real-

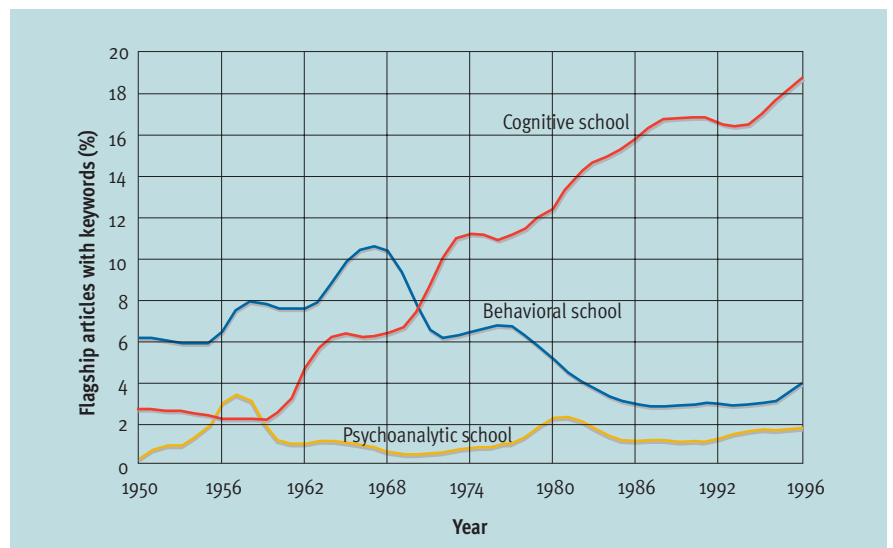


Figure 1.4

The relative prominence of three major schools of thought in psychology. To estimate the relative influence of various theoretical orientations in recent decades, Robins, Gosling, and Craik (1999) analyzed the subject matter of four prestigious general publications in psychology, measuring the percentage of articles relevant to each school of thought. Obviously, their approach is just one of many ways one might gauge the prominence of various theoretical orientations in psychology. Nonetheless, the data are thought provoking. Their findings suggest that the cognitive perspective surpassed the behavioral perspective in influence sometime around 1970. As you can see, the psychoanalytic perspective has always had a modest impact on the mainstream of psychology.

Source: Adapted from Robins, R. W., Gosling, S. D., & Craik, K. H. (1999). An empirical analysis of trends in psychology. *American Psychologist*, 54, 117–128. Copyright © 1999 by the American Psychological Association. Reprinted by permission of the author.

ity, however, psychology has largely been a Western (North American and European) enterprise with a remarkably provincial slant (Gergen et al., 1996). The vast preponderance of psychology's research has been conducted in the United States by middle- and upper-class white psychologists who have used mostly middle- and upper-class white males as subjects (Hall, 1997; Segall et al., 1990). Traditionally, Western psychologists have paid scant attention to how well their theories and research might apply to non-Western cultures, to ethnic minorities in Western societies, or even to women as opposed to men.

Why has the focus of Western psychology been so narrow? A host of factors have probably contributed (Albert, 1988; Segall, Lonner, & Berry, 1998). First, cross-cultural research is costly, difficult, and time-consuming. It has always been cheaper, easier, and more convenient for academic psychologists to study the middle-class white students enrolled in their schools. Second, some psychologists worry that cultural comparisons may inadvertently foster stereotypes of various cultural groups, many of whom already have a long history of being victimized by prejudice. Third, **ethnocentrism—the tendency to view one's own group as superior to others and as the standard for judging the worth of foreign**

Web Link 1.4



The Archives of the History of American Psychology (AHAP)
The Archives of the History of American Psychology (AHAP) at the University of Akron is a huge repository of information and materials on the history of psychology. Its website provides a well-organized overview of the archive's holdings and access to a host of photos of instruments and equipment used in psychological research.

ways—may have contributed to Western psychologists' lack of interest in other cultures.

Despite these considerations, in recent years Western psychologists have begun to recognize that their neglect of cultural variables has diminished the value of their work, and they are devoting increased attention to culture as a determinant of behavior. What brought about this shift? Some of the impetus probably came from the sociopolitical upheavals of the 1960s and 1970s (Bronstein & Quina, 1988). The civil rights movement, the women's movement, and the gay rights movement all raised doubts about whether psychology had dealt adequately with human diversity. Above all else, however, the new interest in culture appears attributable to two recent trends: (1) Advances in communication, travel, and international trade have "shrunk" the world and increased global interdependence, bringing more and more Americans and Europeans into contact with people from non-Western cultures, and (2) the ethnic makeup of the Western world has become an increasingly diverse multicultural mosaic, as the data in **Figure 1.5** show for the United States (Brislin, 2000; Hermans & Kempen, 1998; Mays et al., 1996).

These realities have prompted more and more Western psychologists to broaden their horizons and incorporate cultural factors into their theories and research (Adamopoulos & Lonner, 2001; Miller, 1999). These psychologists are striving to study previously underrepresented groups of subjects to test the generality of earlier findings and to catalog both the differences and similarities among cultural groups. They are working to increase knowledge of how culture is transmitted through socialization practices and how culture colors one's view of the world. They are seeking to learn how people cope with cultural change and to find ways to reduce misunderstandings and

conflicts in intercultural interactions. In addition, they are trying to enhance understanding of how cultural groups are affected by prejudice, discrimination, and racism. In all these efforts, they are striving to understand the unique experiences of culturally diverse people *from the point of view of those people*. These efforts to ask new questions, study new groups, and apply new perspectives promise to enrich the discipline of psychology in the 21st century (Lehman, Chiu, & Schaller, 2004; Matsumoto, 2003; Sue, 2003).

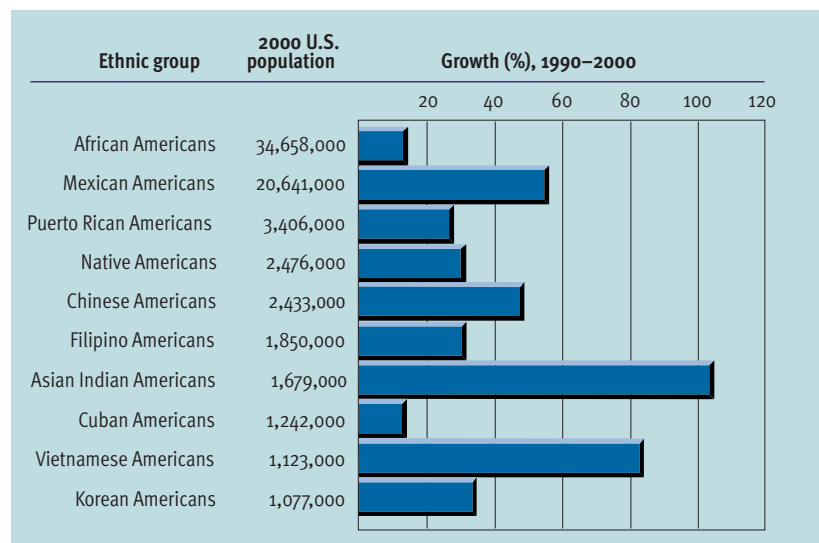
Psychology Adapts: The Emergence of Evolutionary Psychology



Another relatively recent development in psychology has been the emergence of *evolutionary psychology* as an influential theoretical perspective. Evolutionary psychologists assert that the patterns of behavior seen in a species are products of evolution in the same way that anatomical characteristics are. **Evolutionary psychology examines behavioral processes in terms of their adaptive value for members of a species over the course of many generations.** The basic premise of evolutionary psychology is that natural selection favors behaviors that enhance organisms' reproductive success—that is, passing on genes to the next generation. Thus, if a species is highly aggressive, evolutionary psychologists argue that it's because aggressiveness conveys a survival or reproductive advantage for members of that species, so genes that promote aggressiveness are more likely to be passed on to the next generation. Although evolutionary psychologists have a natural interest in animal behavior, they have not been bashful about analyzing the evolutionary bases of human behavior.

Figure 1.5

Increased cultural diversity in the United States. The 1980s and 1990s brought significant changes in the ethnic makeup of the United States. During the 1990s, the nation's Hispanic population grew by 45% and its Asian American population grew by 49%, while the white population increased by only 6%. Experts project that ethnic minorities will account for over one-third of the U.S. population within the next few decades. These realities have contributed to psychologists' increased interest in cultural factors as determinants of behavior. (Data from U.S. Bureau of the Census)



As La Cerra and Kurzban (1995) put it, “The human mind was sculpted by natural selection, and it is this evolved organ that constitutes the subject matter of psychology” (p. 63).

Looking at behavioral patterns in terms of their evolutionary significance is not an entirely new idea (Graziano, 1995). As noted earlier, William James and other functionalists were influenced by Darwin’s concept of natural selection over a century ago. Until the 1990s, however, applications of evolutionary concepts to *psychological* processes were piecemeal, halfhearted, and not particularly well received. The 1960s and 1970s brought major breakthroughs in the field of evolutionary *biology* (Hamilton, 1964; Trivers, 1971, 1972; Williams, 1966), but these advances had little immediate impact in psychology. The situation began to change in the 1980s. A growing cadre of evolutionary psychologists, led by David Buss (1985, 1988, 1989), Martin Daly and Margo Wilson (1985, 1988), and Leda Cosmides and John Tooby (Cosmides & Tooby, 1989; Tooby & Cosmides, 1989), published widely cited studies on a broad range of topics, including mating preferences, jealousy, aggression, sexual behavior, language, decision making, personality, and development. By the mid-1990s, it became clear that psychology was witnessing the birth of its first major, new theoretical perspective since the cognitive revolution in the 1950s and 1960s.

As with all prominent theoretical perspectives in psychology, evolutionary theory has its critics (Gould, 1993; Lickliter & Honeycutt, 2003; Plotkin, 2004; Rose & Rose, 2000). Among other things, they argue that many evolutionary hypotheses are untestable and that evolutionary explanations are post hoc, speculative accounts for obvious behavioral phenomena (see the Critical Thinking Application for this chapter). However, evolutionary psychologists have articulated persuasive rebuttals to these and other criticisms (Bereczkei, 2000; Buss & Reeve, 2003; Conway & Schaller, 2002), and the evolutionary perspective has become increasingly influential.

Psychology Moves in a Positive Direction



Shortly after Martin Seligman was elected president of the American Psychological Association in 1997, he experienced a profound insight that he characterized as an “epiphany.” This pivotal insight came from an unusual source—Seligman’s 5-year-old daughter, Nikki. She scolded her overachieving, task-oriented father for being “grumpy” far too much of the time. Provoked by his daughter’s criticism, Seligman suddenly realized that his approach to life *was* overly



© Michael & Patricia Fogden/Corbis

The praying mantis has an astonishing ability to blend in with its environment, along with remarkably acute hearing and vision that permit it to detect prey up to 60 feet away and powerful jaws that allow it to devour its prey. They are so deadly they will eat each other, which makes sex quite a challenge, but males have evolved a reflex module that allows them to copulate successfully while being eaten (even after decapitation)! These physical characteristics obviously represent adaptations that have been crafted by natural selection over the course of millions of generations. Evolutionary psychologists maintain that many patterns of behavior seen in various species are also adaptations that have been shaped by natural selection.

and unnecessarily negative. More important, he recognized that the same assessment could be made of the field of psychology—that, it too, was excessively and needlessly negative in its approach (Seligman, 2003). This revelation inspired Seligman to launch a new initiative within psychology that came to be known as the *positive psychology movement*.

Seligman went on to argue convincingly that the field of psychology had historically devoted too much attention to pathology, weakness, damage, and ways to heal suffering. He acknowledged that this approach had yielded valuable insights and progress, but he argued that it also resulted in an unfortunate neglect of the forces that make life worth living. Seligman convened a series of informal meetings with influential psychologists and then more formal conferences to gradually outline the philosophy and goals of positive psychology. Other major architects of the positive psychology movement have included Mihaly Csikszentmihalyi (2000), Christopher Peterson (2000), and Barbara Fredrickson (2002). Like humanism before it, positive psychology seeks to shift the field’s focus away from negative experiences. As Seligman and Csikszentmihalyi (2000) put it, “The aim of positive psychology is to begin to catalyze a change in the focus of psychology from preoccupation with only repairing the worst things in life to also building positive qualities” (p. 5). Thus, **positive psychology uses theory and research to better understand the positive, adaptive, creative, and fulfilling aspects of human existence.**

The emerging field of positive psychology has three areas of interest (Seligman, 2003). The first is the study of *positive subjective experiences*, or positive emotions, such as happiness, love, gratitude, contentment, and hope. The second focus is on *positive individual traits*—that is, personal strengths and virtues. Theorists are working to identify, classify, and analyze the origins of human strengths and virtues, such as courage, perseverance, nurturance, tolerance, creativity, integrity, and kindness. The third area of

Illustrated Overview of Psychology's History

1875

First demonstration laboratories are set up independently by William James (at Harvard) and Wilhelm Wundt (at the University of Leipzig).



1905

Alfred Binet develops first successful intelligence

Image Not Available

1908

1908	Margaret Washburn publishes <i>The Animal Mind</i> , which serves as an impetus for behaviorism.
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Image Not Available

1909

1909 Sigmund Freud's increasing influence receives formal recognition as G. S. Hall invites Freud to give lectures at Clark University.

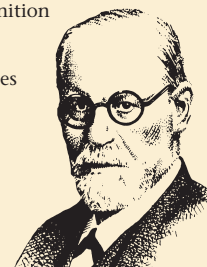



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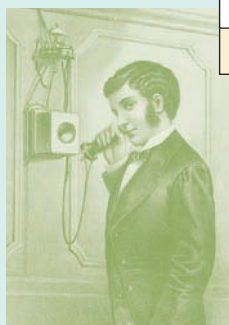
1879

1879 Wilhelm Wundt establishes first research laboratory in psychology at Leipzig, Germany.



1881

1881	Wilhelm Wundt establishes first journal devoted to research in psychology.
-------------	--



1883

1883	G. Stanley Hall establishes America's first research laboratory in psychology at Johns Hopkins University.
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1890

1890	William James publishes his seminal work, <i>The Principles of Psychology</i> .
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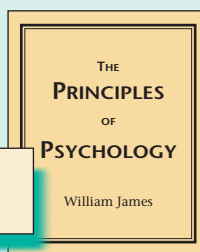


Image Not Available

1914

1914	Leta Stetter Hollingworth publishes pioneering work on the psychology of women.
-------------	---

Image Not Available

1914–1918

1914–1918	Widespread intelligence testing is begun by military during World War I.
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1916

1916	Lewis Terman publishes Stanford-Binet Intelligence Scale, which becomes the world's foremost intelligence test.
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1920S

1920s	Gestalt psychology nears its peak influence.
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1904

1904 Ivan Pavlov shows how conditioned responses are created, paving the way for stimulus-response psychology.

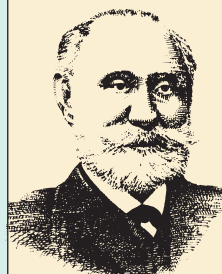


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1880

1890

1900

1910

1920

1933 Sigmund Freud's influence continues to build as he publishes *New Introductory Lectures on Psychoanalysis*.

1936	Hans Selye introduces concept of stress into the language of science.
-------------	---

1954	Abraham Maslow's <i>Motivation and Personality</i> helps fuel humanistic movement.
-------------	--

1956	The cognitive revolution is launched at watershed conference where Herbert Simon, George Miller, and Noam Chomsky report three major advances in just one day.
-------------	--

1941–1945	Rapid growth in clinical psychology begins in response to huge demand for clinical services created by World War II and its aftermath.
------------------	--

1943	Clark Hull advocates modified behaviorism, which permits careful inferences about unobservable internal states.
-------------	---

1961–1964	Roger Sperry's split-brain research
and work by David Hubel and Torsten Wiesel on how cortical cells respond to light help rejuvenate the biological perspective in psychology.	

1963	Stanley Milgram publishes controversial study of obedience to authority, which may be the most famous single study in psychology's history.
-------------	---

1947	Kenneth and Mamie Clark publish work on prejudice that is cited in landmark 1954 Supreme Court decision outlawing segregation.
-------------	--

1971	B. F. Skinner creates furor over radical behaviorism with his controversial book <i>Beyond Freedom and Dignity</i> .
-------------	--


1974	Eleanor Maccoby and Carol Jacklin publish their landmark review of research on gender differences, which galvanizes research in this area.
-------------	--

1978	Herbert Simon wins Nobel prize (in economics) for research on cognition.
-------------	--

1980s	Increased global interdependence and cultural diversity in Western societies spark surge of interest in how cultural factors mold behavior.
--------------	---

1981	Roger Sperry wins Nobel prize (in physiology and medicine) for split-brain studies.
-------------	---


1988 Research psychologists form the American Psychological Society (APS) to serve as an advocate for the science of psychology.



more
pub
Ch
Th

Carl Rogers helps launch humanistic movement with publication of *Client-Centered Therapy*.

1953 B. F. Skinner publishes his influential *Science and Human Behavior*, advocating radical behaviorism similar to Watson's.



A black and white portrait of John H. Garvey, a man with glasses, wearing a suit and tie, smiling slightly.

interest is in *positive institutions and communities*. Here the focus is on how societies can foster civil discourse, strong families, healthy work environments, and supportive neighborhood communities.

Although it has proven far less controversial than evolutionary psychology, positive psychology has its critics. For example, Richard Lazarus (2003) has argued that dividing human experience into positive and negative domains is an oversimplification and that the line between them is not as clear and obvious as most have assumed. Lazarus expresses concern that positive psychology may be little more than “one of the many fads that come and go in our field” (p. 93). Only time will tell, as positive psychology is still in its infancy. It will be fascinating to see whether and how this new movement reshapes psychology’s research priorities and theoretical interests in the years to come.

Our review of psychology’s past has shown the field’s evolution. We have seen psychology develop from philosophical speculation into a rigorous science committed to research. We have seen how a highly visible professional arm involved in mental health services emerged from this science. We have seen how psychology’s focus on physiology is rooted in its 19th-century origins. We have seen how and why psychologists began conducting research on lower animals. We have seen how psychology has evolved from the study of mind and body to the study of behavior. And we have seen how the investigation of mind and body has been welcomed back into the mainstream of modern psychology. We have seen how various theoretical schools have defined the scope and mission of psychology in different ways. We have seen how psychology’s interests have

expanded and become increasingly diverse. Above all else, we have seen that psychology is a growing, evolving intellectual enterprise.

Psychology’s history is already rich, but its story has barely begun. The century or so that has elapsed since Wilhelm Wundt put psychology on a scientific footing is only an eyeblink of time in human history. What has been discovered during those years, and what remains unknown, is the subject of the rest of this book.

➤ REVIEW OF KEY POINTS

- Stimulated by the demands of World War II, clinical psychology grew rapidly in the 1950s. Thus, psychology became a profession as well as a science. This movement toward professionalization eventually spread to other areas in psychology.
- During the 1950s and 1960s advances in the study of cognition led to renewed interest in mental processes, as psychology returned to its roots. Advocates of the cognitive perspective argue that human behavior cannot be fully understood without considering how people think.
- The 1950s and 1960s also saw advances in research on the physiological bases of behavior. Advocates of the biological perspective assert that human and animal behavior can be explained in terms of the bodily structures and biochemical processes that allow organisms to behave.
- In the 1980s, Western psychologists, who had previously been rather provincial, developed a greater interest in how cultural factors influence behavior. This trend was sparked in large part by growing global interdependence and by increased cultural diversity in Western societies.
- The 1990s witnessed the emergence of a new theoretical perspective called evolutionary psychology. The central premise of this new school of thought is that natural selection favors behaviors that enhance reproductive success. Around the beginning of the 21st century, the positive psychology movement became an influential force in psychology.

➤ Psychology Today: Vigorous and Diversified

PREVIEW QUESTIONS

- What evidence suggests that psychology is a vigorous, growing discipline?
- What are the main areas of research in psychology?
- What are the four professional specialties in psychology?
- How do clinical psychology and psychiatry differ?

We began this chapter with an informal description of what psychology is about. Now that you have a feel for how psychology has developed, you can better appreciate a definition that does justice to the field’s modern diversity: ***Psychology is the science that studies behavior and the physiological and cognitive processes that underlie it, and it is the profession that applies the accumulated knowledge of this science to practical problems.***

Contemporary psychology is a thriving science and profession. Its growth has been remarkable. One simple index of this growth is the dramatic rise in membership in the American Psychological Association.

Figure 1.6 shows that APA membership has increased ninefold since 1950. In the United States, psychology is the second most popular undergraduate major, and the field accounts for about 9% of all doctoral degrees awarded in the sciences and humanities. The comparable figure in 1945 was only 4% (Howard et al., 1986). Of course, psychology is an international enterprise. Today, over 1900 technical journals from all over the world publish research articles on psychology. Thus, by any standard of measurement—the number of people involved, the number of degrees granted, the number of journals published—psychology is a healthy, growing field.

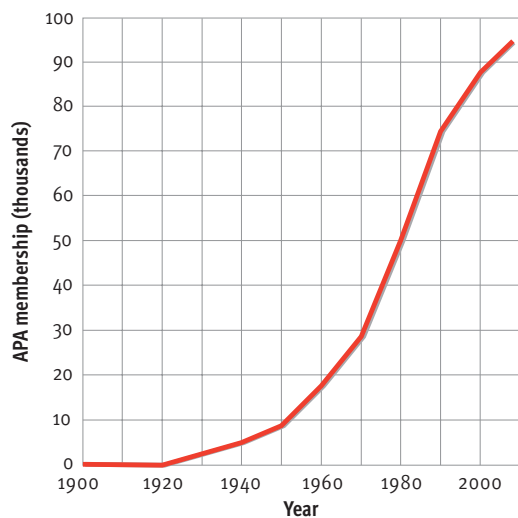


Figure 1.6
Membership in the American Psychological Association, 1900–2004. The steep rise in the number of psychologists in the APA since 1950 testifies to psychology’s remarkable growth as a science and a profession. If graduate student members are also counted, the APA has over 155,000 members. (Adapted from data published by the American Psychological Association, by permission.)

Psychology’s vigorous presence in modern society is also demonstrated by the great variety of settings in which psychologists work. Psychologists were once found almost exclusively in the halls of academia. Today, however, colleges and universities are the primary work setting for fewer than 30% of American psychologists. The remaining 70% work in hospitals, clinics, police departments, research institutes, government agencies, business and industry, schools, nursing homes, counseling centers, and private practice. **Figure 1.7** shows the distribution of psychologists employed in various categories of settings.

Clearly, contemporary psychology is a multifaceted field, a fact that is especially apparent when we consider the many areas of specialization in both the science and the profession of psychology.

Research Areas in Psychology

Although most psychologists receive broad training that provides them with knowledge about many areas of psychology, they usually specialize when it comes to doing research. Such specialization is necessary because the subject matter of psychology has become so vast over the years. Today it is virtually impossible for anyone to stay abreast of the new research in all specialties. Specialization is also necessary because specific skills and training are required to do research in some areas.

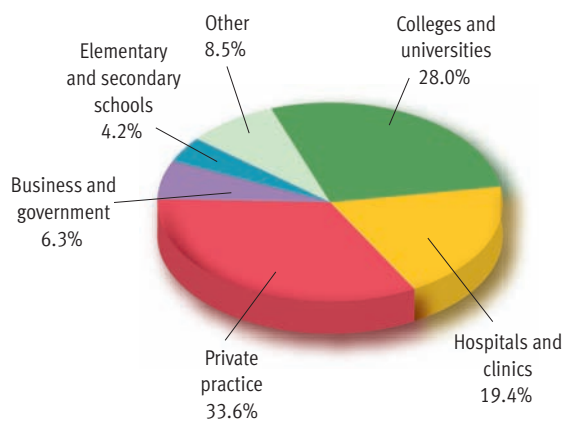


Figure 1.7
Employment of psychologists by setting. The work settings in which psychologists are employed have become very diverse. Survey data on the primary employment setting of APA members indicates that one-third are in private practice (compared to 12% in 1976) and only 28% work in colleges and universities (compared to 47% in 1976). These data may slightly underestimate the percentage of psychologists in academia, given the competition between APA and APS to represent research psychologists. (Based on 2000 APA Directory Survey)

The seven major research areas in modern psychology are (1) developmental psychology, (2) social psychology, (3) experimental psychology, (4) physiological psychology, (5) cognitive psychology, (6) personality, and (7) psychometrics. **Figure 1.8** on the next page describes these areas briefly and shows the percentage of research psychologists in the APA who identify each area as their primary interest. As you can see, social psychology and developmental psychology have become especially active areas of research.

Professional Specialties in Psychology

Applied psychology consists of four clearly identified areas of specialization: (1) clinical psychology, (2) counseling psychology, (3) educational and school psychology, and (4) industrial and organizational psychology. Descriptions of these specialties can be found in **Figure 1.9** on the next page, along with the percentage of professional psychologists in the APA who are working in each area. As the graphic indicates, clinical psychology is the most prominent and widely practiced professional specialty in the field.

The data in **Figure 1.8** and **Figure 1.9** are based on APA members’ reports of their single, principal area of specialization. However, many psychologists work on both research and application. Some academic psychologists work as consultants, therapists, and counselors on a part-time basis. Similarly, some

Web Link 1.5



American Psychological Association (APA)
The APA website is a treasure trove of resources on psychology in all its rich diversity. The section for the public includes electronic pamphlets on practical topics such as depression, aging, and anger. A wealth of information on career possibilities in the field is also available here.

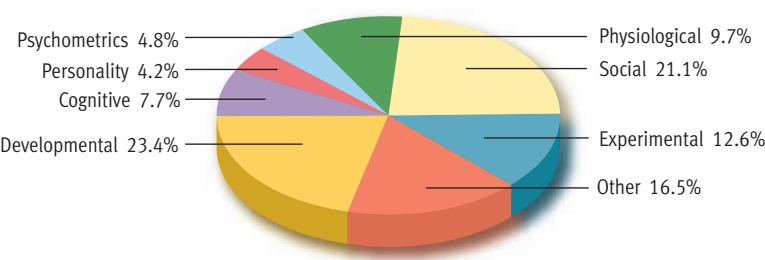
Web Link 1.6



Marky Lloyd’s Career Page
For those who think they might want to find a job or career in psychology or a related field, Marky Lloyd of Georgia Southern University has put together a fine set of resources to help in both planning and making choices.

Figure 1.8

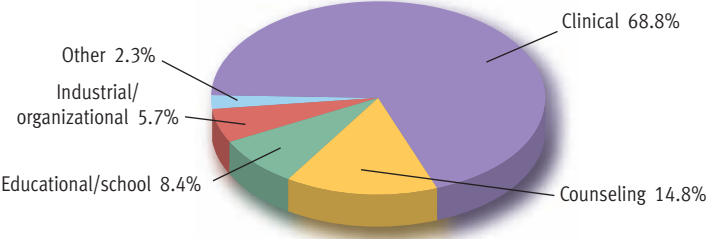
Major research areas in contemporary psychology. Most research psychologists specialize in one of the seven broad areas described here. The figures in the pie chart reflect the percentage of academic and research psychologists belonging to APA who identify each area as their primary interest. (Based on 2000 APA Directory Survey)



Area	Focus of research
Developmental psychology	Looks at human development across the life span. Developmental psychology once focused primarily on child development, but today devotes a great deal of research to adolescence, adulthood, and old age.
Social psychology	Focuses on interpersonal behavior and the role of social forces in governing behavior. Typical topics include attitude formation, attitude change, prejudice, conformity, attraction, aggression, intimate relationships, and behavior in groups.
Experimental psychology	Encompasses the traditional core of topics that psychology focused on heavily in its first half-century as a science: sensation, perception, learning, conditioning, motivation, and emotion. The name experimental psychology is somewhat misleading, as this is not the only area in which experiments are done. Psychologists working in all the areas listed here conduct experiments.
Physiological psychology	Examines the influence of genetic factors on behavior and the role of the brain, nervous system, endocrine system, and bodily chemicals in the regulation of behavior.
Cognitive psychology	Focuses on “higher” mental processes, such as memory, reasoning, information processing, language, problem solving, decision making, and creativity.
Personality	Is interested in describing and understanding individuals’ consistency in behavior, which represents their personality. This area of interest is also concerned with the factors that shape personality and with personality assessment.
Psychometrics	Is concerned with the measurement of behavior and capacities, usually through the development of psychological tests. Psychometrics is involved with the design of tests to assess personality, intelligence, and a wide range of abilities. It is also concerned with the development of new techniques for statistical analysis.

Figure 1.9

Principal professional specialties in contemporary psychology. Most psychologists who deliver professional services to the public specialize in one of the four areas described here. The figures in the pie chart reflect the percentage of APA members delivering professional services who identify each area as their chief specialty. (Based on 2000 APA Directory Survey)



Specialty	Focus of professional practice
Clinical psychology	Clinical psychologists are concerned with the evaluation, diagnosis, and treatment of individuals with psychological disorders, as well as treatment of less severe behavioral and emotional problems. Principal activities include interviewing clients, psychological testing, and providing group or individual psychotherapy.
Counseling psychology	Counseling psychology overlaps with clinical psychology in that specialists in both areas engage in similar activities—interviewing, testing, and providing therapy. However, counseling psychologists usually work with a somewhat different clientele, providing assistance to people struggling with everyday problems of moderate severity. Thus, they often specialize in family, marital, or career counseling.
Educational and school psychology	Educational psychologists work to improve curriculum design, achievement testing, teacher training, and other aspects of the educational process. School psychologists usually work in elementary or secondary schools, where they test and counsel children having difficulties in school and aid parents and teachers in solving school-related problems.
Industrial and organizational psychology	Psychologists in this area perform a wide variety of tasks in the world of business and industry. These tasks include running human resources departments, working to improve staff morale and attitudes, striving to increase job satisfaction and productivity, examining organizational structures and procedures, and making recommendations for improvements.

applied psychologists conduct basic research on issues related to their specialty. For example, many clinical psychologists are involved in research on the nature and causes of abnormal behavior.

Some people are confused about the difference between clinical psychology and psychiatry. The confusion is understandable, as both clinical psychologists and psychiatrists are involved in analyzing and treating psychological disorders. Although some overlap exists between the two professions, the training and educational requirements for the two are quite different. Clinical psychologists go to graduate school to earn one of several doctoral degrees (Ph.D., Ed.D., or Psy.D.) in order to enjoy full status in their profession. Psychiatrists go to medical school for their postgraduate education, where they receive general training in medicine and earn an M.D. degree. They then specialize by completing residency training in psychiatry at a hospital. Clinical psychologists and psychiatrists also differ in the way they tend to approach the treatment of mental disorders, as we will see in Chapter 15. To summarize, **psychiatry is a branch of medicine concerned with the diagnosis**

and treatment of psychological problems and disorders. In contrast, clinical psychology takes a non-medical approach to such problems.

➤ REVIEW OF KEY POINTS

- Contemporary psychology is a diversified science and profession that has grown rapidly in recent decades. The main work settings for contemporary psychologists are (1) private practice, (2) colleges and universities, and (3) hospitals and clinics.
- Major areas of research in modern psychology include developmental psychology, social psychology, experimental psychology, physiological psychology, cognitive psychology, personality, and psychometrics.
- Applied psychology encompasses four professional specialties: clinical psychology, counseling psychology, educational and school psychology, and industrial and organizational psychology.
- Although clinical psychology and psychiatry share some of the same interests, they are different professions with different types of training. Psychiatrists are physicians who specialize in the diagnosis and treatment of mental disorders, whereas clinical psychologists take a nonmedical approach to psychological problems.

Web Link 1.7



A Student's Guide to Careers in the Helping Professions

Written by Melissa J. Hime-line of the University of North Carolina at Asheville, this online guide provides detailed career information for 15 of the most important helping professions that psychology majors often consider entering.

➤ Seven Unifying Themes

The enormous breadth and diversity of psychology make it a challenging subject for the beginning student. In the pages ahead you will be introduced to many areas of research and a multitude of ideas, concepts, and principles. Fortunately, ideas are not all created equal. Some are far more important than others. In this section, I will highlight seven fundamental themes that will reappear in a number of variations as we move from one area of psychology to another in this text. You have already met some of these key ideas in our review of psychology's past and present. Now we will isolate them and highlight their significance. In the remainder of the book these ideas serve as organizing themes to provide threads of continuity across chapters and to help you see the connections among the various areas of research in psychology.

In studying psychology, you are learning about both behavior and the scientific discipline that investigates it. Accordingly, our seven themes come in two sets. The first set consists of statements highlighting crucial aspects of psychology as a way of thinking and as a field of study. The second set consists of broad generalizations about psychology's subject matter: behavior and the cognitive and physiological processes that underlie it.

Themes Related to Psychology as a Field of Study

Looking at psychology as a field of study, we see three crucial ideas: (1) psychology is empirical, (2) psychology is theoretically diverse, and (3) psychology evolves in a sociohistorical context. Let's look at each of these ideas in more detail.

Theme 1: Psychology Is Empirical



Everyone tries to understand behavior. Most of us have our own personal answers to questions such as why some people are hard workers, why some are overweight, and why others stay in demeaning relationships. If all of us are amateur psychologists, what makes scientific psychology different? The critical difference is that psychology is *empirical*. This aspect of psychology is fundamental, and virtually every page of this book reflects it.

What do we mean by empirical? **Empiricism is the premise that knowledge should be acquired through observation.** This premise is crucial to the scientific method that psychology embraced in the late 19th century. To say that psychology is empirical means that its conclusions are based on direct ob-

PREVIEW QUESTIONS

- What is the purpose of the text's unifying themes?
- What are the first three themes that elucidate the nature of psychology?
- What are the remaining four themes that emphasize crucial insights about behavior?



Encyclopedia of Psychology

This “encyclopedia,” developed by psychology faculty at Jacksonville State University, is actually a collection of over 2000 links to webpages around the world on psychological matters. The links related to the history of the field and careers in psychology are extensive, as are the links relating to theories and publications in psychology.

servation rather than on reasoning, speculation, traditional beliefs, or common sense. Psychologists are not content with having ideas that sound plausible. They conduct research to *test* their ideas. Is intelligence higher, on average, in some social classes than in others? Are men more aggressive than women? Psychologists find a way to make direct, objective, and precise observations to answer such questions.

The empirical approach requires a certain attitude—a healthy brand of *skepticism*. Empiricism is a tough taskmaster. It demands data and documentation. Psychologists’ commitment to empiricism means that they must learn to think critically about generalizations concerning behavior. If someone asserts that people tend to get depressed around Christmas, a psychologist is likely to ask, “How many people get depressed? In what population? In comparison to what baseline rate of depression? How is depression defined?” Their skeptical attitude means that psychologists are trained to ask, “Where’s the evidence? How do you know?” If psychology’s empirical orientation rubs off on you (and I hope it does), you will be asking similar questions by the time you finish this book.

Theme 2: Psychology Is Theoretically Diverse



Although psychology is based on observation, a string of unrelated observations would not be terribly enlightening. Psychologists do not set out to just collect isolated facts; they seek to explain and understand what they observe. To achieve these goals they must construct theories. **A theory is a system of inter-related ideas used to explain a set of observations.** In other words, a theory links apparently unrelated observations and tries to explain them. As an example, consider Sigmund Freud’s observations about slips of the tongue, dreams, and psychological disturbances. On the surface, these observations appear unrelated. By devising the concept of the *unconscious*, Freud created a theory that links and explains these seemingly unrelated aspects of behavior.

Our review of psychology’s past should have made one thing abundantly clear: Psychology is marked by theoretical diversity. Why do we have so many competing points of view? One reason is that no single theory can adequately explain everything that is known about behavior. Sometimes different theories focus on different aspects of behavior—that is, different collections of observations. Sometimes there is simply more than one way to look at something. Is the glass half empty or half full? Obviously, it is both. To take an example from another science, physicists wrestled for years with the nature of light. Is it a wave, or is it a particle? In the end, scientists found it useful to think of light sometimes as a wave and some-

times as a particle. Similarly, if a business executive lashes out at her employees with stinging criticism, is she releasing pent-up aggressive urges (a psychoanalytic view)? Is she making a habitual response to the stimulus of incompetent work (a behavioral view)? Or is she scheming to motivate her employees by using “mind games” (a cognitive view)? In some cases, all three of these explanations might have some validity. In short, it is an oversimplification to expect that one view has to be right while all others are wrong. Life is rarely that simple.

Students are often troubled by psychology’s many conflicting theories, which they view as a weakness. However, contemporary psychologists increasingly recognize that theoretical diversity is a strength rather than a weakness (Hilgard, 1987). As we proceed through this text, you will see how differing theoretical perspectives often provide a more complete understanding of behavior than could be achieved by any one perspective alone.

Theme 3: Psychology Evolves in a Sociohistorical Context



Science is often seen as an “ivory tower” undertaking, isolated from the ebb and flow of everyday life. In reality, however, psychology and other sciences do not exist in a cultural vacuum. Dense interconnections exist between what happens in psychology and what happens in society at large (Altman, 1990; Braginsky, 1985; Danziger, 1990). Trends, issues, and values in society influence psychology’s evolution. Similarly, progress in psychology affects trends, issues, and values in society. To put it briefly, psychology develops in a *sociohistorical* (social and historical) context.

Our review of psychology’s past is filled with examples of how social trends have left their imprint on psychology. In the late 19th century, psychology’s rapid growth as a laboratory science was due, in part, to its fascination with physics as the model discipline. Thus, the spirit of the times fostered a scientific approach rather than a philosophical approach to the investigation of the mind. Similarly, Freud’s groundbreaking ideas emerged out of a specific sociohistorical context. Cultural values in Freud’s era encouraged the suppression of sexuality. Hence, people tended to feel guilty about their sexual urges to a much greater extent than is common today. This situation clearly contributed to Freud’s emphasis on unconscious sexual conflicts. As another example, consider the impact of World War II on the development of psychology as a profession. The rapid growth of professional psychology was largely due to the war-related surge in the demand for clinical services. Hence, World War II reshaped the landscape of psy-

chology in a remarkably short time. Finally, in recent years we have seen how growing global interdependence and increased cultural diversity have prompted psychologists to focus new attention on cultural factors as determinants of behavior.

If we reverse our viewpoint, we can see that psychology has in turn left its mark on society. Consider, for instance, the pervasive role of mental testing in modern society. Your own career success may depend in part on how well you weave your way through a complex maze of intelligence and achievement tests made possible (to the regret of some) by research in psychology. As another example of psychology's impact on society, consider the influence that various theorists have had on parenting styles. Trends in childrearing practices have been shaped by the ideas of John B. Watson, Sigmund Freud, B. F. Skinner, and Carl Rogers—not to mention a host of additional psychologists yet to be discussed. In short, society and psychology influence each other in complex ways. In the chapters to come, we will frequently have occasion to notice this dynamic relationship.

Themes Related to Psychology's Subject Matter

Looking at psychology's subject matter, we see four additional crucial ideas: (4) behavior is determined by multiple causes, (5) behavior is shaped by cultural heritage, (6) heredity and environment jointly influence behavior, and (7) people's experience of the world is highly subjective.

Theme 4: Behavior Is Determined by Multiple Causes



As psychology has matured, it has provided more and more information about the forces that govern behavior. This growing knowledge has led to a deeper appreciation of a simple but important fact: Behavior is exceedingly complex and most aspects of behavior are determined by multiple causes.

Although the complexity of behavior may seem self-evident, people usually think in terms of single causes. Thus, they offer explanations such as "Andrea flunked out of school because she is lazy." Or they assert that "teenage pregnancies are increasing because of all the sex in the media." Single-cause explanations are sometimes accurate as far as they go, but they usually are incomplete. In general, psychologists find that behavior is governed by a complex network of interacting factors, an idea referred to as the *multifactorial causation of behavior*.

As a simple illustration, consider the multiple factors that might influence your performance in your

introductory psychology course. Relevant personal factors might include your overall intelligence, your reading ability, your memory skills, your motivation, and your study skills. In addition, your grade could be affected by numerous situational factors, including whether you like your psychology professor, whether you like your assigned text, whether the class meets at a good time for you, whether your work schedule is light or heavy, and whether you're having any personal problems.

As you proceed through this book, you will learn that complexity of causation is the rule rather than the exception. If we expect to understand behavior, we usually have to take into account multiple determinants.

Theme 5: Behavior Is Shaped by Cultural Heritage



Among the multiple determinants of human behavior, cultural factors are particularly prominent. Just as psychology evolves in a sociohistorical context, so, too, do individuals. People's cultural backgrounds exert considerable influence over their behavior. What is *culture*? It's the human-made part of the environment. More specifically, ***culture refers to the widely shared customs, beliefs, values, norms, institutions, and other products of a community that are transmitted socially across generations.*** Culture is a broad construct, encompassing everything from a society's legal system to its assumptions about family roles, from its dietary habits to its political ideals, from its technology to its attitudes about time, from its modes of dress to its spiritual beliefs, and from its art and music to its unspoken rules about sexual liaisons. We tend to think of culture as belonging to entire societies or broad ethnic groups within societies—which it does—but the concept can also be applied to small groups (a tiny Aboriginal tribe in Australia, for example) and to nonethnic groups (gay/homosexual culture, for instance).



© Steve Raymer/Corbis

Cultural background has an enormous influence on people's behavior, shaping everything from modes of dress to sexual values and norms. Increased global interdependence brings more and more people into contact with cultures other than their own. This increased exposure to diverse cultures only serves to underscore the importance of cultural factors.

Much of a person's cultural heritage is invisible (Brislin, 2000). Assumptions, ideals, attitudes, beliefs, and unspoken rules exist in people's minds and may not be readily apparent to outsiders. Moreover, because a cultural background is widely shared, members feel little need to discuss it with others and often take it for granted. For example, you probably don't spend much time thinking about the importance of living in rectangular rooms, trying to minimize body odor, limiting yourself to one spouse at a time, or using credit cards to obtain material goods and services.

Although we generally fail to appreciate its influence, our cultural heritage has a pervasive impact on our thoughts, feelings, and behavior. For example, in North America, when people are invited to dinner in someone's home, they generally show their appreciation of their host's cooking efforts by eating all of the food they are served. In India, this behavior would be insulting to the host, as guests are expected to leave some food on their plates. The leftover food acknowledges the generosity of the host, implying that he or she provided so much food the guest could not eat it all (Moghaddam, Taylor, & Wright, 1993). Cultures also vary in their emphasis on punctuality. In North America, we expect people to show up for meetings on time; if someone is more than 10 to 15 minutes late we begin to get upset. We generally strive to be on time, and many of us are quite proud of our precise and dependable punctuality. However, in many Asian and Latin American countries, social obligations that arise at the last minute are given just as much priority as scheduled commitments. Hence, people often show up for important meetings an hour or two late with little remorse, and they may be quite puzzled by the consternation of their Western visitors (Brislin, 2000). These examples may seem trivial, but as you will see in upcoming chapters, culture can also influence crucial matters, such as educational success, mental health, and vulnerability to physical illnesses.

Although the influence of culture is everywhere, generalizations about cultural groups must always be tempered by the realization that great diversity also exists within any society or ethnic group. Researchers may be able to pinpoint genuinely useful insights about Ethiopian, Korean American, or Ukrainian culture, for example, but it would be foolish to assume that all Ethiopians, Korean Americans, or Ukrainians exhibit identical behavior. It is also important to realize that both differences and similarities in behavior occur across cultures. As we will see repeatedly, psychological processes are characterized by both cultural variance and invariance. Caveats aside, if we

hope to achieve a sound understanding of human behavior, we need to consider cultural determinants.

Theme 6: Heredity and Environment Jointly Influence Behavior



Are individuals who they are—athletic or artistic, quick-tempered or calm, shy or outgoing, energetic or laid back—because of their genetic inheritance or because of their upbringing? This question about the importance of nature versus nurture, or heredity versus environment, has been asked in one form or another since ancient times. Historically, the nature-versus-nurture question was framed as an all-or-none proposition. In other words, theorists argued that personal traits and abilities are governed either entirely by heredity or entirely by environment. John B. Watson, for instance, asserted that personality and ability depend almost exclusively on an individual's environment. In contrast, Sir Francis Galton, a pioneer in mental testing (see Chapter 9), maintained that personality and ability depend almost entirely on genetic inheritance.

Today, most psychologists agree that heredity and environment are both important. A century of research has shown that genetics and experience jointly influence an individual's intelligence, temperament, personality, and susceptibility to many psychological disorders (Grigerenko & Sternberg, 2003; Plomin, 2004). If we ask whether individuals are born or made, psychology's answer is "Both." This does not mean that nature versus nurture is a dead issue. Lively debate about the *relative influence* of genetics and experience continues unabated. Furthermore, psychologists are actively seeking to understand the complex ways in which genetic inheritance and experience interact to mold behavior.

Theme 7: People's Experience of the World is Highly Subjective



Even elementary perception—for example, of sights and sounds—is not a passive process. People actively process incoming stimulation, selectively focusing on some aspects of that stimulation while ignoring others. Moreover, they impose organization on the stimuli that they pay attention to. These tendencies combine to make perception personalized and subjective.

The subjectivity of perception was demonstrated nicely in a classic study by Hastorf and Cantril (1954). They showed students at Princeton and Dartmouth universities a film of a recent football game between the two schools. The students were told to watch for rules infractions. Both groups saw the same film, but

the Princeton students “saw” the Dartmouth players engage in twice as many infractions as the Dartmouth students “saw.” The investigators concluded that the game “actually was many different games and that each version of the events that transpired was just as ‘real’ to a particular person as other versions were to other people” (Hastorf & Cantril, 1954). In this study, the subjects’ perceptions were swayed by their motives. It shows how people sometimes see what they *want* to see.

Other studies reveal that people also tend to see what they *expect* to see. For example, Harold Kelley (1950) showed how perceptions of people are influenced by their reputation. Kelley told students that their class would be taken over by a new lecturer, whom they would be asked to evaluate later. Before the class, the students were given a short description of the incoming instructor, with one important variation. Half the students were led to expect a “warm” person, while the other half were led to expect a “cold” one (see **Figure 1.10**). All the subjects were exposed to the same 20 minutes of lecture and interaction with the new instructor. However, the group of subjects who *expected* a warm person rated the instruc-

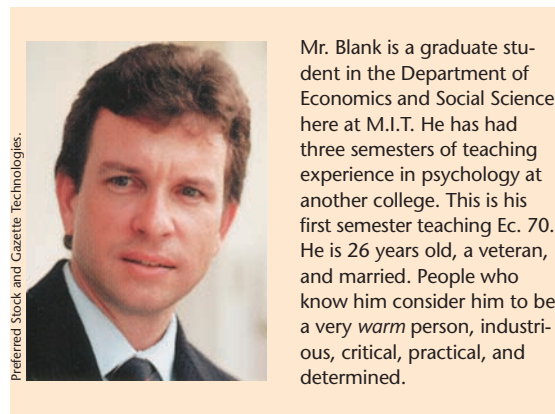


Figure 1.10
Manipulating person perception. Read the accompanying description of Mr. Blank carefully. If you were about to hear him give a lecture, would this description bias your perceptions of him? You probably think not, but when Kelley (1950) altered one adjective in this description (replacing the word *warm* with *cold*), the change had a dramatic impact on subjects’ ratings of the guest lecturer.

Source: Description from Kelley, H. H. (1950). The warm-cold variable in first impressions of persons. *Journal of Personality*, 8, 431–439. Copyright © 1950 by the Ecological Society of America. Reprinted by permission.

tor as more considerate, sociable, humorous, good natured, informal, and humane than the subjects in the group who had expected a cold person.

Thus, it is clear that motives and expectations color people’s experiences. To some extent, individuals see what they want to see or what they expect to see. This subjective bias in perception turns out to explain a variety of behavioral tendencies that would otherwise be perplexing (Pronin, Lin, & Ross, 2002; Pronin, Gilovich, & Ross, 2004).

concept check 1.3

Understanding the Seven Key Themes

Check your understanding of the seven key themes introduced in the chapter by matching the vignettes with the themes they exemplify. You’ll find the answers in Appendix A.

Themes

1. Psychology is empirical.
2. Psychology is theoretically diverse.
3. Psychology evolves in a sociohistorical context.
4. Behavior is determined by multiple causes.
5. Behavior is shaped by cultural heritage.
6. Heredity and environment jointly influence behavior.
7. People’s experience of the world is highly subjective.

Vignettes

- _____ a. Several or more theoretical models of emotion have contributed to our overall understanding of the dynamics of emotion.
- _____ b. According to the stress-vulnerability model, some people are at greater risk for developing certain psychological disorders for genetic reasons. Whether these people actually develop the disorders depends on how much stress they experience in their work, families, or other areas of their lives.
- _____ c. Physical health and illness seem to be influenced by a complex constellation of psychological, biological, and social system variables.
- _____ d. One of the difficulties in investigating the effects of drugs on consciousness is that individuals tend to have different experiences with a given drug because of their different expectations.

Human subjectivity is precisely what the scientific method is designed to counteract. In using the scientific approach, psychologists strive to make their observations as objective as possible. In some respects, overcoming subjectivity is what science is all about. Left to their own subjective experience, people might still believe that the earth is flat and that the sun revolves around it. Thus, psychologists are committed to the scientific approach because they believe it is the most reliable route to accurate knowledge.

Now that you have been introduced to the text's organizing themes, let's turn to an example of how psychological research can be applied to the challenges of everyday life. In our first Personal Application, we'll focus on a subject that should be highly relevant to you: how to be a successful student. In the Critical Thinking Application that follows it, we discuss the nature and importance of critical thinking skills.

➤ REVIEW OF KEY POINTS

- As we examine psychology in all its many variations, we will emphasize seven key ideas as unifying themes. First, psychology is empirical because psychologists base their conclusions on observation through research rather than reasoning or common sense.
- Psychology is theoretically diverse, as there are many competing schools of thought in the field. This diversity has fueled progress and is a strength rather than a weakness. Psychology also evolves in a sociohistorical context, as trends, issues, and values in society influence what goes on in psychology, and vice versa.
- Behavior is determined by multiple causes, as most aspects of behavior are influenced by complex networks of interacting factors. Although cultural heritage is often taken for granted, it has a pervasive impact on people's thoughts, feelings, and behavior.
- Lively debate about the relative importance of nature versus nurture continues, but it is clear that heredity and environment jointly influence behavior. People's experience of the world is highly subjective, as they sometimes see what they want to see or what they expect to see.

PERSONAL *Application*

Improving Academic Performance

Answer the following "true" or "false."

- ___ 1 It's a good idea to study in as many different locations (your bedroom or kitchen, the library, lounges around school, and so forth) as possible.
- ___ 2 If you have a professor who delivers chaotic, hard-to-follow lectures, there is little point in attending class.
- ___ 3 Cramming the night before an exam is an effective method of study.
- ___ 4 In taking lecture notes, you should try to be a "human tape recorder" (that is, write down everything your professor says).
- ___ 5 You should never change your answers to multiple-choice questions, because your first hunch is your best hunch.

All of the above statements are false. If you answered them all correctly, you may have already acquired the kinds of skills and habits that facilitate academic success. If so, however, you are not typical. Today, many students enter college with poor study skills

and habits—and it's not entirely their fault. The American educational system generally provides minimal instruction on good study techniques. In this first Application, we will try to remedy this situation to some extent by reviewing some insights that psychology offers on how to improve academic performance. We will discuss how to promote better study habits, how to enhance reading efforts, how to get more out of lectures, and how to improve test-taking strategies. You may also want to jump ahead and read the Personal Application for Chapter 7, which focuses on how to improve everyday memory.

Developing Sound Study Habits

Effective study is crucial to success in college. Although you may run into a few classmates who boast about getting good grades without studying, you can be sure that if they perform well on exams, they *do* study.

Students who claim otherwise simply want to be viewed as extremely bright rather than as studious.

Learning can be immensely gratifying, but studying usually involves hard work. The first step toward effective study habits is to face up to this reality. You don't have to feel guilty if you don't look forward to studying. Most students don't. Once you accept the premise that studying doesn't come naturally, it should be apparent that you need to set up an organized program to promote adequate study. According to Siebert (1995), such a program should include the following considerations:

1. *Set up a schedule for studying.* If you wait until the urge to study strikes you, you may still be waiting when the exam rolls around. Thus, it is important to allocate definite times to studying. Review your various time obligations (work, chores, and so on) and figure out in advance when you can study. When allotting certain times to studying, keep in mind that you need to be wide awake and alert. Be realistic about

how long you can study at one time before you wear down from fatigue. Allow time for study breaks—they can revive sagging concentration.

It's important to write down your study schedule. A written schedule serves as a reminder and increases your commitment to following it. You should begin by setting up a general schedule for the quarter or semester, like the one in **Figure 1.11**. Then, at the beginning of each week, plan the specific assignments that you intend to work on during each study session. This approach to scheduling should help you avoid cramming for exams at the last minute. Cramming is an ineffective study strategy for most students (Underwood, 1961; Zechmeister & Nyberg, 1982). It will strain your memorization capabilities, can tax your energy level, and may stoke the fires of test anxiety.

In planning your weekly schedule, try to avoid the tendency to put off working on major tasks such as term papers and reports. Time-management experts such as Alan Lakein (1996) point out that many people tend to tackle simple, routine tasks first, saving larger tasks for later when they supposedly will have more time. This common tendency leads many individuals to repeatedly delay working on major assignments until it's too late to do a good job. A good way to



Some locations are far more conducive to successful studying than others.

avoid this trap is to break major assignments down into smaller component tasks that can be scheduled individually.

Research on the differences between successful and unsuccessful college students suggests that successful students monitor and regulate their use of time more effectively (Allgood et al., 2000). You can assess other aspects of your time-management prac-

tices by responding to the questionnaire in **Figure 1.12** on the next page.

2. *Find a place to study where you can concentrate.* Where you study is also important. The key is to find a place where distractions are likely to be minimal. Most people cannot study effectively while the TV or stereo is on or while other people are talking. Don't depend on willpower to carry you through such distractions. It's much easier to plan ahead and avoid the distractions altogether. In fact, you would be wise to set up one or two specific places to use solely for study (Hettich, 1998).

3. *Reward your studying.* One reason that it is so difficult to be motivated to study regularly is that the payoffs often lie in the distant future. The ultimate reward, a degree, may be years away. Even short-term rewards, such as an A in the course, may be weeks or months away. To combat this problem, it helps to give yourself immediate, tangible rewards for studying, such as a snack, TV show, or phone call to a friend. Thus, you should set realistic study goals for yourself, then reward yourself when you meet them. The systematic manipulation of rewards involves harnessing the principles of *behavior modification* described by B. F. Skinner and other behavioral psychologists. These principles are covered in the Chapter 6 Personal Application.

Figure 1.11

One student's general activity schedule for a semester. Each week the student fills in the specific assignments to work on during each study period.

Weekly Activity Schedule							
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8 A.M.						Work	
9 A.M.	History	Study	History	Study	History	Work	
10 A.M.	Psychology	French	Psychology	French	Psychology	Work	
11 A.M.	Study	French	Study	French	Study	Work	
NOON	Math	Study	Math	Study	Math	Work	Study
1 P.M.							Study
2 P.M.	Study	English	Study	English	Study		Study
3 P.M.	Study	English	Study	English	Study		Study
4 P.M.							
5 P.M.							
6 P.M.	Work	Study	Study	Work			Study
7 P.M.	Work	Study	Study	Work			Study
8 P.M.	Work	Study	Study	Work			Study
9 P.M.	Work	Study	Study	Work			Study
10 P.M.	Work			Work			

Figure 1.12

Assessing your time management. This brief questionnaire (from LeBoeuf, 1980) is designed to evaluate the quality of one’s time management. It should allow you to get a rough handle on how well you manage your time.

How Well Do You Manage Your Time?

Listed below are ten statements that reflect generally accepted principles of good time management. Answer these items by circling the response most characteristic of how you perform. Please be honest. No one will know your answers except you.

1

Each day I set aside a small amount of time for planning and thinking about my responsibilities.

0. Almost never 1. Sometimes 2. Often 3. Almost always

2

I set specific, written goals and put deadlines on them.

0. Almost never 1. Sometimes 2. Often 3. Almost always

3

I make a daily “to do” list, arrange items in order of importance, and try to get the important items done as soon as possible.

0. Almost never 1. Sometimes 2. Often 3. Almost always

4

I am aware of the 80/20 rule and use it. (The 80/20 rule states that 80% of your effectiveness will generally come from achieving only 20% of your goals.)

0. Almost never 1. Sometimes 2. Often 3. Almost always

5

I keep a loose schedule to allow for crises and the unexpected.

0. Almost never 1. Sometimes 2. Often 3. Almost always

6

I delegate everything I can to others.

0. Almost never 1. Sometimes 2. Often 3. Almost always

7

I try to handle each piece of paper only once.

0. Almost never 1. Sometimes 2. Often 3. Almost always

8

I eat a light lunch so I don’t get sleepy in the afternoon.

0. Almost never 1. Sometimes 2. Often 3. Almost always

9

I make an active effort to keep common interruptions (visitors, meetings, telephone calls) from continually disrupting my work day.

0. Almost never 1. Sometimes 2. Often 3. Almost always

10

I am able to say no to others’ requests for my time that would prevent my completing important tasks.

0. Almost never 1. Sometimes 2. Often 3. Almost always

To get your score, give yourself

If you scored

3 points for each “almost always”

2 points for each “often”

1 point for each “sometimes”

0 points for each “almost never”

0–15

16–20

21–25

26–30

Better give some thought to managing your time.

You’re doing OK, but there’s room for improvement.

Very good.

You cheated!

Add up your points to get your total score.

Source: LeBoeuf, M. (1980, February). Managing time means managing yourself. *Business Horizons Magazine*, 23 (1), p. 45, Table 3. Copyright © 1980 by the Board of Trustees of Indiana University, Kelley School of Business. Reprinted by permission.

Improving Your Reading

Much of your study time is spent reading and absorbing information. *These efforts must be active.* Many students deceive themselves into thinking that they are studying by running a marker through a few sentences here and there in their text. If they do so without thoughtful selectivity, they are simply turning a textbook into a coloring book. Research suggests that highlighting selected textbook material *is* a useful strategy—if students are reasonably effective

in identifying the main ideas in the material and if they subsequently review the main ideas they have highlighted (Caverly, Orlando, & Mullen, 2000). You can use a number of methods to actively attack your reading assignments. One of the more widely taught strategies is Robinson’s (1970) SQ3R method. **SQ3R is a study system designed to promote effective reading, which includes five steps: survey, question, read, recite, and review.** Its name is an acronym for the five steps in the procedure:

Step 1: Survey. Before you plunge into the reading itself, glance over the topic headings in the chapter. If you know where the chapter is going, you can better appreciate and organize the information you are about to read.

Step 2: Question. Once you have an overview of your reading assignment, you should proceed through it one section at a time. Take a look at the heading of the first section and convert it into a question. Doing so is usually quite simple. If the heading is “Prenatal Risk Factors,” your question should be “What are sources of risk during prenatal development?” If the heading is “Stereotyping,” your question should be “What is stereotyping?” Asking these questions gets you actively involved in your reading and helps you identify the main ideas.

Step 3: Read. Only now, in the third step, are you ready to sink your teeth into the reading. Read only the specific section that you have decided to tackle. Read it with an eye toward answering the question you have just formulated. If necessary, reread the section until you can answer that question. Decide whether the segment addresses any other important questions and answer them as well.

Step 4: Recite. Now that you can answer the key question for the section, recite the answer out loud to yourself in your own words. Don’t move on to the next section until you understand the main ideas of the current section. You may want to write down these ideas for review later. When you have fully digested the first section, you may go on to the next. Repeat steps 2 through 4 with the next section. Once you have mastered the crucial points there, you can go on again.

Step 5: Review. When you have read the entire chapter, refresh your memory by going back over the key points. Repeat your questions and try to answer them without consulting your book or notes. This review should fortify your retention of the main ideas. It should also help you see how the main ideas are related.

The SQ3R method should probably be applied to many texts on a paragraph-by-

28

CHAPTER 1

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paragraph basis. Obviously, doing so will require you to formulate some questions without the benefit of topic headings. If you don't have enough headings, you can simply reverse the order of steps 2 and 3. Read the paragraph first and then formulate a question that addresses the basic idea of the paragraph. Then work at answering the question in your own words. The point is that you can be flexible in your use of the SQ3R technique.

Using the SQ3R method does not automatically lead to improved mastery of textbook reading assignments. It won't be effective unless it is applied diligently and skillfully, and it tends to be more helpful to students with low to medium reading ability (Caverly, Orlando, & Mullen, 2000). Any strategy that facilitates active processing of text material, the identification of key ideas, and effective review of these ideas should enhance your reading.

Besides topic headings, your textbooks may contain various other learning aids you can use to improve your reading. If a book provides a chapter outline, chapter summary, learning objectives, or preview questions, don't ignore them. They can help you recognize the important points in the chapter. Graphic organizers (such as the Concept Charts available for this text) can enhance understanding of text material (Nist & Hol-schuh, 2000). A lot of effort and thought go into formulating these and other textbook learning aids. It is wise to take advantage of them.

Getting More Out of Lectures

Although lectures are sometimes boring and tedious, it is a simple fact that poor class attendance is associated with poor grades. For example, in one study, Lindgren (1969) found that absences from class were much more common among "unsuccessful" students (grade average C- or below) than among "successful" students (grade average B or above), as shown in **Figure 1.13**. Even when you have an instructor who delivers hard-to-follow lectures, it is still important to go to class. If nothing else, you can get a feel for how the instructor thinks, which can help you anticipate the content of exams and respond in the manner expected by your professor.

Fortunately, most lectures are reasonably coherent. Studies indicate that attentive, accurate note taking is associated with enhanced learning and performance in college classes (Titsworth & Kiewra, 2004; Williams & Eggert, 2002). However, research also shows that many students' lecture notes are surprisingly incomplete, with the average student often recording less than 40% of the crucial ideas in a lecture (Armbruster, 2000). Thus, the key to getting more out of lectures is to stay motivated, stay attentive, and expend the effort to make your notes as complete as possible. Books on study skills (Longman & Atkinson, 2002; Sotiriou, 2002) offer a number of suggestions on how to take good-quality lecture notes, some of which are summarized here:

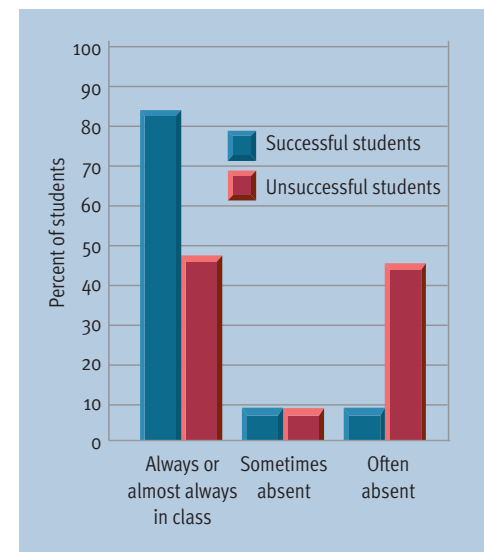


Figure 1.13

Attendance and grades. When Lindgren (1969) compared the class attendance of successful students (B average or above) and unsuccessful students (C- average or below), he found a clear association between poor attendance and poor grades.

- Extracting information from lectures requires *active listening*. Focus full attention on the speaker. Try to anticipate what's coming and search for deeper meanings.
- When course material is especially complex, it is a good idea to prepare for the lecture by *reading ahead* on the scheduled subject in your text. Then you have less brand-new information to digest.
- You are not supposed to be a human tape recorder. Insofar as possible, try to write down the lecturer's thoughts *in your*

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own words. Doing so forces you to organize the ideas in a way that makes sense to you.

- In taking notes, pay attention to clues about what is most important. These clues may range from subtle hints, such as an instructor repeating a point, to not-so-subtle hints, such as an instructor saying “You’ll run into this again.”
- *Asking questions* during lectures can be helpful. Doing so keeps you actively involved in the lecture and allows you to clarify points that you may have misunderstood. Many students are more bashful about asking questions than they should be. They don’t realize that most professors welcome questions.

Improving Test-Taking Strategies

Let’s face it—some students are better than others at taking tests. **Testwiseness is the ability to use the characteristics and format of a cognitive test to maximize one’s score.** Students clearly vary in testwiseness, and such variations are reflected in performance on exams (Geiger, 1997; Rogers & Yang, 1996). Testwiseness is *not* a substitute for knowledge of the subject matter. However, skill in taking tests can help you show

what you know when it is critical to do so (Flippo, Becker & Wark, 2000).

A number of myths exist about the best way to take tests. For instance, it is widely believed that students shouldn’t go back and change their answers to multiple-choice questions. Benjamin, Cavell, and Shallenberger (1984) found this to be the dominant belief among college *faculty* as well as students (see **Figure 1.14**). However, the old adage that “your first hunch is your best hunch on tests” has been shown to be wrong. Empirical studies clearly and consistently indicate that, over the long run, changing answers pays off. Benjamin and his colleagues reviewed 20 studies on this issue; their findings are presented in **Figure 1.15**. As you can see, answer changes that go from a wrong answer to a right answer outnumber changes that go from a right answer to a wrong one by a sizable margin. The popular belief that answer changing is harmful is probably attributable to painful memories of right-to-wrong changes. In any case, you can see how it pays to be familiar with sound test-taking strategies.

General Tips

The principles of testwiseness were first described by Millman, Bishop, and Ebel (1965). Here are a few of their general ideas:

- If efficient time use appears crucial, set up a mental schedule for progressing through the test. Make a mental note to check whether you’re one-third finished when a third of your time is gone.
- Don’t waste time pondering difficult-to-answer questions excessively. If you have no idea at all, just guess and go on. If you need to devote a good deal of time to the question, skip it and mark it so you can return to it later if time permits.
- Adopt the appropriate level of sophistication for the test. Don’t read things into questions. Sometimes students make things more complex than they were intended to be. Often, simple-looking questions are just what they appear to be.
- If you complete all of the questions and still have some time remaining, review the test. Make sure that you have recorded your answers correctly. If you were unsure of some answers, go back and reconsider them.

Tips for Multiple-Choice Exams

Sound test-taking strategies are especially important with multiple-choice (and true-false) questions. These types of questions often include clues that may help you converge on the correct answer (Mentzer, 1982; Weiten, 1984). You may be able to improve

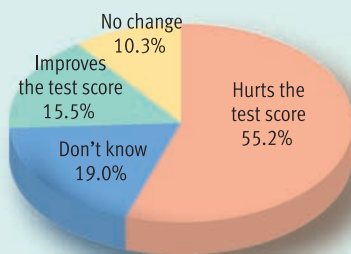


Figure 1.14

Beliefs about the effects of answer changing on tests. Ludy Benjamin and his colleagues (1984) asked 58 college faculty whether changing answers on tests is a good idea. Like most students, the majority of the faculty felt that answer changing usually hurts a student’s test score, even though the research evidence contradicts this belief (see Figure 1.15).

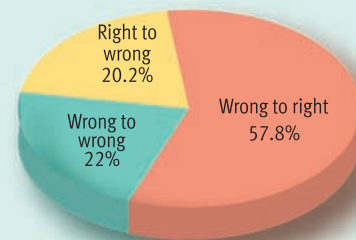


Figure 1.15

Actual effects of changing answers on multiple-choice tests. When the data from all the relevant studies were combined by Benjamin et al. (1984), they indicated that answer changing on tests generally *increased* rather than *reduced* students’ test scores. It is interesting to note the contrast between beliefs about answer changing (see Figure 1.14) and the actual results of this practice.

your performance on such tests by considering the following points (Flippo, 2000):

- As you read the stem of each multiple-choice question, *anticipate* the answer if you can, before looking at the options. If the answer you anticipated is among the options, it is likely to be the correct one.
- Always read each question completely. Continue reading even if you find your anticipated answer among the options. A more complete option may be farther down the list.
- Learn how to quickly eliminate options that are highly implausible. Many questions have only two plausible options, accompanied by “throwaway” options for filler. You should work at spotting these implausible options so that you can quickly discard them and narrow your task.
- Be alert to the fact that information relevant to one question is sometimes given away in another test item.
- On items that have “all of the above” as an option, if you know that just two of the options are correct, you should choose “all of the above.” If you are confident that one of the options is incorrect, you should eliminate this option and “all of the above” and choose from the remaining options.
- Options that represent broad, sweeping generalizations tend to be incorrect. You should be vigilant for words such as *always*, *never*, *necessarily*, *only*, *must*, *completely*, *totally*, and so forth that create these improbable assertions.
- In contrast, options that represent carefully qualified statements tend to be correct. Words such as *often*, *sometimes*, *per-*

haps, *may*, and *generally* tend to show up in these well-qualified statements.

Tips for Essay Exams

Little research has been done on testwise-ness as it applies to essay exams. That’s because there are relatively few clues to take advantage of in the essay format. Nonetheless, various books (Flippo, 2000; Pauk, 1990; Walter & Siebert, 1990) offer tips based on expert advice, including the following:

- Time is usually a crucial factor on essay tests. Therefore, you should begin by looking over the questions and making time allocations on the basis of (1) your knowledge, (2) the time required to answer each question, and (3) the points awarded for answering each question. It’s usually a good idea to answer the questions that you know best first.
- Many students fail to appreciate the importance of good organization in their essay responses. If your instructor can’t follow where you are going with your answers, you won’t get many points. Test essays are often poorly organized because students feel pressured for time and plunge into answering questions without any planning. It will pay off in the long run if you spend a minute getting organized first. Also, many examiners appreciate it if you make your organization quite explicit by using headings or by numbering the points you’re making.
- In many courses you’ll learn a great deal of jargon or technical terminology. Demonstrate your learning by using this technical vocabulary in your essay answers.

In summary, sound study skills and habits are crucial to academic success. Intelligence alone won’t do the job (although it certainly helps). Good academic skills do not develop overnight. They are acquired gradually, so be patient with yourself. Fortunately, tasks such as reading textbooks, writing papers, and taking tests get easier with practice. Ultimately, I think you’ll find that the rewards—knowledge, a sense of accomplishment, and progress toward a degree—are worth the effort.

➤ REVIEW OF KEY POINTS

- To foster sound study habits, you should devise a written study schedule and reward yourself for following it. You should also try to find one or two specific places for studying that are relatively free of distractions.
- You should use active reading techniques to select the most important ideas from the material you read. SQ3R is one approach to active reading that can be helpful if it is used diligently.
- The key to good note taking is to strive to make lecture notes as complete as possible. It’s important to use active listening techniques and to record lecturers’ ideas in your own words. It also helps if you read ahead to prepare for lectures and ask questions as needed.
- Being an effective student requires sound test-taking skills. In general, it’s a good idea to devise a schedule for progressing through an exam, to adopt the appropriate level of sophistication, to avoid wasting time on troublesome questions, and to review your answers whenever time permits.
- On multiple-choice tests it is wise to anticipate answers, to read questions completely, and to quickly eliminate implausible options. Options that represent carefully qualified assertions are more likely to be correct than options that create sweeping generalizations.
- On essay tests, it is wise to start with questions you know, to emphasize good organization, and to use technical vocabulary when it is appropriate.

CRITICAL THINKING Application

Developing Critical Thinking Skills: An Introduction

If you ask any group of professors, parents, employers, or politicians, “What is the most important outcome of an education?” The most popular answer is likely to be “the development of the ability to think critically.” **Critical thinking is the use of cognitive skills and strategies that increase the probability of a desirable outcome.** Such outcomes would include good career choices, effective decisions in the workplace, wise investments, and so forth. In the long run, critical thinkers should have more desirable outcomes than people who are not skilled in critical thinking (Halpern, 1998, 2003). Critical thinking is purposeful, reasoned, goal-directed thinking that involves solving problems, formulating inferences, working with probabilities, and making carefully thought-out decisions. Here are some of the skills exhibited by critical thinkers:

- They understand and use the principles of scientific investigation. (How can the effectiveness of punishment as a disciplinary procedure be determined?)
- They apply the rules of formal and informal logic. (If most people disapprove of sex sites on the Internet, why are these sites so popular?)
- They carefully evaluate the quality of information. (Can I trust the claims made by this politician?)
- They analyze arguments for the soundness of the conclusions. (Does the rise in drug use mean that a stricter drug policy is needed?)

The topic of thinking has a long history in psychology, dating back to Wilhelm Wundt in the 19th century. Modern cognitive psychologists have found that a useful model of critical thinking has at least two components: (1) knowledge of the skills of critical thinking—the *cognitive component*, and (2) the attitude or disposition of a critical thinker—the *emotional or affective compo-*

nent. Both are needed for effective critical thinking.

Instruction in critical thinking is based on two assumptions: (1) a set of skills or strategies exists that students can learn to recognize and apply in appropriate contexts; (2) if the skills are applied appropriately, students will become more effective thinkers. Critical thinking skills that would be useful in any context might include understanding how reasons and evidence support or refute conclusions; distinguishing among facts, opinions, and reasoned judgments; using principles of likelihood and uncertainty when thinking about probabilistic events; generating multiple solutions to problems and working systematically toward a desired goal; and understanding how causation is determined. This list provides some typical examples of what is meant by the term *critical thinking skills*. Because these skills are useful in a wide variety of contexts, they are sometimes called *transcontextual skills*.

It is of little use to know the skills of critical thinking if you are unwilling to exert the hard mental work to use them or if you have a sloppy or careless attitude toward thinking. A critical thinker is willing to plan, flexible in thinking, persistent, able to admit mistakes and make corrections, and mindful of the thinking process. The use of the word *critical* represents the notion of a critique or evaluation of thinking processes

and outcomes. It is not meant to be negative (as in a “critical person”) but rather to convey that critical thinkers are vigilant about their thinking.

The Need to Teach Critical Thinking

Decades of research on instruction in critical thinking have shown that the skills and attitudes of critical thinking need to be deliberately and consciously taught, because they often do not develop by themselves with standard instruction in a content area (Nisbett, 1993). For this reason, each chapter in this text ends with a “Critical Thinking Application.” The material presented in each of these Critical Thinking Applications relates to the chapter topics, but the focus is on how to think about a particular issue, line of research, or controversy. Because the emphasis is on the thinking process, you may be asked to consider conflicting interpretations of data, judge the credibility of information sources, or generate your own testable hypotheses. The specific critical thinking skills highlighted in each Application are summarized in a table so that they are easily identified. Some of the skills will show up in multiple chapters because the goal is to help you spontaneously select the appropriate critical thinking skills when you encounter new information. Repeated prac-

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tice with selected skills across chapters should help you develop this ability.

An Example

As explained in the main body of the chapter, *evolutionary psychology* is emerging as an influential school of thought. To show you how critical thinking skills can be applied to psychological issues, let's examine the evolutionary explanation of gender differences in spatial talents and then use some critical thinking strategies to evaluate this explanation.

On the average, males tend to perform slightly better than females on most visual-spatial tasks, especially tasks involving mental rotation of images and navigation in space (Halpern, 2000; see **Figure 1.16**). Irwin Silverman and his colleagues maintain that these gender differences originated in human evolution as a result of the sex-based division of labor in ancient hunting-and-gathering societies (Silverman & Phillips, 1998; Silverman et al., 2000). According to this analysis, males' superiority in mental rotation and navigation developed because the chore of *hunting* was largely assigned to men over the course of human history, and these skills would have facilitated success on hunting trips (by helping men to traverse long distances, aim projectiles at prey, and so forth) and thus been favored by natural selection. In contrast, women in ancient societies generally had responsibility for *gathering* food rather than hunting it. This was an efficient division of labor because women spent much of their adult lives pregnant, nursing, or caring for the young and, therefore, could not travel long distances. Hence, Silverman and Eals (1992) hypothesized that females ought to be superior to males on spatial skills that would have facilitated gathering, such as memory for locations, which is exactly what they found in a series of four studies. Thus, evolutionary psychologists explain gender differences in spatial ability—like other aspects of human behavior—in terms of how such abilities evolved to meet the adaptive pressures faced by our ancestors.

How can you critically evaluate these claims? If your first thought was that you need more information, good for you, be-

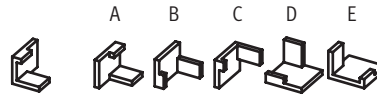


Figure 1.16
An example of a spatial task involving mental rotation. Spatial reasoning tasks can be divided into a variety of subtypes. Studies indicate that males perform slightly better than females on most, but not all, spatial tasks. The tasks on which males are superior often involve mentally rotating objects, such as in the problem shown here. In this problem, the person has to figure out which object on the right (A through E) could be a rotation of the object at the left. The answer is B.

Source: Stafford, R. E., & Gullikson, H. (1962). *Identical Blocks*, Form AA.

cause you are already showing an aptitude for critical thinking. Some additional information about gender differences in cognitive abilities is presented in Chapter 11 of this text. You also need to develop the habit of asking good questions, such as, “Are there alternative explanations for these results? Are there contradictory data?” Let’s briefly consider each of these questions.

Are there alternative explanations for gender differences in spatial skills? Well, there certainly are other explanations for males’ superiority on most spatial tasks. For example, one could attribute this finding to the gender-typed activities that males are encouraged to engage in more than females, such as playing with building blocks, Lego sets, Lincoln Logs, and various types of construction sets, as well as a host of spatially oriented video games. These gender-typed activities appear to provide boys with more practice than girls on most types of spatial tasks (Voyer, Nolan, & Voyer, 2000), and experience with spatial activities appears to enhance spatial skills (Lizarraga & Ganuza, 2003). If we can ex-

plain gender differences in spatial abilities in terms of disparities in the everyday activities of males and females, we may have no need to appeal to natural selection.

Are there data that run counter to the evolutionary explanation for modern gender differences in spatial skills? Again, the answer is yes. Some scholars who have studied hunting-and-gathering societies suggest that women often traveled long distances to gather food and that women were often involved in hunting (Adler, 1993). In addition, women wove baskets and clothing and worked on other tasks that required spatial thinking (Halpern, 1997). Moreover—think about it—men on long hunting trips obviously needed to develop a good memory for locations or they might never have returned home. So, there is room for some argument about exactly what kinds of adaptive pressures males and females faced in ancient hunting-and-gathering societies.

Thus, you can see how considering alternative explanations and contradictory evidence weakens the evolutionary explanation of gender differences in spatial abilities. The questions we raised about alternative explanations and contradictory data are two generic critical thinking questions that can be asked in a wide variety of contexts. The answers to these questions do *not* prove that evolutionary psychologists are wrong in their explanation of gender differences in visual-spatial skills, but they do *weaken* the evolutionary explanation. In thinking critically about psychological issues, you will see that it makes more sense to talk about the *relative strength of an argument*, as opposed to whether an argument is right or wrong, because we will be dealing with complex issues that rarely lend themselves to being correct or incorrect.

Table 1.2 Critical Thinking Skills Discussed in This Application

Skill	Description
Looking for alternative explanations for findings and events	In evaluating explanations, the critical thinker explores whether there are other explanations that could also account for the findings or events under scrutiny.
Looking for contradictory evidence	In evaluating the evidence presented on an issue, the critical thinker attempts to look for contradictory evidence that may have been left out of the debate.

CHAPTER 1 *Recap*

Key Ideas

From Speculation to Science: How Psychology Developed

- Psychology's intellectual parents were 19th-century philosophy and physiology, which shared an interest in the mysteries of the mind. Psychology was born as an independent discipline when Wilhelm Wundt established the first psychological research laboratory in 1879 at Leipzig, Germany. He argued that psychology should be the scientific study of consciousness.
- The structuralists believed that psychology should use introspection to analyze consciousness into its basic elements. The functionalists, inspired by William James, believed that psychology should focus on the purpose and adaptive functions of consciousness.
- Sigmund Freud's psychoanalytic theory emphasized the unconscious determinants of behavior and the importance of sexuality. Freud's ideas were controversial, and they met with resistance in academic psychology.
- Behaviorists, led by John B. Watson, argued that psychology should study only observable behavior. Thus, they campaigned to redefine psychology as the science of behavior. Emphasizing the importance of the environment over heredity, they began to explore stimulus-response relationships, often using laboratory animals as subjects.
- The influence of behaviorism was boosted greatly by B. F. Skinner's research. Like Watson before him, Skinner asserted that psychology should study only observable behavior, and he generated controversy by arguing that free will is an illusion.
- Finding both behaviorism and psychoanalysis unsatisfactory, advocates of a new theoretical orientation called humanism became influential in the 1950s. Humanism, led by Abraham Maslow and Carl Rogers, emphasized humans' freedom and potential for personal growth.
- Stimulated by the demands of World War II, clinical psychology grew rapidly in the 1950s. Thus, psychology became a profession as well as a science. This movement toward professionalization eventually spread to other areas in psychology.
- During the 1950s and 1960s advances in the study of cognitive processes and the physiological bases of behavior led to renewed interest in cognition and physiology, as psychology returned to its original roots.
- In the 1980s, Western psychologists, who had previously been rather provincial, developed a greater interest in how cultural factors influence thoughts, feelings, and behavior. This trend was sparked in large part by growing global interdependence and by increased cultural diversity in Western societies.
- The 1990s witnessed the emergence of a new theoretical perspective called evolutionary psychology. The central premise of this new school of thought is that patterns of behavior are the product of evolutionary forces, just as anatomical characteristics are shaped by natural selection. The turn of the 21st century saw the emergence of the positive psychology movement.

Psychology Today: Vigorous and Diversified

- Contemporary psychology is a diversified science and profession that has grown rapidly in recent decades. Major areas of research in modern psychology include developmental psychology, social psychology, experimental psychology, physiological psychology, cognitive psychology, personality, and psychometrics.
- Applied psychology encompasses four professional specialties: clinical psychology, counseling psychology, educational and school psychology, and industrial and organizational psychology.

Seven Unifying Themes

- As we examine psychology in all its many variations, we will emphasize seven key ideas as unifying themes. Looking at psychology as a field of

study, our three key themes are (1) psychology is empirical, (2) psychology is theoretically diverse, and (3) psychology evolves in a sociohistorical context.

- Looking at psychology's subject matter, the remaining four themes are (4) behavior is determined by multiple causes, (5) behavior is shaped by cultural heritage, (6) heredity and environment jointly influence behavior, and (7) people's experience of the world is highly subjective.

PERSONAL APPLICATION • Improving Academic Performance

- To foster sound study habits, you should devise a written study schedule and reward yourself for following it. You should also try to find one or two specific places for studying that are relatively free of distractions.
- You should use active reading techniques to select the most important ideas from the material you read. SQ3R, one approach to active reading, breaks a reading assignment into manageable segments and requires that you understand each segment before you move on.
- Good note taking can help you get more out of lectures. It's important to use active listening techniques and to record lecturers' ideas in your own words.
- Being an effective student also requires sound test-taking skills. In general, it's a good idea to devise a schedule for progressing through an exam, to adopt the appropriate level of sophistication, to avoid wasting time on troublesome questions, and to review your answers whenever time permits.

CRITICAL THINKING APPLICATION • Developing Critical Thinking Skills: An Introduction

- Critical thinking is the use of cognitive skills and strategies that increase the probability of a desirable outcome. Critical thinking is purposeful, reasoned thinking. A critical thinker is flexible, persistent, able to admit mistakes, and mindful of the thinking process.
- Evolutionary psychologists have attributed contemporary gender differences in spatial abilities to the sex-based division of labor in hunting and gathering societies. However, alternative explanations have been offered for these differences, focusing on the gender-typed activities that modern males and females engage in. There also are contradictory data regarding the adaptive pressures faced by females and males in hunting-and-gathering societies.

Key Terms

Applied psychology (p. 11)
Behavior (p. 7)
Behaviorism (p. 7)
Clinical psychology (p. 11)
Cognition (p. 12)
Critical thinking (p. 32)
Culture (p. 23)
Empiricism (p. 21)
Ethnocentrism (p. 13)
Evolutionary psychology (p. 14)
Functionalism (p. 4)
Humanism (p. 10)
Introspection (p. 4)
Natural selection (p. 5)
Positive psychology (p. 15)
Psychiatry (p. 21)
Psychoanalytic theory (p. 6)
Psychology (p. 18)

SQ3R (p. 28)
Structuralism (p. 4)
Testwiseness (p. 30)
Theory (p. 22)
Unconscious (p. 6)

Key People

Mary Whiton Calkins (p. 5)
Sigmund Freud (p. 6)
G. Stanley Hall (p. 3)
Leta Stetter Hollingworth (p. 5)
William James (p. 4)
Carl Rogers (p. 10)
Martin Seligman (p. 15)
B. F. Skinner (p. 8)
Margaret Floy Washburn (p. 5)
John B. Watson (p. 7)
Wilhelm Wundt (p. 3)

CHAPTER 1 Practice Test

1. For which of the following is Wilhelm Wundt primarily known?
 - A. the establishment of the first formal laboratory for research in psychology
 - B. the distinction between mind and body as two separate entities
 - C. the discovery of how signals are conducted along nerves in the body
 - D. the development of the first formal program for training in psychotherapy
2. G. Stanley Hall is noteworthy in the history of psychology because he:
 - A. established the first American research laboratory in psychology.
 - B. launched America's first psychological journal.
 - C. was the driving force behind the establishment of the American Psychological Association.
 - D. did all of the above.
3. Which of the following approaches might William James criticize for examining a movie frame by frame instead of seeing the motion in the motion picture?
 - A. structuralism
 - B. functionalism
 - C. dualism
 - D. humanism
4. Which of the following approaches might suggest that forgetting to pick his mother up at the airport was Henry's unconscious way of saying that he did not welcome her visit?
 - A. psychoanalytic
 - B. behavioral
 - C. humanistic
 - D. cognitive
5. Fred, a tennis coach, insists that he can make any reasonably healthy individual into an internationally competitive tennis player. Fred is echoing the thoughts of:
 - A. Sigmund Freud.
 - B. John B. Watson.
 - C. Abraham Maslow.
 - D. William James.
6. Which of the following is a statement with which Skinner's followers would agree?
 - A. Most behavior is controlled by unconscious forces.
 - B. The goal of behavior is self-actualization.
 - C. Nature is more influential than nurture.
 - D. Free will is an illusion.
7. Which of the following approaches has the most optimistic view of human nature?
 - A. humanism
 - B. behaviorism
 - C. psychoanalysis
 - D. structuralism
8. Which of the following historical events created a demand for clinicians that was far greater than the supply and stimulated the development of clinical psychology?
 - A. World War I
 - B. the Depression
 - C. World War II
 - D. the Korean War
9. The tendency to view one's own group as superior to others and as the standard for judging the worth of foreign ways is known as:
 - A. behaviorism.
 - B. ethnocentrism.
 - C. humanism.
 - D. functionalism.
10. The study of the endocrine system and genetic mechanisms would most likely be undertaken by a:
 - A. clinical psychologist.
 - B. physiological psychologist.
 - C. social psychologist.
 - D. educational psychologist.
11. The fact that psychologists do not all agree about the nature and development of personality demonstrates:
 - A. that there are many ways of looking at the same phenomenon.
 - B. the fundamental inability of psychologists to work together in developing a single theory.
 - C. the failure of psychologists to communicate with one another.
 - D. the possibility that personality may simply be incomprehensible.
12. A multifactorial causation approach to behavior suggests that:
 - A. most behaviors can be explained best by single-cause explanations.
 - B. most behavior is governed by a complex network of interrelated factors.
 - C. data must be subjected to rigorous statistical analysis in order to make sense.
 - D. explanations of behavior tend to build up from the simple to the complex in a hierarchical manner.
13. Psychology's answer to the question of whether we are born or made tends to be:
 - A. we are born.
 - B. we are made.
 - C. we are both born and made.
 - D. neither.
14. In regard to changing answers on multiple-choice tests, research indicates that _____ changes tend to be more common than other types of changes.
 - A. wrong to right
 - B. right to wrong
 - C. wrong to wrong
15. Critical thinking skills:
 - A. are abstract abilities that cannot be identified.
 - B. usually develop spontaneously through normal content instruction.
 - C. usually develop spontaneously without any instruction.
 - D. need to be deliberately taught, because they often do not develop by themselves with standard content instruction.

15 D p. 32	10 B p. 20	5 B p. 8
14 A p. 30	9 B p. 13-14	4 A p. 6
13 C p. 24	8 C p. 11	3 A p. 5
12 B p. 23	7 A p. 10	2 D pp. 3-4
11 A p. 22	6 D p. 9	1 A p. 3

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/

Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



CHAPTER

2

The Research Enterprise in Psychology

Looking for Laws: The Scientific Approach to Behavior

Goals of the Scientific Enterprise
Steps in a Scientific Investigation
Advantages of the Scientific Approach

Looking for Causes: Experimental Research

Independent and Dependent Variables
Experimental and Control Groups
Extraneous Variables
Variations in Designing Experiments

FEATURED STUDY • The Emotional Fallout of Expected and Unexpected Outcomes

Advantages and Disadvantages
of Experimental Research

Looking for Links: Descriptive/Correlational Research

Naturalistic Observation
Case Studies
Surveys
Advantages and Disadvantages of
Descriptive/Correlational Research

Looking for Conclusions: Statistics and Research

Descriptive Statistics
Inferential Statistics

Looking for Flaws: Evaluating Research

Sampling Bias
Placebo Effects
Distortions in Self-Report Data
Experimenter Bias

Looking at Ethics: Do the Ends Justify the Means?

The Question of Deception
The Question of Animal Research
Ethical Principles in Research

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Finding and Reading Journal Articles

The Nature of Technical Journals
Finding Journal Articles
Reading Journal Articles

CRITICAL THINKING APPLICATION • The Perils of Anecdotal Evidence: "I Have A Friend Who . . ."

Recap

Practice Test

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- Do adversaries in debates overestimate the gap between their views?
- How does anxiety affect people's desire to be with others? Does misery love company?
- Do positive outcomes feel better when they are a surprise?
- Are there substantial differences among cultures when it comes to the pace of everyday life?
- What are the psychological characteristics of people who commit suicide?
- Are taller people more successful in life?

Questions, questions, questions—everyone has questions about behavior. The most basic question is, how should these questions be investigated? As noted in Chapter 1, *psychology is empirical*. Psychologists rely on formal, systematic observations to address their questions about behavior. This methodology is what makes psychology a scientific endeavor.

The scientific enterprise is an exercise in creative problem solving. Scientists have to figure out how to make observations that will shed light on the puzzles they want to solve. To make these observations, psychologists use a variety of research methods because different questions call for different strategies of study. In this chapter, you will see how researchers have used such methods as experiments, case studies, surveys, and naturalistic observation to investigate the questions posed above.

Psychology's methods are worth a close look for at least two reasons. First, a better appreciation of the empirical approach will enhance your understanding of the research-based information that you will be reading about in the remainder of this book. Second, familiarity with the logic of the empirical approach should improve your ability to think critically about research. This ability is important because you are exposed to research findings nearly every day. The news media constantly report on studies that yield conclusions about how you should raise your children, improve your health, and enhance your interpersonal relationships. Learning how to evaluate these reports can help you use such information wisely.

In this chapter, we will examine the scientific approach to the study of behavior and then look at the specific research methods that psychologists use most frequently. We'll also see why psychologists use statistics in their research. After you learn how research is done, you'll also learn how *not* to do it. That is, we'll review some common flaws in doing research. Finally, we will take a look at ethical issues in behavioral research. In the Personal Application, you'll learn how to find and read journal articles that report on research. In the chapter's Critical Thinking Application, we'll examine the nature and validity of anecdotal evidence.

Looking for Laws: The Scientific Approach to Behavior

Whether the object of study is gravitational forces or people's behavior under stress, *the scientific approach assumes that events are governed by some lawful order*. As scientists, psychologists assume that behavior is governed by discernible laws or principles, just as the movement of the earth around the sun is governed by the laws of gravity. The behavior of living creatures may not seem as lawful and predictable as the "behavior" of planets. However, the scientific enterprise is based on the belief that there *are* consistencies or laws that can be uncovered. Fortunately, the plausibility of applying this fundamental assumption to psychology has been supported by the discovery of a great many such consistencies in behavior, some of which provide the subject matter for this text.

Goals of the Scientific Enterprise

Psychologists and other scientists share three sets of interrelated goals: measurement and description, understanding and prediction, and application and control.

1. *Measurement and description.* Science's commitment to observation requires that an investigator figure out a way to measure the phenomenon under study. For example, a psychologist could not investigate whether men are more or less sociable than women without first developing some means of measuring sociability. Thus, the first goal of psy-

PREVIEW QUESTIONS

- What are the goals of the scientific enterprise?
- What are the key steps required by a scientific investigation?
- What are the principal advantages of the scientific approach?

chology is to develop measurement techniques that make it possible to describe behavior clearly and precisely.

2. *Understanding and prediction.* A higher-level goal of science is understanding. Scientists believe that they understand events when they can explain the reasons for the occurrence of the events. To evaluate their understanding, scientists make and test predictions called hypotheses. **A hypothesis is a tentative statement about the relationship between two or more variables. Variables are any measurable conditions, events, characteristics, or behaviors that are controlled or observed in a study.** If we hypothesized that putting people under time pressure would lower the accuracy of their time perception, the variables in our study would be time pressure and accuracy of time perception.

3. *Application and control.* Ultimately, many scientists hope that the information they gather will be of some practical value in helping to solve everyday problems. Once people understand a phenomenon, they often can exert more control over it. Today, the profession of psychology attempts to apply research findings to practical problems in schools, businesses, factories, and mental hospitals. For example, a school psychologist might use findings about the causes of math anxiety to devise a program to help students control their math phobias.

How do theories help scientists to achieve their goals? As noted in Chapter 1, psychologists do not set out just to collect isolated facts about relation-

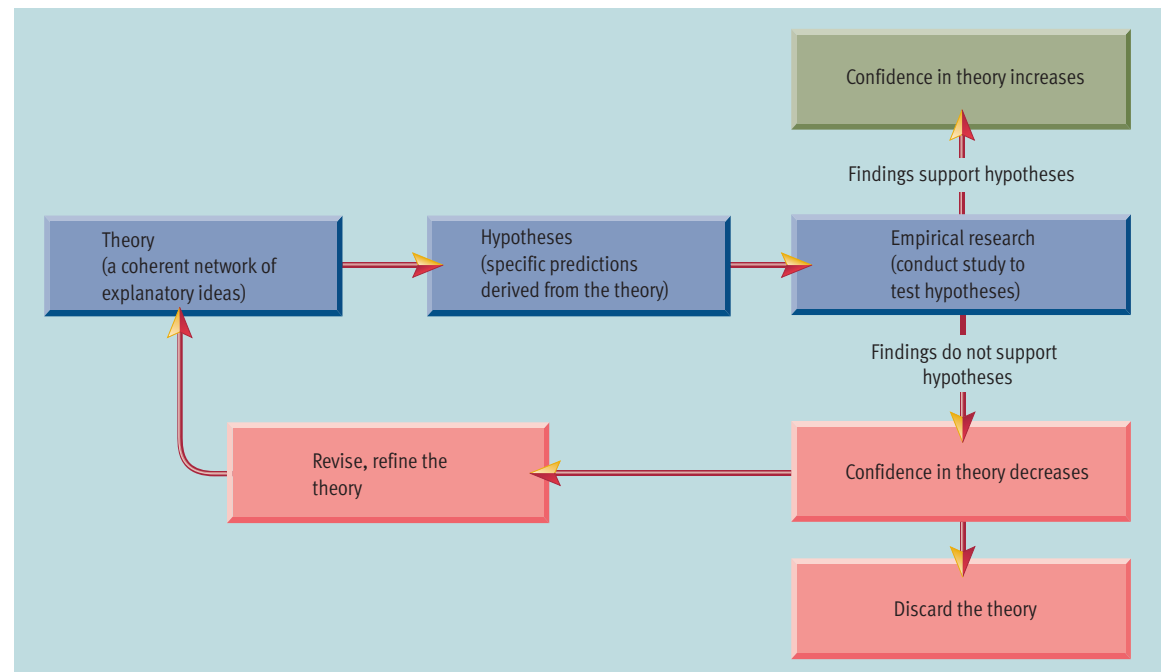
ships between variables. To build toward a better understanding of behavior, they construct theories. **A theory is a system of interrelated ideas used to explain a set of observations.** For example, using a handful of concepts, such as natural selection and reproductive fitness, evolutionary theorists in psychology attempt to explain a diverse array of known facts about mating preferences, jealousy, aggression, sexual behavior, and so forth (see Chapter 1). Thus, by integrating apparently unrelated facts and principles into a coherent whole, theories permit psychologists to make the leap from the *description* of behavior to the *understanding* of behavior. Moreover, the enhanced understanding afforded by theories guides future research by generating new predictions and suggesting new lines of inquiry (Fiske, 2004; Higgins, 2004).

A scientific theory must be testable, as the cornerstone of science is its commitment to putting ideas to an empirical test. Most theories are too complex to be tested all at once. For example, it would be impossible to devise a single study that could test all the many facets of evolutionary theory. Rather, in a typical study, investigators test one or two specific hypotheses derived from a theory. If their findings support the hypotheses, confidence in the theory that the hypotheses were derived from grows. If their findings fail to support the hypotheses, confidence in the theory diminishes, and the theory may be revised or discarded (see **Figure 2.1**). Thus, theory construction is a gradual, iterative process that is always subject to revision.

Figure 2.1

Theory construction.

A good theory will generate a host of testable hypotheses. In a typical study, only one or a few of these hypotheses can be evaluated. If the evidence supports the hypotheses, our confidence in the theory they were derived from generally grows. If the hypotheses are not supported, confidence in the theory decreases, and revisions to the theory may be made to accommodate the new findings. If the hypotheses generated by a theory consistently fail to garner empirical support, the theory may be discarded altogether. Thus, theory construction and testing is a gradual process.



Steps in a Scientific Investigation

Curiosity about a question provides the point of departure for any kind of investigation, scientific or otherwise. Scientific investigations, however, are *systematic*. They follow an orderly pattern, which is outlined in **Figure 2.2**. Let's look at how this standard series of steps was followed in a study of *naïve realism* conducted by David Sherman, Leif Nelson, and Lee Ross (2003). Sherman and his colleagues wanted to investigate whether adversaries in political debates overestimate the gap between their views.

Step 1: Formulate a Testable Hypothesis

The first step in a scientific investigation is to translate a theory or an intuitive idea into a testable hypothesis. Sherman et al. (2003) noted that in heated disputes people seem to assume that they see matters as they really are—that their perceptions are objective and accurate—whereas their opponents' views must be distorted by self-interest, ideology, or some other source of bias. The researchers call this belief in one's own objectivity and opponents' subjectivity "naïve realism." Sherman and his colleagues speculated that in political debates people on both sides would tend to characterize their opponents as extremists and to overestimate the extent of their mutual disagreement. To explore this line of thinking, they chose to examine individuals' views on the contentious issue of affirmative action. Thus, they hypothesized that proponents of affirmative action would overestimate opponents' conservatism and that opponents of affirmative action would overestimate proponents' liberalism.

To be testable, scientific hypotheses must be formulated precisely, and the variables under study must be clearly defined. Researchers achieve these clear formulations by providing operational definitions of the relevant variables. **An operational definition describes the actions or operations that will be used to measure or control a variable.** Operational definitions—which may be quite different from concepts' dictionary definitions—establish precisely what is meant by each variable in the context of a study.

To illustrate, let's see how Sherman and his colleagues operationalized their variables. They decided that the issue of affirmative action is too complex and multifaceted to ask people about their views of affirmative action *in general*. Each person would be judging something different, based on his or her highly varied exposure to affirmative action initiatives. To circumvent this problem they asked students to respond to a specific affirmative action program that

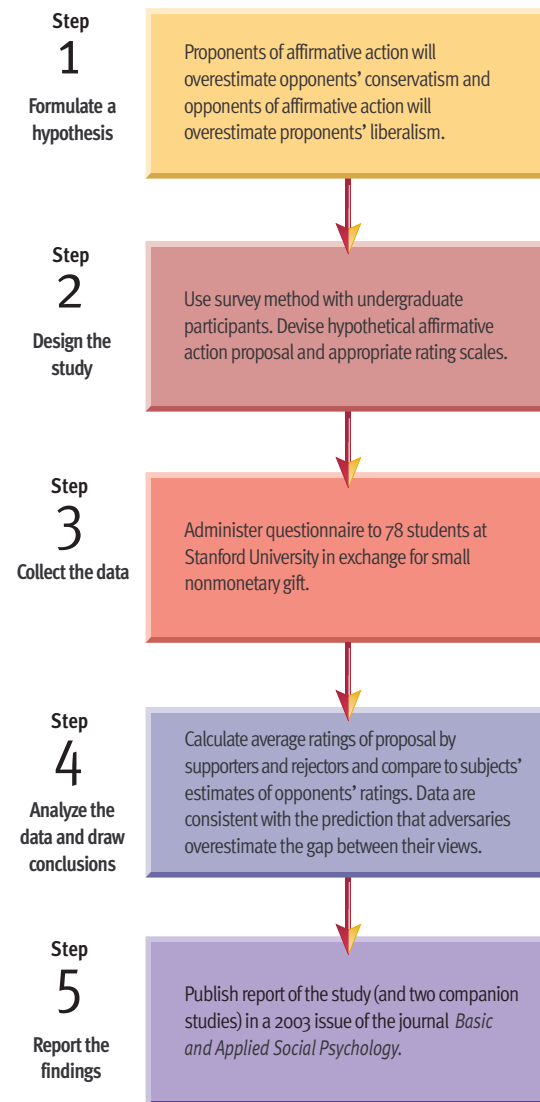


Figure 2.2

Flowchart of steps in a scientific investigation. As illustrated in the study by Sherman, Nelson, and Ross (2003), a scientific investigation consists of a sequence of carefully planned steps, beginning with the formulation of a testable hypothesis and ending with the publication of the study, if its results are worthy of examination by other researchers.

supposedly had been proposed for their university. To get a precise measurement of participants' views, they asked the students to indicate their degree of support for the proposal on a 9-point scale anchored by the descriptions *definitely adopt* and *definitely reject*. Those checking 1 to 4 on the scale were designated as *supporters* of the proposal and those checking 6 to 9 on the scale were designated as *rejecters* (those who checked the midpoint of 5 were classified as *neutral*).

Step 2: Select the Research Method and Design the Study

The second step in a scientific investigation is to figure out how to put the hypothesis to an empirical

atically observed in a study. For their first study, the researchers chose to use 78 undergraduates (45 women and 29 men) at Stanford University. They also had to devise a plausible-sounding affirmative action proposal that students could evaluate, and they had to craft rating scales that would permit the assessment of subjects' political ideology and their perceptions of their opponents' political ideology.

Step 3: Collect the Data

The third step in the research enterprise is to collect the data. Researchers use a variety of *data collection techniques, which are procedures for making empirical observations and measurements*. Commonly used techniques include direct observation, questionnaires, interviews, psychological tests, physiological recordings, and examination of archival records (see Table 2.1). The data collection techniques used in a study depend largely on what is being investigated. For example, questionnaires are well suited for studying attitudes, psychological tests for studying personality, and physiological recordings for studying the biological bases of behavior. Depending on the nature and complexity of the study, data collection can often take months, and it sometimes requires years of work. One advantage of the survey method, however, is that you can often collect data quickly and easily, which was true in this case. Sherman and his colleagues simply had their subjects complete a carefully designed questionnaire in exchange for a small nonmonetary gift.

Step 4: Analyze the Data and Draw Conclusions

The observations made in a study are usually converted into numbers, which constitute the raw data of the study. Researchers use *statistics* to analyze their data and to decide whether their hypotheses have been supported. Thus, statistics play an essential role

Image Not Available

test. The research method chosen depends to a large degree on the nature of the question under study. The various methods—experiments, case studies, surveys, naturalistic observation, and so forth—each have advantages and disadvantages. The researcher has to ponder the pros and cons and then select the strategy that appears to be the most appropriate and practical. In this case, Sherman and colleagues decided that their question called for *survey* research, which involves administering questionnaires or interviews to people.

Once researchers have chosen a general method, they must make detailed plans for executing their study. Thus, Sherman et al. had to decide how many people they needed to survey and where they would get their participants. *Participants, or subjects, are the persons or animals whose behavior is system-*

Web Link 2.1



PubMed

Few commercial databases of journal articles or abstracts in the health sciences are available online for no charge. However, the National Library of Medicine has opened the millions of items in MEDLINE's database to anyone wanting to search within the scientific literature of medical journals, including some important psychology publications.

Table 2-1 Key Data Collection Techniques in Psychology

Technique	Description
Direct observation	Observers are trained to watch and record behavior as objectively and precisely as possible. They may use some instrumentation, such as a stopwatch or video recorder.
Questionnaire	Subjects are administered a series of written questions designed to obtain information about attitudes, opinions, and specific aspects of their behavior.
Interview	A face-to-face dialogue is conducted to obtain information about specific aspects of a subject's behavior.
Psychological test	Subjects are administered a standardized measure to obtain a sample of their behavior. Tests are usually used to assess mental abilities or personality traits.
Physiological recording	An instrument is used to monitor and record a specific physiological process in a subject. Examples include measures of blood pressure, heart rate, muscle tension, and brain activity.
Examination of archival records	The researcher analyzes existing institutional records (the archives), such as census, economic, medical, legal, educational, and business records.

in the scientific enterprise. Based on their statistical analyses, Sherman et al. (2003) concluded that their data supported their hypothesis. As predicted, they found that supporters of the affirmative action proposal greatly overestimated the conservatism of the rejectors and that the rejectors of the proposal greatly overestimated the liberalism of the supporters (see **Figure 2.3**). The data indicated that the actual (average) attitudes of the two groups were not all that far apart, but each group *assumed* that their opponents held very dissimilar views. Obviously, insofar as this may be true of political debates in general, it sheds light on (1) why it is often so difficult for opposing sides to bridge the (perceived) gap between them, and (2) why people often have such pervasively negative views of their adversaries.

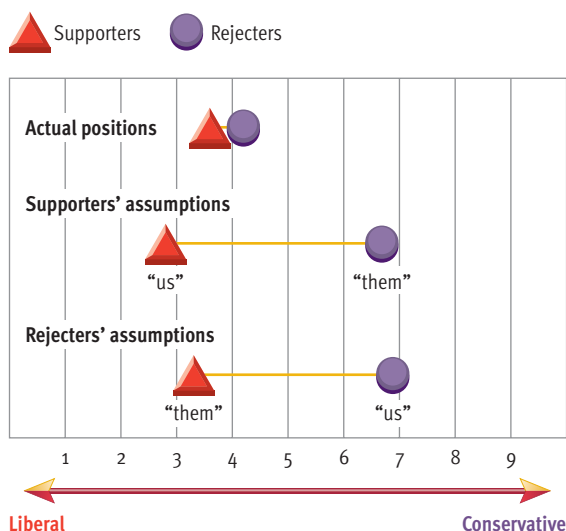
Step 5: Report the Findings

Scientific progress can be achieved only if researchers share their findings with one another and with the general public. Therefore, the final step in a scientific investigation is to write up a concise summary of the study and its findings. Typically, researchers prepare a report that is delivered at a scientific meeting and submitted to a journal for publication. **A**

Figure 2.3

Results of the Sherman et al. (2003) study. As you can see, the actual liberal-conservative positions of the supporters and rejectors of the affirmative action proposal were not all that far apart (top row). However, when supporters of the proposal were asked to estimate the political ideology of other supporters as well as those who rejected the proposal, they assumed that there was a huge gap between the two groups (middle row). Similarly, when those who were against the proposal were asked to make the same estimates (bottom row), they also overestimated the disparity between the two groups.

SOURCE: Sherman, D. K., Nelson, L. D., & Ross, L. D. (2003). Naïve realism and affirmative action: Adversaries are more similar than they think. *Basic and Applied Social Psychology*, 25, 275–289. Copyright © 2003 Lawrence Erlbaum Associates, Inc. Reprinted by permission.



Affirmative action is a hotly debated issue that provided a perfect vehicle for the study of "naïve realism" by David Sherman and colleagues (2003). The study supported the notion that people tend to think that they view controversial issues objectively, whereas opponents' views are distorted by self-interest or ideology. Curiously, adversaries also tend to overestimate the gap between their views.

journal is a periodical that publishes technical and scholarly material, usually in a narrowly defined area of inquiry. The study by Sherman and his colleagues was published, along with two companion studies, in a journal called *Basic and Applied Social Psychology*.

The process of publishing scientific studies allows other experts to evaluate and critique new research findings. When articles are submitted to scientific journals they go through a very demanding *peer review process*. Experts thoroughly scrutinize each submission. They carefully evaluate each study's methods, statistical analyses, and conclusions, as well as its contribution to knowledge and theory. The peer review process is so demanding, many top journals reject over 90% of submitted articles! The purpose of the peer review process is to ensure that journals publish reliable findings based on high-quality research. The peer review process is a major strength of the scientific approach because it greatly reduces the likelihood of publishing erroneous findings.

Advantages of the Scientific Approach

Science is certainly not the only method that can be used to draw conclusions about behavior. Everyone uses logic, casual observation, and good old-fashioned common sense. Because the scientific method often requires painstaking effort, it seems reasonable to ask what advantages make it worth the trouble.

Basically, the scientific approach offers two major advantages. The first is its clarity and precision. Commonsense notions about behavior tend to be vague and ambiguous. Consider the old adage "Spare the rod and spoil the child." What exactly does this generalization about childrearing amount to? How severely should children be punished if parents are not to "spare the rod"? How do we assess whether a child qualifies as "spoiled"? A fundamental problem is that such statements have different meanings, depend-

Web Link 2.2



PsycINFO Direct
The definitive resource for information on the scientific literature in psychology is the PsycINFO database of abstracts maintained by the American Psychological Association (see the Personal Application for this chapter). You may be able to access this database for free through your college library. If not, you can purchase access to PsycINFO Direct via the Internet. However, it would be wise to carefully plan your research in advance, as the cost is not cheap (\$9.95 for a 24-hour period).

ing on the person. When people disagree about this assertion, it may be because they are talking about entirely different things. In contrast, the scientific approach requires that people specify *exactly* what they are talking about when they formulate hypotheses. This clarity and precision enhance communication about important ideas.

The second and perhaps greatest advantage offered by the scientific approach is its relative intolerance of error. Scientists are trained to be skeptical. They subject their ideas to empirical tests. They also scrutinize one another's findings with a critical eye. They demand objective data and thorough documentation before they accept ideas. When the findings of two studies conflict, the scientist tries to figure out why, usually by conducting additional research. In contrast, common sense and casual observation often tolerate contradictory generalizations, such as "Opposites attract" and "Birds of a feather flock together." Furthermore, commonsense analyses involve little effort to verify ideas or detect errors. Thus, many "truisms" about behavior that come to be widely believed are simply myths.

All this is not to say that science has an exclusive copyright on truth. However, the scientific approach does tend to yield more accurate and dependable information than casual analyses and armchair speculation do. Knowledge of scientific data can thus provide a useful benchmark against which to judge claims and information from other kinds of sources.

Now that we have had an overview of how the scientific enterprise works, we can focus on how spe-

cific research methods are used. **Research methods consist of various approaches to the observation, measurement, manipulation, and control of variables in empirical studies.** In other words, they are general strategies for conducting studies. No single research method is ideal for all purposes and situations. Much of the ingenuity in research involves selecting and tailoring the method to the question at hand. The next two sections of this chapter discuss the two basic types of methods used in psychology: *experimental research methods* and *descriptive/correlational research methods*.

➤ REVIEW OF KEY POINTS

- The scientific approach assumes that there are laws of behavior that can be discovered through empirical research. The goals of the science of psychology include (1) the measurement and description of behavior, (2) the understanding and prediction of behavior, and (3) the application of this knowledge to the task of controlling behavior.
- By integrating apparently unrelated facts into a coherent whole, theories permit psychologists to make the leap from the description of behavior to the understanding of behavior. Confidence in a theory increases when hypotheses derived from it are supported by research.
- A scientific investigation follows a systematic pattern that includes five steps: (1) formulate a testable hypothesis, (2) select the research method and design the study, (3) collect the data, (4) analyze the data and draw conclusions, and (5) report the findings.
- Scientists use operational definitions to clarify what their variables mean. They depend on statistics to analyze their data. The two major advantages of the scientific approach are its clarity in communication and its relative intolerance of error.

➤ Looking for Causes: Experimental Research

PREVIEW QUESTIONS

- What is the difference between an independent variable and a dependent variable?
- What is the purpose of experimental and control groups?
- What are extraneous variables and confounded variables?
- How can experiments vary in format?
- What are the strengths and weaknesses of experimental research?

Does misery love company? This question intrigued social psychologist Stanley Schachter. When people feel anxious, he wondered, do they want to be left alone, or do they prefer to have others around? Schachter's review of relevant theories suggested that in times of anxiety people would want others around to help them sort out their feelings. Thus, his hypothesis was that increases in anxiety would cause increases in the desire to be with others, which psychologists call the *need for affiliation*. To test this hypothesis, Schachter (1959) designed a clever experiment.

The *experiment* is a research method in which the investigator manipulates a variable under carefully controlled conditions and observes whether any changes occur in a second variable as a result. The experiment is a relatively powerful procedure

that allows researchers to detect cause-and-effect relationships. Psychologists depend on this method more than any other.

Although its basic strategy is straightforward, in practice the experiment is a fairly complicated technique. A well-designed experiment must take into account a number of factors that could affect the clarity of the results. To see how an experiment is designed, let's use Schachter's study as an example.

Independent and Dependent Variables



The purpose of an experiment is to find out whether changes in one variable (let's call it X) cause changes

in another variable (let's call it *Y*). To put it more concisely, we want to find out *how X affects Y*. In this formulation, we refer to *X* as the *independent variable* and to *Y* as the *dependent variable*.

An independent variable is a condition or event that an experimenter varies in order to see its impact on another variable. The independent variable is the variable that the experimenter controls or manipulates. It is hypothesized to have some effect on the dependent variable, and the experiment is conducted to verify this effect. **The dependent variable is the variable that is thought to be affected by manipulation of the independent variable.** In psychology studies, the dependent variable is usually a measurement of some aspect of the participants' behavior. The independent variable is called *independent* because it is *free* to be varied by the experimenter. The dependent variable is called *dependent* because it is thought to *depend* (at least in part) on manipulations of the independent variable.

In Schachter's experiment, *the independent variable was the subjects' anxiety level*. He manipulated anxiety level in a clever way. Participants assembled in his laboratory were told by a "Dr. Zilstein" that they would be participating in a study on the physiological effects of electric shock. They were further informed that during the experiment they would receive a series of electric shocks while their pulse and blood pressure were being monitored. Half of the subjects were warned that the shocks would be very painful. They made up the *high-anxiety* group. The other half of the participants (the *low-anxiety* group) were told that the shocks would be mild and painless. In reality, there was no plan to shock anyone at any time. These orientation procedures were simply intended to evoke different levels of anxiety. After the orientation, the experimenter indicated that there would be a delay while he prepared the shock apparatus for use. The participants were asked whether they would prefer to wait alone or in the company of others. *The participants' desire to affiliate with others was the dependent variable.*

Experimental and Control Groups



In an experiment the investigator typically assembles two groups of subjects who are treated differently with regard to the independent variable. These two groups are referred to as the experimental group and the control group. **The experimental group consists of the subjects who receive some special treatment in regard to the independent variable. The control**

concept check 2.1



Recognizing Independent and Dependent Variables

Check your understanding of the experimental method by identifying the independent variable (IV) and dependent variable (DV) in the following investigations. Note that one study has two IVs and another has two DVs. You'll find the answers in Appendix A in the back of the book.

1. A researcher is interested in how heart rate and blood pressure are affected by viewing a violent film sequence as opposed to a nonviolent film sequence.
IV _____
DV _____
2. An organizational psychologist develops a new training program to improve clerks' courtesy to customers in a large chain of retail stores. She conducts an experiment to see whether the training program leads to a reduction in the number of customer complaints.
IV _____
DV _____
3. A researcher wants to find out how stimulus complexity and stimulus contrast (light/dark variation) affect infants' attention to stimuli. He manipulates stimulus complexity and stimulus contrast and measures how long infants stare at various stimuli.
IV _____
DV _____
4. A social psychologist investigates the impact of group size on subjects' conformity in response to group pressure.
IV _____
DV _____

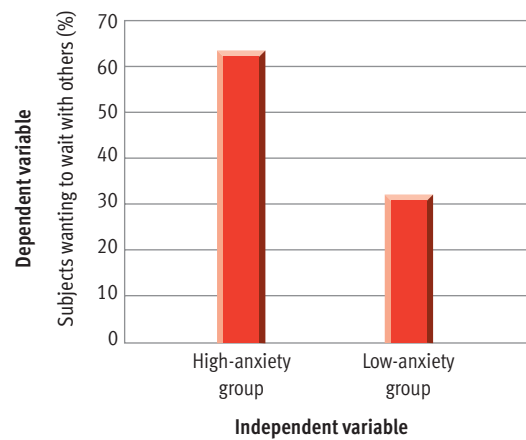
group consists of similar subjects who do not receive the special treatment given to the experimental group.

In the Schachter study, the participants in the high-anxiety condition constituted the experimental group. They received a special treatment designed to create an unusually high level of anxiety. The participants in the low-anxiety condition served as the control group. They were not exposed to the special anxiety-arousing procedure.

It is crucial that the experimental and control groups in a study be alike, except for the different treatment that they receive in regard to the independent variable. This stipulation brings us to the logic that underlies the experimental method. If the two groups are alike in all respects *except for the variation created by the manipulation of the independent variable*, any differences between the two groups on the dependent variable *must be due to the manipulation of the independent variable*. In this way researchers isolate the effect of the independent variable on the dependent variable. Schachter, for example, isolated the impact of anxiety on the need for affiliation. As predicted, he found that increased anxiety led to

Figure 2.4

Results of Schachter's study of affiliation. The percentage of people wanting to wait with others was higher in the high-anxiety (experimental) group than in the low-anxiety (control) group, consistent with Schachter's (1959) hypothesis that anxiety would increase the desire for affiliation. The graphic portrayal of these results allows us to see at a glance the effects of the experimental manipulation on the dependent variable.



increased affiliation. As **Figure 2.4** indicates, the percentage of participants in the high-anxiety group who wanted to wait with others was nearly twice that of the low-anxiety group.

Web Link 2.3



Psychological Research on the Net

This site, sponsored by the American Psychological Society, is a jumping-off point for people interested in participating in ongoing research projects that are collecting data over the Internet. Visitors will find a host of opportunities for taking part in genuine research.

Extraneous Variables



As we have seen, the logic of the experimental method rests on the assumption that the experimental and control groups are alike except for their treatment in regard to the independent variable. Any other differences between the two groups can cloud the situation and make it impossible to draw conclusions about how the independent variable affects the dependent variable.

In practical terms, of course, it is impossible to ensure that two groups of participants are exactly alike in *every* respect. In reality, the experimental and control groups have to be alike only on dimensions relevant to the dependent variable. Thus, Schachter did not need to worry about whether his two groups were similar in hair color, height, or interest in ballet, as these variables were unlikely to influence the dependent variable of affiliation behavior.

Instead, experimenters concentrate on ensuring that the experimental and control groups are alike on a limited number of variables that could have a bearing on the results of the study. These variables are called extraneous, secondary, or nuisance variables. **Extraneous variables are any variables other than the independent variable that seem likely to influence the dependent variable in a specific study.**

In Schachter's study, one extraneous variable would have been the subjects' tendency to be sociable. Why? Because participants' sociability could affect their desire to be with others (the dependent variable). If the participants in one group had happened to be more sociable (on the average) than those in the other

group, the variables of anxiety and sociability would have been confounded. **A confounding of variables occurs when two variables are linked together in a way that makes it difficult to sort out their specific effects.** When an extraneous variable is confounded with an independent variable, a researcher cannot tell which is having what effect on the dependent variable.

Unanticipated confoundings of variables have wrecked innumerable experiments. That is why so much care, planning, and forethought must go into designing an experiment. One of the key qualities that separates a talented experimenter from a mediocre one is the ability to foresee troublesome extraneous variables and control them to avoid confoundings.

Experimenters use a variety of safeguards to control for extraneous variables. For instance, subjects are usually assigned to the experimental and control groups randomly. **Random assignment of subjects occurs when all subjects have an equal chance of being assigned to any group or condition in the study.** When experimenters distribute subjects into groups through some random procedure, they can be reasonably confident that the groups will be similar in most ways. **Figure 2.5** provides an overview of the elements in an experiment, using Schachter's study as an example.

Variations in Designing Experiments



We have discussed the experiment in only its simplest format, with just one independent variable and one dependent variable. Actually, many variations are possible in conducting experiments. Because you'll be learning about experiments with more complicated designs, these variations merit a brief mention.

First, it is sometimes advantageous to use only one group of subjects who serve as their own control group. The effects of the independent variable are evaluated by exposing this single group to two different conditions—an *experimental condition* and a *control condition*. For example, imagine that you wanted to study the effects of loud music on typing performance. You could have a group of participants work on a typing task while loud music was played (experimental condition) and in the absence of music (control condition). This approach would ensure that the participants in the experimental and control conditions would be alike on any extraneous variables involving their personal characteristics, such as motivation or typing skill. After all, the same people would be studied in both conditions.

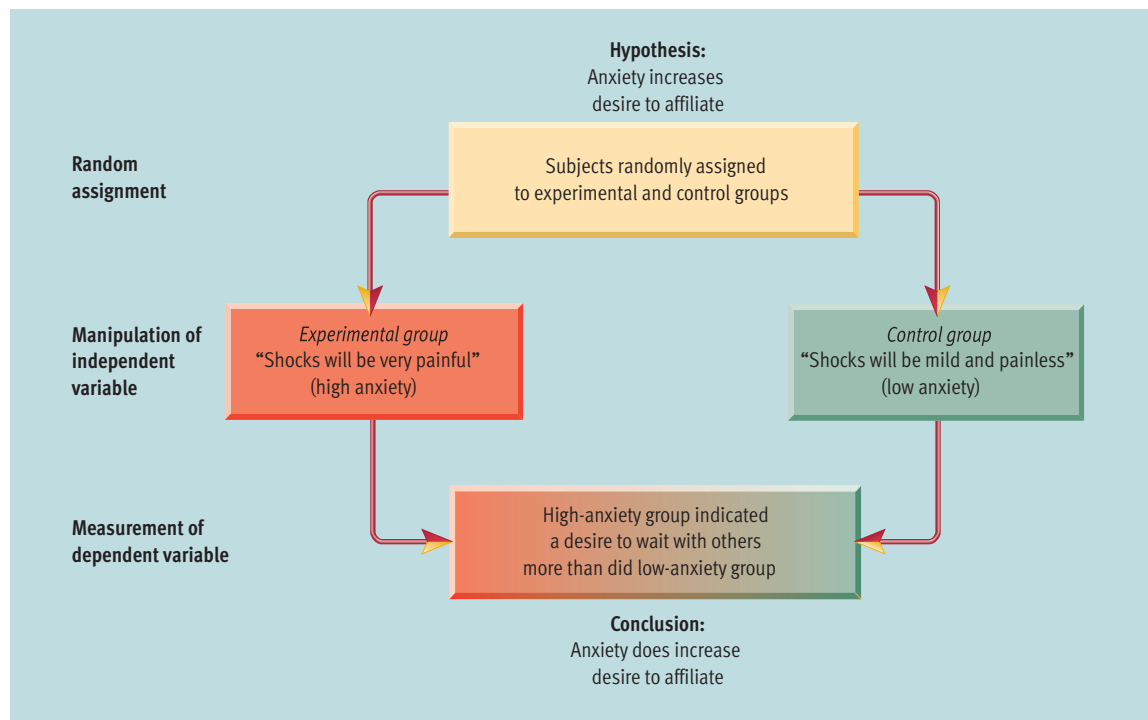


Figure 2.5
The basic elements of an experiment. As illustrated by the Schachter (1959) study, the logic of experimental design rests on treating the experimental and control groups exactly alike (to control for extraneous variables) except for the manipulation of the independent variable. In this way, the experimenter attempts to isolate the effects of the independent variable on the dependent variable.

Second, it is possible to manipulate more than one independent variable in a single experiment. Researchers often manipulate two or three independent variables to examine their joint effects on the dependent variable. For example, in another study of typing performance, you could vary both room temperature and the presence of distracting music (see Figure 2.6). The main advantage of this approach is that it permits the experimenter to see whether two variables interact. An *interaction* means that the effect of one variable depends on the effect of another. For instance, if we found that distracting music impaired typing performance only when room temperature was high, we would be detecting an interaction.

Third, it is also possible to use more than one dependent variable in a single study. Researchers frequently use a number of dependent variables to get a more complete picture of how experimental manipulations affect subjects' behavior. For example, in your studies of typing performance, you would probably measure two dependent variables: speed (words per minute) and accuracy (number of errors).

Now that you're familiar with the logic of the experiment, let's turn to our Featured Study for Chapter 2. You will find a Featured Study in each chapter from this point onward. These studies are provided to give you in-depth examples of how psychologists conduct empirical research. Each is described in a way that resembles a journal article, thereby acquainting you with the format of scientific reports (see the Personal Application at the end of the chapter for more

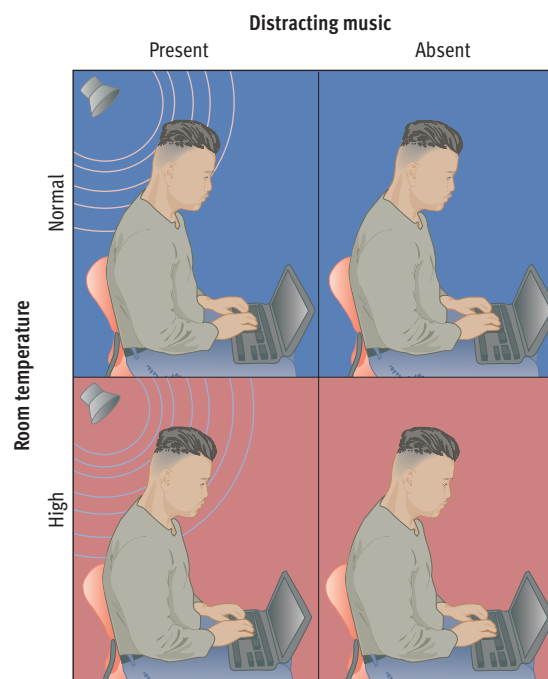


Figure 2.6
Manipulation of two independent variables in an experiment. As this example shows, when two independent variables are manipulated in a single experiment, the researcher has to compare four groups of subjects (or conditions) instead of the usual two. The main advantage of this procedure is that it allows an experimenter to see whether two variables interact.

information on this format). The Featured Study for this chapter gives you another example of an experiment in action.

FEATURED Study

Source: Shepperd, J. A., & McNulty, J. K. (2002). The affective consequences of expected and unexpected outcomes. *Psychological Science*, 13, 85–88.

The Emotional Fallout of Expected and Unexpected Outcomes

Common sense suggests that people feel good when they experience positive outcomes and that they are disappointed when they experience setbacks, but Shepperd and McNulty theorize that people's reactions to events aren't that simple—that outcomes are judged *relative to expectations*. According to decision affect theory (Mellers et al., 1997), people's feelings about events are determined in part by comparing what actually happened with what *might* have been. Hence, two outcomes that are objectively the same can produce very different emotional reactions depending on the participant's expectations. Specifically, they hypothesized *that bad outcomes feel worse when unexpected than when expected and that positive outcomes feel better when unexpected than when expected*.

Their first test of this hypothesis consisted of a small survey in which students rated how happy they would feel in response to four scenarios: (1) they expected to earn an A in a course and they received an A, (2) they expected an A and they got a C, (3) they expected a C and got an A, and (4) they expected a C and got a C. Subjects' ratings of how they would feel about each of these scenarios, which can be seen in **Figure 2.7**, supported the hypothesis that events are judged relative to expectations. After obtaining these encouraging findings, Shepperd and McNulty then put their hypothesis to an experimental test.

Method

Participants. Ninety introductory psychology students (25 males, 65 females) served as subjects. They earned credit toward a course requirement mandating participation in research. They participated in groups of 1 to 3 people.

Procedure. Subjects met an experimenter wearing a lab coat who appeared to be affiliated with the university hospital. They were told that the study was concerned with their attitudes about a new home medical test that was designed to detect a plausible-sounding but fictitious medical condition (an enzyme deficiency). They were given the (bogus) medical test, which required them to hold a strip under their tongue for 30 seconds. The strips were collected and taken away for analysis. In a few minutes the experimenter returned and gave each participant a sealed envelope containing his or her test results. Subjects' expectations were manipulated as follows. Half the subjects were told that the enzyme deficiency was uncommon among college students, so they expected good news, whereas the other half were told that the enzyme deficiency was prevalent among college students, so they expected bad news. After getting their test results, participants were asked to rate their emotions. After their ratings were turned in, they were thoroughly debriefed about the true nature of the study.

Figure 2.7

Effects of expectations on reactions to grades. Shepperd and McNulty (2002) asked subjects to rate how happy they would feel if they experienced each of the grading scenarios described on the right. As predicted, a positive outcome (receiving an A) resulted in greater happiness when it was unexpected, and a negative outcome (receiving a C) generated more disappointment when it was unexpected. (Based on Shepperd & McNulty, 2002)

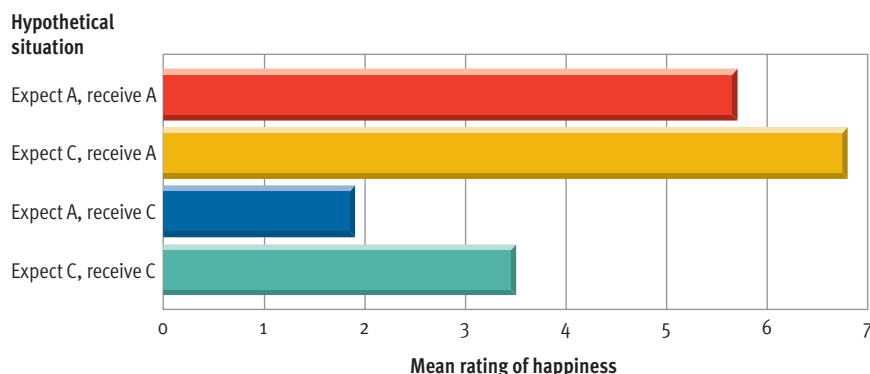
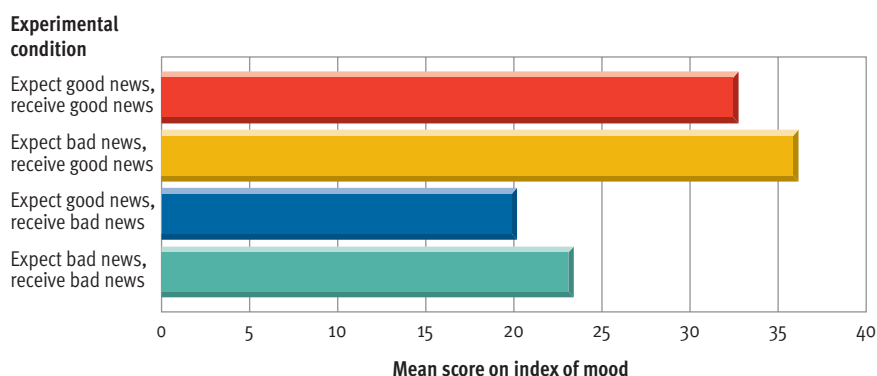


Figure 2.8

Effects of expectations on reactions to positive and negative outcomes. In their experiment, Shepperd and McNulty (2002) manipulated subjects' expectations about the likely result of an apparent medical test. After receiving either good or bad test results, participants filled out ratings of their emotions that were summed into the mood scores graphed here. As you can see, people felt better about good news when it was unexpected, and they felt better about bad news when it was expected. (Based on Shepperd & McNulty, 2002)



Results

The data are summarized in **Figure 2.8**, which shows the mean emotion ratings for each condition. As predicted, subjects who were informed that they tested positive for the enzyme deficiency felt worse when this news was unexpected than when it was expected. And those who were told that they did not have the enzyme deficiency felt better when this result was unexpected than when it was expected.

Discussion

The authors conclude that their results provide strong support for their hypothesis that people's expectations color their evaluation of events—in a study that was realistic and highly involving to participants. As they put it, "People feel bad when their outcomes fall short of their expectations and feel elated when their outcomes

exceed their expectations" (p. 87). They note that their findings are consistent with the folk wisdom contained in the advice "Expect the worst and you will never be disappointed."

Comment

This study was featured because it addresses an interesting question using a reasonably straightforward experimental design. It also provides a nice demonstration of one of this text's unifying themes—that people's experience of the world is highly subjective. It shows how two individuals can experience the same event—for example, getting a grade of C in a course—but react to it very differently. The study also highlights the enormous power of expectations, which is a phenomenon that we will see repeatedly as we proceed through this book.

Advantages and Disadvantages of Experimental Research

The experiment is a powerful research method. Its principal advantage is that it permits conclusions about cause-and-effect relationships between variables. Researchers are able to draw these conclusions about causation because the precise control available in the experiment allows them to isolate the relationship between the independent variable and the dependent variable while neutralizing the effects of extraneous variables. No other research method can duplicate this strength of the experiment. This advantage is why psychologists usually prefer to use the experimental method whenever possible.

For all its power, however, the experiment has limitations. One problem is that experiments are often artificial. Because experiments require great control over proceedings, researchers must often construct simple, contrived situations to test their hypotheses experimentally. For example, to investigate decision making in juries, psychologists have conducted many experiments in which subjects read a brief summary of a trial and then record their individual "verdicts" of innocence or guilt. This approach allows the experimenter to manipulate a variable, such as the race of the defendant, to see whether it affects the participants' verdicts. However, critics have pointed out that having a participant read a short case summary and make an individual decision cannot really compare to the complexities of real trials (Weiten & Diamond, 1979). In actual court cases, jurors may spend

weeks listening to confusing testimony while making subtle judgments about the credibility of witnesses. They then retire for hours of debate to arrive at a group verdict, which is quite different from rendering an individual decision. Many researchers have failed to do justice to this complex process in their laboratory experiments. When experiments are highly artificial, doubts arise about the applicability of findings to everyday behavior outside the experimental laboratory.

Another disadvantage is that the experimental method can't be used to explore some research questions. Psychologists are frequently interested in the effects of factors that cannot be manipulated as independent variables because of ethical concerns or practical realities. For instance, you might be interested in whether a nutritionally poor diet during pregnancy increases the likelihood of birth defects. This clearly is a significant issue. However, you obviously cannot select 100 pregnant women and assign 50 of them to a condition in which they consume an inadequate diet. The potential risk to the health of the women and their unborn children would make this research strategy unethical.

In other cases, manipulations of variables are difficult or impossible. For example, you might want to know whether being brought up in an urban as opposed to a rural area affects people's values. An experiment would require you to randomly assign similar families to live in urban and rural areas, which obviously is impossible to do. To explore this question, you would have to use descriptive/correlational research methods, which we turn to next.

➤ REVIEW OF KEY POINTS

- Experimental research involves the manipulation of an independent variable to determine its effect on a dependent variable. This research is usually done by comparing experimental and control groups, which must be alike in regard to important extraneous variables.
- Any differences between the groups in the dependent variable ought to be due to manipulation of the independent variable, as long as there are no confounds. Variables are said to be confounded when they vary together so that researchers cannot isolate the effect of the independent variable on the dependent variable.
- Experimental designs may vary. For example, sometimes an experimental group serves as its own control group. And many experiments have more than one independent variable or more than one dependent variable.
- In our first Featured Study, Shepperd and McNulty (2002) used the experimental method to demonstrate that emotional reactions to events depend on people's expectations.
- The experiment is a powerful research method that permits conclusions about cause-and-effect relationships between variables. However, the experimental method is often not usable for a specific problem, and many experiments tend to be artificial.

➤ Looking for Links: Descriptive/Correlational Research

PREVIEW QUESTIONS

- How does naturalistic observation work?
- How can case studies be used to look for general principles of behavior?
- Why do researchers use surveys?
- What are the strengths and weaknesses of descriptive/correlational research?

As we just noted, in some situations psychologists cannot exert experimental control over the variables they want to study. In such situations, investigators must rely on *descriptive/correlational research methods*. These methods include naturalistic observation, case studies, and surveys. What distinguishes these methods is that the researcher cannot manipulate the variables under study. This lack of control means that these methods cannot be used to demonstrate cause-and-effect relationships between variables. *Descriptive/correlational methods permit investigators to only describe patterns of behavior and discover links or associations between variables.* That is not to suggest that associations are un-

important. You'll see in this section that information on associations between variables can be extremely valuable in our efforts to understand behavior.

Naturalistic Observation

Does the pace of everyday life vary substantially from one culture to the next? Do people operate at a different speed in say, Germany, as opposed to Canada or Brazil? Are factors such as economic vitality and climate related to differences in the pace of life? These are the kinds of questions that intrigued Robert V. Levine and Ara Norenzayan (1999), who compared the pace of life in 31 countries around the world. Perhaps they could have devised an experiment to examine this question, but they wanted to focus on the pace of life in the real world rather than in the laboratory.

To study the pace of life, Levine and Norenzayan (1999) had to come up with concrete ways to measure it—their operational definition of the concept. The measure they chose depended on *naturalistic observation*. **In naturalistic observation a researcher engages in careful observation of behavior without intervening directly with the subjects.** In this instance, the researchers observed (1) the average walking speed in downtown locations, (2) the accuracy of public clocks, and (3) the speed with which postal clerks completed a simple request. Their collection of data on walking speed illustrates the careful planning required to execute naturalistic observation effectively. In the main downtown area of each city, they had to find two flat, unobstructed, uncrowded 60-foot walkways where they could unobtrusively time pedestrians during normal business hours. Only adult pedestrians walking alone and not window shopping were timed. In most cities, the observations continued until 35 men and 35 women had been timed.

Naturalistic observation can be complex and challenging, as the study by Levine and Norenzayan (1999) illustrates. One of their measures of the pace of life in 31 cultures involved estimating people's walking speed in downtown locations. To reduce the influence of confounding factors, they had to find sidewalks that were unobstructed, uncrowded, not dominated by window shoppers, and so forth. Moreover, they had to find reasonably comparable locations in 31 very different types of cities.



© Carl & Ann Purcell/Corbis

Table 2-2 Levine and Norenzayan's (1999) Ranking of the Pace of Life in 31 Cultures

Rank	Country	Rank	Country	Rank	Country
1	Switzerland	11	France	21	Greece
2	Ireland	12	Poland	22	Kenya
3	Germany	13	Costa Rica	23	China
4	Japan	14	Taiwan	24	Bulgaria
5	Italy	15	Singapore	25	Romania
6	England	16	United States	26	Jordan
7	Sweden	17	Canada	27	Syria
8	Austria	18	S. Korea	28	El Salvador
9	Netherlands	19	Hungary	29	Brazil
10	Hong Kong	20	Czech Republic	30	Indonesia
				31	Mexico

Source: Adapted from Levine, R. V., & Norenzayan, A. (1999). The pace of life in 31 countries. *Journal of Cross-Cultural Psychology*, 30 (2), 178–205. Copyright © 1999 by Sage Publications. Reprinted by permission.

Levine and Norenzayan conducted their naturalistic observations in 31 countries, typically using the largest city in each country as the locale for their research. Their findings, based on all three measures, are summarized in **Table 2.2**, which ranks the pace of life in the countries studied. Their data suggest that the pace of life is fastest in the countries of Western Europe and in Japan. Using archival data, they also conducted correlational analyses to see whether variations in the pace of life were associated with factors such as climate, economic vitality, or population size. Among other things, they found that the pace of life was faster in colder climates and in countries that were more economically productive.

This type of research is called *naturalistic* because behavior is allowed to unfold naturally (without interference) in its natural environment—that is, the setting in which it would normally occur. The major strength of naturalistic observation is that it allows researchers to study behavior under conditions that are less artificial than in experiments. A major problem with this method is that researchers often have trouble making their observations unobtrusively so they don't affect their participants' behavior.

Case Studies

What portion of people who commit suicide suffer from psychological disorders? Which disorders are most common among victims of suicide? In health care visits during the final month of their lives, do people who commit suicide communicate their intent to do so? A research team in Finland wanted to investigate the psychological characteristics of people who take their own lives (Henriksson et al., 1993;

Isometsa et al., 1995). Other researchers had explored these questions, but the Finnish team planned a comprehensive, national study of unprecedented scope. Their initial sample consisted of all the known suicides in Finland for an entire year.

The research team decided that their question called for a case study approach. **A case study is an in-depth investigation of an individual subject.** When this method is applied to victims of suicide the case studies are called *psychological autopsies*. A variety of data collection techniques can be used in case studies. In normal circumstances, when the participants are not deceased, typical techniques include interviewing the subjects, interviewing people who are close to the subjects, direct observation of the subjects, examination of records, and psychological testing. In this study, the investigators conducted thorough interviews with the families of the suicide victims and with the health care professionals who had treated them. The researchers also examined the suicide victims' medical, psychiatric, and social agency records, as well as relevant police investigations and forensic reports. Comprehensive case reports were then assembled for each person who committed suicide.

These case studies revealed that in 93% of the suicides the victim suffered from a significant psychological disorder (Henriksson et al., 1993). The most common diagnoses, by a large margin, were depression and alcohol dependence. In 571 cases, victims had a health care appointment during the last four weeks of their lives, but only 22% of these people discussed the possibility of suicide during their final visit (Isometsa et al., 1995). Even more surprising, the sample included 100 people who saw a health pro-

Web Link 2.4



PSYCLine: Your Guide to Psychology and Social Science Journals on the Web

Relatively few journals actually post their articles online for free. But this searchable index to the online sites of more than 2000 psychology journals may lead you to recent tables of contents or abstracts or help you identify research resources on more unusual topics in psychology.



Figure 2.9

An example of a case study report. As this example illustrates, case studies are particularly appropriate for clinical situations in which efforts are made to diagnose and treat psychological problems. Usually, one case study does not provide much basis for deriving general laws of behavior. However, if you examine a series of case studies involving similar problems, you can look for threads of consistency that may yield general conclusions.

SOURCE: Greenfeld, D. (1985). *The psychotic patient: Medication and psychotherapy*. New York: The Free Press. Copyright © 1985 by David Greenfeld. Reprinted by permission of the author.

Case Study

Page 2

Jennie is a 21-year-old single college student with no prior psychiatric history. She was admitted to a short-term psychiatric ward from a hospital emergency room with a chief complaint of "I think I was psychotic." For several months prior to her admission she reported a series of "strange experiences." These included religious experiences, increased anxiety, a conviction that other students were conspiring against her, visual distortions, auditory hallucinations, and grandiose delusions. During the week prior to admission, the symptoms gradually worsened, and eventually she became agitated and disorganized.

A number of stressful events preceded this decompensation. A maternal aunt, a strong and central figure in her family, had died four months previously. As a college senior, she was struggling with decisions about her career choices following graduation. She was considering applying to graduate programs but was unable to decide which course of study she preferred. She was very much involved with her boyfriend, also a college senior. He, too, was struggling with anxiety about graduation, and it was not clear that their relationship would continue. The patient also reported feeling pressured and overextended.

The patient's older sister had suffered two psychotic episodes. This sister had slowly deteriorated, particularly after

professional on the same day they killed themselves, yet only 21% of these individuals raised the issue of suicide. The investigators concluded that mental illness is a contributing factor in virtually all completed suicides and that the vast majority of suicidal people do not spontaneously reveal their intentions to health care professionals.

Clinical psychologists, who diagnose and treat psychological problems, routinely do case studies of their clients (see **Figure 2.9**). When clinicians assemble a case study for diagnostic purposes, they generally are *not* conducting empirical research. Case study *research* typically involves investigators analyzing a collection of case studies to look for patterns that permit general conclusions.

Case studies are particularly well suited for investigating certain phenomena, such as psychological disorders. They can also provide compelling, real-life illustrations that bolster a hypothesis or theory. However, the main problem with case studies is that they are highly subjective. Information from several sources must be knit together in an impressionistic way. In this process, clinicians and researchers often focus selectively on information that fits with their expect-

tations, which usually reflect their theoretical slant. Thus, it is relatively easy for investigators to see what they expect to see in case study research.

Surveys

Are taller people more successful in life? That would hardly seem fair, but folk wisdom suggests that height is associated with success. Some empirical studies of this issue have been conducted over the years, but many of them are extremely old and hobbled by a variety of methodological weaknesses. Hence, Timothy Judge and Daniel Cable (2004) set out to conduct a thorough investigation of the relationship between height and income. Their study depended on survey data. **In a survey researchers use questionnaires or interviews to gather information about specific aspects of participants' background and behavior.** In this case, Judge and Cable examined already-existing data that had been collected in four large-scale surveys that were concerned with other issues. Information on height and income were available for over 8000 participants from these studies.

What did the survey data reveal? In all four studies a modest association was found between height and income, with taller people earning more money. The association was not particularly strong, but it was not negligible. For example, based on their data, Judge and Cable estimated that someone 6 feet tall would earn \$166,000 more during a 30-year career than someone 5 feet 5 inches tall. The relationship between greater height and greater income held for both men and women. The strength of the association varied somewhat across occupational areas. The height-income link was strongest for people in sales or management. The authors conclude that "our analyses revealed that height clearly matters in the context of workplace success" (p. 437). They discuss a variety of possible explanations for the association between height and earnings. Among other things, they note that taller people may develop higher self-esteem, which could foster better performance. Another possibility is that people just assume that taller individuals are more capable and competent and hence are more likely to buy products from them, hire them for good jobs, and promote them into even better positions. The exact mechanisms underlying the correlation between height and income are yet to be determined.

Surveys are often used to obtain information on aspects of behavior that are difficult to observe directly. Surveys also make it relatively easy to collect data on attitudes and opinions from large samples of participants. The major problem with surveys is that they depend on self-report data. As we'll discuss later,





intentional deception, wishful thinking, memory lapses, and poorly worded questions can distort participants' verbal reports about their behavior (Krosnick, 1999).

Advantages and Disadvantages of Descriptive/Correlational Research

Descriptive/correlational research methods have advantages and disadvantages, which are compared to the strengths and weaknesses of experimental research

in **Figure 2.10**. As a whole, the foremost advantage of these methods is that they give researchers a way to explore questions that could not be examined with experimental procedures. For example, after-the-fact analyses would be the only ethical way to investigate the possible link between poor maternal nutrition and birth defects in humans. In a similar vein, if researchers hope to learn how urban and rural upbringing relate to people's values, they have to depend on descriptive methods, since they can't control where subjects grow up. Thus, *descriptive/correlational research broadens the scope of phenomena that psychologists are able to study*.

Figure 2.10
Comparison of major research methods. This chart pulls together a great deal of information on key research methods in psychology and gives a simple example of how each method might be applied in research on aggression. As you can see, the various research methods each have their strengths and weaknesses.

Overview of key research methods in psychology				
Research method	Description	Example	Advantages	Disadvantages
<div>Experiment</div> <div></div>	Manipulation of an independent variable under carefully controlled conditions to see whether any changes occur in a dependent variable	Youngsters are randomly assigned to watch a violent or nonviolent film, and their aggression is measured in a laboratory situation	Precise control over variables; ability to draw conclusions about cause-and-effect relationships	Contrived situations often artificial; ethical concerns and practical realities preclude experiments on many important questions
<div>Naturalistic observation</div> <div></div>	Careful, usually prolonged observation of behavior without direct intervention	Youngsters' spontaneous acts of aggression during recreational activities are observed unobtrusively and recorded	Minimizes artificiality; can be good place to start when little is known about phenomena under study	Often difficult to remain unobtrusive; can't explain why certain patterns of behavior were observed
<div>Case studies</div> <div></div>	In-depth investigation of a single participant using direct interview, direct observation, and other data collection techniques	Detailed case histories are worked up for youngsters referred to counseling because of excessive aggressive behavior	Well-suited for study of certain phenomena; can provide compelling illustrations to support a theory	Subjectivity makes it easy to see what one expects to see based on one's theoretical slant; clinical samples often unrepresentative
<div>Surveys</div> <div></div>	Use of questionnaires or interviews to gather information about specific aspects of participants' behavior	Youngsters are given questionnaire that describes hypothetical scenarios and are asked about the likelihood of aggressive behavior	Can gather data on difficult-to-observe aspects of behavior; relatively easy to collect data from large samples	Self-report data often unreliable, due to intentional deception, social desirability bias, response sets, memory lapses, and wishful thinking

concept check 2.2

Matching Research Methods to Questions




Check your understanding of the uses and strengths of various research methods by figuring out which method would be optimal for investigating the following questions about behavioral processes. Choose from the following methods: (a) experiment, (b) naturalistic observation, (c) case study, and (d) survey. Indicate your choice (by letter) next to each question. You'll find the answers in Appendix A in the back of the book.

- _____ 1. Are people's attitudes about nuclear disarmament related to their social class or education?
- _____ 2. Do people who suffer from anxiety disorders share similar early childhood experiences?
- _____ 3. Do troops of baboons display territoriality—that is, do they mark off an area as their own and defend it from intrusion by other baboons?
- _____ 4. Can the presence of food-related cues (delicious-looking desserts in advertisements, for example) cause an increase in the amount of food that people eat?

Unfortunately, descriptive methods have one significant disadvantage: Investigators cannot control events to isolate cause and effect. *Consequently, correlational research cannot demonstrate conclusively that two variables are causally related.* As an example, con-






sider the cross-cultural investigation of the pace of life that we discussed earlier. Although Levine and Norenzayan (1999) found an association between colder climates and a faster pace of life, their data do not permit us to conclude that a cold climate *causes* a culture to move at a faster pace. Too many factors were left uncontrolled in the study. For example, we do not know how similar the cold and warm cities were. Climate could co-vary with some other factors, such as modernization or economic vitality, that might have led to the observed differences in the pace of life.

REVIEW OF KEY POINTS

-  Psychologists rely on descriptive/correlational research when they are unable to manipulate the variables they want to study. Naturalistic observation involves careful, prolonged observation of behavior in its natural setting without any intervention.
-  Clinical research depends heavily on case studies, which involve in-depth investigations of individuals. In a survey, researchers interview participants or administer questionnaires to gather information on specific aspects of behavior.
-  Descriptive/correlational research methods allow psychologists to explore issues that might not be open to experimental investigation. However, these research methods cannot demonstrate cause-effect relationships.

Looking for Conclusions: Statistics and Research

PREVIEW QUESTIONS

-  What are the three measures of central tendency?
-  How do researchers measure variability?
-  What is the difference between positive and negative correlations?
-  How is correlation related to prediction and causation?
-  What does statistical significance mean?

Whether researchers use experimental or correlational methods, they need some way to make sense of their data. **Statistics is the use of mathematics to organize, summarize, and interpret numerical data.** Statistical analyses permit researchers to draw conclusions based on their observations. Many students find statistics intimidating, but statistics are an integral part of modern life. Although you may not realize it, you are bombarded with statistics nearly every day. When you read about economists' projections for inflation, when you check a baseball player's batting average, when you see the popularity ratings of television shows, you are dealing with statistics. In this section, we will examine a few basic statistical concepts that will help you understand the research discussed throughout this book. For the most part, we won't concern ourselves with the details of statistical *computations*. These details and some additional statistical concepts are discussed in Appendix B at the back of the book. At this juncture, we will discuss only the purpose, logic, and value of the two basic types of statistics: descriptive statistics and inferential statistics.

Descriptive Statistics

Descriptive statistics are used to organize and summarize data. They provide an overview of numerical data. Key descriptive statistics include measures of central tendency, measures of variability, and the coefficient of correlation. Let's take a brief look at each of these.

Central Tendency

In summarizing numerical data, researchers often want to know what constitutes a typical or average score. To answer this question, they use three measures of central tendency: the median, the mean, and the mode. **The median is the score that falls exactly in the center of a distribution of scores.** Half of the scores fall above the median and half fall below it. **The mean is the arithmetic average of the scores in a distribution.** It is obtained by adding up all the scores and dividing by the total number of scores. Finally, **the mode is the most frequent score in a distribution.**

In general, the mean is the most useful measure of central tendency because additional statistical manipulations can be performed on it that are not possible with the median or mode. However, the mean is sensitive to extreme scores in a distribution, which can sometimes make the mean misleading. To illustrate, imagine that you're interviewing for a sales position at a company. Unbeknownst to you, the company's five salespeople earned the following incomes in the previous year: \$20,000, \$20,000, \$25,000, \$35,000, and \$200,000. You ask how much the typical salesperson earns in a year. The sales director proudly announces that her five salespeople earned a *mean* income of \$60,000 last year (the calculations are shown in **Figure 2.11**). However, before you order that expensive new sports car, you had better inquire about the *median* and *modal* income for the sales staff. In this case, one extreme score (\$200,000) has inflated the mean, making it unrepresentative of the sales staff's earnings. In this instance, the median (\$25,000) and the mode (\$20,000) both provide better estimates of what you are likely to earn.

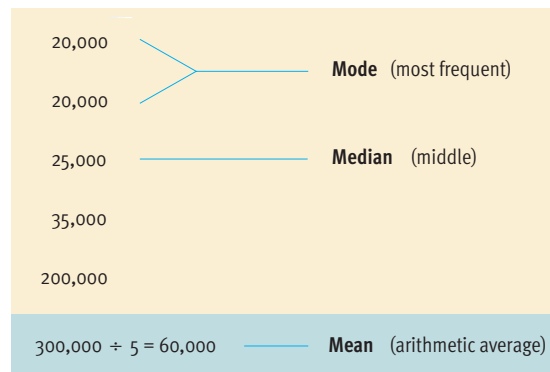


Figure 2.11
Measures of central tendency. The three measures of central tendency usually converge, but that is not always the case, as these data illustrate. Which measure is most useful depends on the nature of the data. Generally, the mean is the best index of central tendency, but in this instance the median is more informative.

Variability



In describing a set of data it is often useful to have some estimate of the variability among the scores. **Variability refers to how much the scores in a data set vary from each other and from the mean. The standard deviation is an index of the amount of variability in a set of data.** When variability is great, the standard deviation will be relatively large. When variability is low, the standard deviation will be smaller. This relationship is apparent if you examine the two sets of data in **Figure 2.12**. The mean is the same for both sets of scores, but variability clearly is greater in set B than in set A. This greater variability yields a higher standard deviation for set B than for set A. Estimates of variability play a crucial role when researchers use statistics to decide whether the results of their studies support their hypotheses.

Correlation



A correlation exists when two variables are related to each other. Investigators often want to quantify the strength of an association between two variables, such as between class attendance and course grades, or between cigarette smoking and physical disease. In this effort, they depend extensively on a useful descriptive statistic: the correlation coefficient. **The correlation coefficient is a numerical index of the degree of relationship between two variables.** A correlation coefficient indicates (1) the direction (positive or negative) of the relationship and (2) how strongly the two variables are related.

Positive Versus Negative Correlation. A *positive correlation* indicates that two variables co-vary in the *same* direction. This means that high scores on variable X are associated with high scores on variable Y and that low scores on variable X are associated with low scores on variable Y. For example, a positive correlation exists between high school grade point average (GPA) and subsequent college GPA. That is, people who do well in high school tend to do well in college, and those who perform poorly in high school tend to perform poorly in college (see **Figure 2.13** on the next page).

In contrast, a *negative correlation* indicates that two variables co-vary in the *opposite* direction. This means that people who score high on variable X tend to score low on variable Y, whereas those who score low on X tend to score high on Y. For example, in most college courses a negative correlation exists between how frequently students are absent and how well they perform on exams. Students who have a high number of absences tend to get low exam scores, while students who have a low number of absences tend to earn higher exam scores (see **Figure 2.13**).

If a correlation is negative, a minus sign (–) is always placed in front of the coefficient. If a correlation

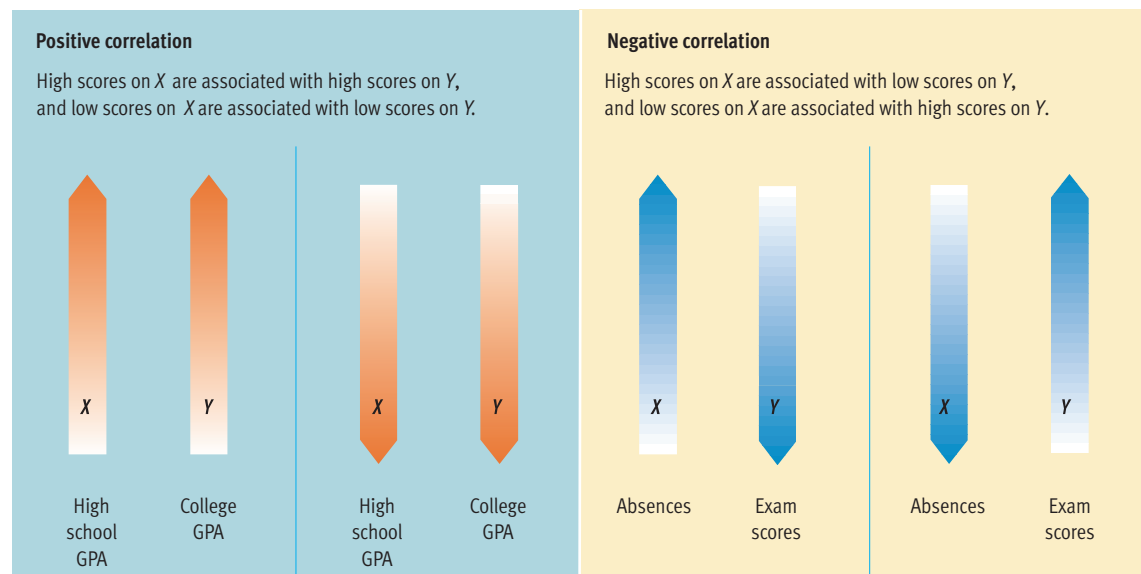
Speed (miles per hour)		
Set A Perfection Boulevard		Set B Wild Street
35		21
34		37
33		50
37		28
38		42
40		37
36		39
33		25
34		23
30		48
35	Mean	35
2.87	Standard deviation	10.39

Figure 2.12
Variability and the standard deviation. Although these two sets of data produce the same mean, or average, an observer on Wild Street would see much more variability in the speeds of individual cars than an observer on Perfection Boulevard would. As you can see, the standard deviation for set B is higher than that for set A because of the greater variability in set B.

Figure 2.13

Positive and negative correlation.

Notice that the terms *positive* and *negative* refer to the direction of the relationship between two variables, not to its strength. Variables are positively correlated if they tend to increase and decrease together and they are negatively correlated if one tends to increase when the other decreases.



is positive, a plus sign (+) may be placed in front of the coefficient, or the coefficient may be shown with no sign. Thus, if there's no sign, the correlation is positive.

depends only on the *size* of the coefficient. The positive or negative sign simply indicates the *direction* of the relationship. Therefore, a correlation of $-.60$ reflects a stronger relationship than a correlation of $+.30$.

Web Link 2.5



HyperStat Online

For psychology researchers who find they've temporarily misplaced their statistics textbook, here's one written in hypertext by Professor David M. Lane of Rice University, and it's always available free online. He also includes links to excellent resources involving statistics, the analysis of experimental data, and even some statistical humor.

Strength of the Correlation. Whereas the positive or negative sign indicates the direction of an association, the *size of the coefficient* indicates the *strength* of an association between two variables. The coefficient can vary between 0 and $+1.00$ (if positive) or between 0 and -1.00 (if negative). A coefficient near 0 indicates no relationship between the variables; that is, high or low scores on variable X show no consistent relationship to high or low scores on variable Y. A coefficient of $+1.00$ or -1.00 indicates a perfect, one-to-one correspondence between the two variables. Most correlations fall between these extremes.

The closer the correlation is to either -1.00 or $+1.00$, the stronger the relationship (see Figure 2.14). Thus, a correlation of $.90$ represents a stronger tendency for variables to be associated than a correlation of $.40$ does. Likewise, a correlation of $-.75$ represents a stronger relationship than a correlation of $-.45$. Keep in mind that the *strength* of a correlation

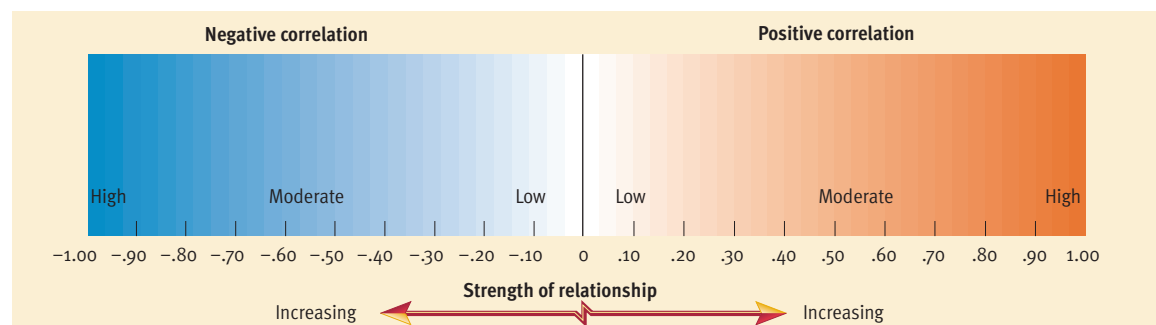
To give you some concrete examples of correlation coefficients of different strengths, let's revisit some of the studies we have discussed in this section. In our earlier example of naturalistic observation, Levine and Norenzayan (1999) found a robust correlation of $+.74$ between a measure of economic vitality (gross domestic product per capita) and the overall pace of life in various cultures, but they found a negligible correlation ($-.07$) between population size and the pace of life. In our earlier example of survey research, Judge and Cable (2004) found an average correlation of $.29$ between height and income. Thus, the computation of correlation coefficients permits researchers to precisely quantify the strength of the associations between variables.

Correlation and Prediction. You may recall that one of the key goals of scientific research is accurate *prediction*. A close link exists between the magnitude

Figure 2.14

Interpreting correlation coefficients.

The magnitude of a correlation coefficient indicates the strength of the relationship between two variables. The sign (plus or minus) indicates whether the correlation is positive or negative. The closer the coefficient comes to $+1.00$ or -1.00 , the stronger the relationship between the variables.

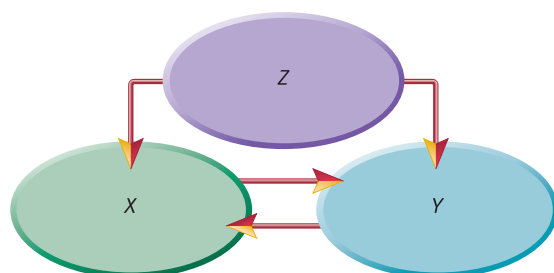


of a correlation and the power it gives scientists to make predictions. *As a correlation increases in strength (gets closer to either -1.00 or $+1.00$), the ability to predict one variable based on knowledge of the other variable increases.*

To illustrate, consider how college admissions tests (such as the SAT or ACT) are used to predict college performance. When students' admissions test scores and first-year college GPA are correlated, researchers generally find moderate positive correlations in the .40s and .50s (Gregory, 1996). Because of this relationship, college admissions committees can predict with modest accuracy how well prospective students will do in college. Admittedly, the predictive power of these admissions tests is *far* from perfect. But it's substantial enough to justify the use of the tests as one factor in making admissions decisions. However, if this correlation were much higher, say .90, admissions tests could predict with superb accuracy how students would perform. In contrast, if this correlation were much lower, say .20, the tests' prediction of college performance would be so poor that it would be unreasonable to consider the test scores in admissions decisions.

Correlation and Causation. Although a high correlation allows us to predict one variable from another, it does not tell us whether a cause-effect relationship exists between the two variables. The problem is that variables can be highly correlated even though they are not causally related. For example, there is a substantial positive correlation between the size of young children's feet and the size of their vocabulary. That is, larger feet are associated with a larger vocabulary. Obviously, increases in foot size do not *cause* increases in vocabulary size. Nor do increases in vocabulary size cause increases in foot size. Instead, both are caused by a third variable: an increase in the children's age.

When we find that variables X and Y are correlated, we can safely conclude only that X and Y are related. We do not know *how* X and Y are related. We do not know whether X causes Y or Y causes X or whether both are caused by a third variable. For example, sur-



concept check 2.3

Understanding Correlation

Check your understanding of correlation by interpreting the meaning of the correlation in item 1 and by guessing the direction (positive or negative) of the correlations in item 2. You'll find the answers in Appendix A.

1. Researchers have found a substantial positive correlation between youngsters' self-esteem and their academic achievement (measured by grades in school). Check any acceptable conclusions based on this correlation.
 - ☐ a. Low grades cause low self-esteem.
 - ☐ b. There is an association between self-esteem and academic achievement.
 - ☐ c. High self-esteem causes high academic achievement.
 - ☐ d. High ability causes both high self-esteem and high academic achievement.
 - ☐ e. Youngsters who score low in self-esteem tend to get low grades, and those who score high in self-esteem tend to get high grades.
2. Indicate whether you would expect the following correlations to be positive or negative.
 - ☐ a. The correlation between age and visual acuity (among adults).
 - ☐ b. The correlation between years of education and income.
 - ☐ c. The correlation between shyness and the number of friends one has.

vey studies have found a positive correlation between smoking and the risk of experiencing a major depressive disorder (Breslau, Kilbey, & Andreski, 1991, 1993). Although it's clear that an association exists between smoking and depression, it's hard to tell what's causing what. The investigators acknowledge that they don't know whether smoking makes people more vulnerable to depression or whether depression increases the tendency to smoke. Moreover, they note that they can't rule out the possibility that both are caused by a third variable (Z). Perhaps anxiety and neuroticism increase the likelihood of both taking up smoking and becoming depressed. The plausible causal relationships in this case are diagrammed in **Figure 2.15**, which illustrates the "third variable problem" in interpreting correlations. This is a common problem in research, and you'll see this type of diagram again when we discuss other correlations. Thus, it is important to remember that *correlation is not equivalent to causation*.

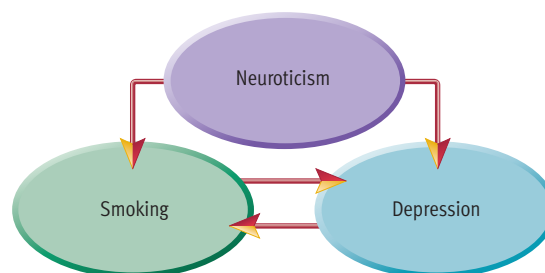


Figure 2.15
Three possible causal relations between correlated variables. If variables X and Y are correlated, does X cause Y , does Y cause X , or does some hidden third variable, Z , account for the changes in both X and Y ? As the relationship between smoking and depression illustrates, a correlation alone does not provide the answer. We will encounter this problem of interpreting the meaning of correlations frequently in our discussions of behavioral research.

Image Not Available

Inferential Statistics

After researchers have summarized their data with descriptive statistics, they still need to decide whether their data support their hypotheses. **Inferential statistics are used to interpret data and draw conclusions.** Working with the laws of probability, researchers use inferential statistics to evaluate the possibility that their results might be due to the fluctuations of chance.

To illustrate this process, envision a hypothetical experiment. A computerized tutoring program (the independent variable) is designed to increase sixth-graders' reading achievement (the dependent variable). Our hypothesis is that program participants (the experimental group) will score higher than non-participants (the control group) on a standardized reading test given near the end of the school year. Let's assume that we compare 60 subjects in each group. We obtain the following results, reported in terms of participants' grade-level scores for reading:

Control group		Experimental group
6.3	Mean	6.8
1.4	Standard deviation	2.4

We hypothesized that the training program would produce higher reading scores in the experimental group than in the control group. Sure enough, that is indeed the case. However, we have to ask ourselves a critical question: Is this observed difference between the two groups large enough to support our hypothesis? That is, do the higher scores in the experimental group reflect the effect of the training program? Or could a difference of this size have occurred by chance? If our results could easily have occurred by chance, they don't provide meaningful support for our hypothesis.

When statistical calculations indicate that research results are not likely to be due to chance, the results are said to be *statistically significant*. You will probably hear your psychology professor use this phrase quite frequently. In discussing research, it is routine to note that "statistically significant differences were found." In statistics, the word *significant* has a precise and special meaning. **Statistical significance is said to exist when the probability that the observed findings are due to chance is very low.** "Very low" is usually defined as less than 5 chances in 100, which is referred to as the *.05 level of significance*.

Notice that in this special usage, *significant* does not mean "important," or even "interesting." Statistically significant findings may or may not be theoretically significant or practically significant. They simply are research results that are unlikely to be due to chance.

You don't need to be concerned here with the details of how statistical significance is calculated. However, it is worth noting that a key consideration is the amount of variability in the data. That is why the standard deviation, which measures variability, is such an important statistic. When the necessary computations are made for our hypothetical experiment, the difference between the two groups does *not* turn out to be statistically significant. Thus, our results would not be adequate to demonstrate that our tutoring program leads to improved reading achievement. Psychologists have to do this kind of statistical analysis as part of virtually every study. Thus, inferential statistics are an integral element in the research enterprise.

REVIEW OF KEY POINTS

- Psychologists use descriptive statistics to organize and summarize their numerical data. The mean, median, and mode are widely used measures of central tendency. The mean tends to be the most useful of these indexes, but it can be distorted by extreme scores. Variability is usually measured with the standard deviation, which increases as the variability in a data set grows.
- Correlations may be either positive (when two variables covary in the same direction) or negative (when two variables co-vary in the opposite direction). The closer a correlation is to either +1.00 or -1.00, the stronger the association is.
- As a correlation increases in strength, the ability to predict one variable based on knowledge of the other variable increases. However, a correlation is no assurance of causation. When variables are correlated, we do not know whether *X* causes *Y*, or *Y* causes *X*, or a third variable causes both.
- Hypothesis testing involves deciding whether observed findings support the researcher's hypothesis. Findings are statistically significant only when they are unlikely to be due to chance.

> Looking for Flaws: Evaluating Research

Scientific research is a more reliable source of information than casual observation or popular belief. However, it would be wrong to conclude that all published research is free of errors. As we just saw, when researchers report statistically significant differences at the .05 level, there are 5 chances in 100 that the results really are a misleading by-product of chance fluctuation. This probability is pretty low, but it's not zero. Moreover, scientists' effort to minimize the probability of obtaining significant differences when none really exist increases the likelihood of the opposite mistake—failing to find significant differences when the groups really are different. Thus, even when research is conducted in a sound fashion, there's still a small chance of erroneous conclusions. Above and beyond this problem, we need to recognize that scientists are fallible human beings who do not conduct flawless research. Their personal biases in designing and interpreting studies can also distort research results (MacCoun, 1998).

For these reasons, researchers are reluctant to settle scientific questions on the basis of just one empirical study. Instead, important questions usually generate a flurry of studies to see whether key findings will stand the test of replication. **Replication is the repetition of a study to see whether the earlier results are duplicated.** The replication process helps science identify and purge erroneous findings. Of course, the replication process sometimes leads to contradictory results. You'll see some examples in the upcoming chapters. Inconsistent findings on a research question can be frustrating and confusing for students. However, some inconsistency in results is to be expected, given science's commitment to replication.

As you will see in upcoming chapters, scientific advances often emerge out of efforts to double-check perplexing findings or to explain contradictory research results. Thus, like all sources of information, scientific studies need to be examined with a critical eye. This section describes a number of common methodological problems that often spoil studies. Being aware of these pitfalls will make you more skilled in evaluating research.

Sampling Bias

A sample is the collection of subjects selected for observation in an empirical study. In contrast, the **population is the much larger collection of animals or people (from which the sample is drawn)**

that researchers want to generalize about (see Figure 2.16). For example, when political pollsters attempt to predict elections, all the voters in a jurisdiction represent the population, and the voters who are actually surveyed constitute the sample. If a researcher was interested in the ability of 6-year-old children to form concepts, those 6-year-olds actually studied would be the sample, and all similar 6-year-old children (perhaps those in modern, Western cultures) would be the population.

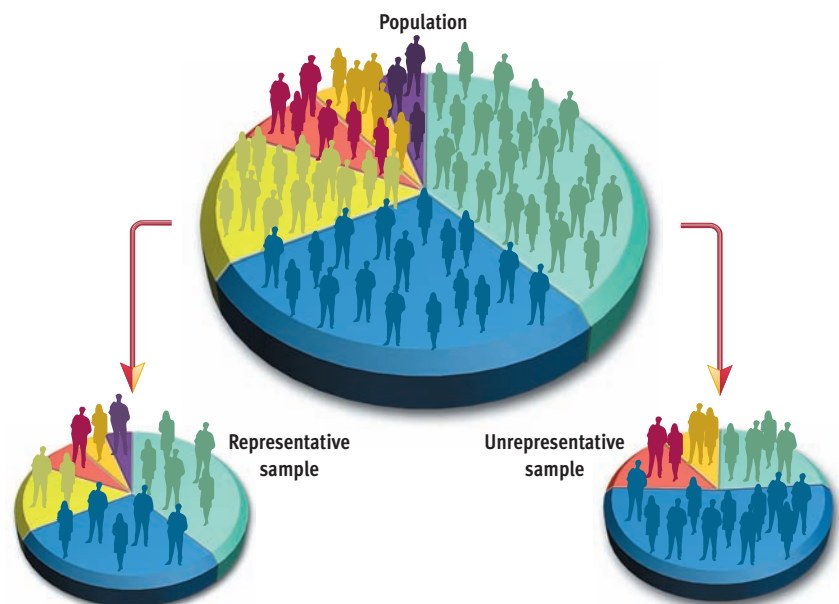
The strategy of observing a limited sample in order to generalize about a much larger population rests on the assumption that the sample is reasonably *representative* of the population. A sample is representative if its composition is similar to the composition of the population. **Sampling bias exists when a sample is not representative of the population from which it was drawn.** When a sample is not representative, generalizations about the population may be inaccurate. For instance, if a political pollster were to survey only people in posh shopping areas frequented by the wealthy, the pollster's generalizations about the voting public as a whole would be off the mark.

As we discussed in Chapter 1, psychologists have historically tended to undersample women, ethnic minorities, and people from non-Western cultures. They have also tended to neglect older adults, while depending much too heavily on white, middle- and upper-class college students. This excessive reliance on college students may not be all that problematic for some research questions, but it certainly seems

PREVIEW QUESTIONS

- What is sampling bias?
- What are placebo effects and how can you guard against them?
- What is the social desirability bias?
- What are response sets?
- What is experimenter bias, and how can you guard against it?

Figure 2.16
The relationship between the population and the sample. The process of drawing inferences about a population based on a sample works only if the sample is reasonably representative of the population. A sample is representative if its demographic makeup is similar to that of the population, as shown on the left. If some groups in the population are overrepresented or underrepresented in the sample, as shown on the right, inferences about the population may be skewed or inaccurate.



Before accepting the results of a survey poll, one should know something about how the poll was conducted. A polling could, for instance, contain sampling bias. Opinions collected solely from middle-class people but generalized to the voting public as a whole would be an example of such bias.



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likely to distort results in many research areas (Sears, 1986). In general, then, when you have doubts about the results of a study, the first thing to examine is the composition of the sample.

Placebo Effects

In pharmacology, a *placebo* is a substance that resembles a drug but has no actual pharmacological effect. In studies that assess the effectiveness of medications, placebos are given to some subjects to control for the effects of a treacherous extraneous variable: participants' expectations. Placebos are used because researchers know that participants' expectations can influence their feelings, reactions, and behavior (Stewart-Williams, 2004). **Thus, placebo effects occur when participants' expectations lead them to experience some change even though they receive empty, fake, or ineffectual treatment.** In medicine, placebo effects are well documented (Quitkin, 1999). Many physicians tell of patients being "cured" by prescriptions of sugar pills. Similarly, psychologists have found that participants' expectations can be powerful determinants of their perceptions and behavior when they are under the microscope in an empirical study.

For example, placebo effects have been seen in research on meditation. A number of studies have found that meditation can improve people's energy level, mental and physical health, and happiness (Alexander et al., 1990; Reibel et al., 2001). However, in many of the early studies of meditation, researchers assembled their experimental groups with volunteer subjects eager to learn meditation. Most of these subjects *wanted* and *expected* meditation to have beneficial effects. Their positive expectations may have colored their subsequent ratings of their energy level, happiness, and so on. Better-designed studies have shown that meditation can be beneficial (see Chapter 5). However, placebo effects have probably exaggerated these benefits in some studies (Shapiro, 1987).

Researchers should guard against placebo effects whenever subjects are likely to have expectations that a treatment will affect them in a certain way. The possible role of placebo effects can be assessed by including a fake version of the experimental treatment (a placebo condition) in a study.

Distortions in Self-Report Data

Research psychologists often work with *self-report data*, consisting of subjects' verbal accounts of their behavior. This is the case whenever questionnaires, interviews, or personality inventories are used to measure variables. Self-report methods can be quite useful, taking advantage of the fact that people have a unique opportunity to observe themselves full-time (Baldwin, 2000). However, self-reports can be plagued by several kinds of distortion.

One of the most problematic of these distortions is **the social desirability bias, which is a tendency to give socially approved answers to questions about oneself.** Subjects who are influenced by this bias try hard to create a favorable impression. For example, many survey respondents will report that they voted in an election, gave to a charity, or attend church regularly when in fact it is possible to determine that these assertions are untrue (Granberg & Holmberg, 1991; Hadaway, Marler, & Chaves, 1993). Respondents influenced by social desirability bias also tend to report that they are healthier, happier, and less prejudiced than other types of evidence would suggest. People who answer questions in socially desirable ways take slightly longer to respond to the questions, suggesting that they are carefully "editing" their responses (Holtgraves, 2004).

Other problems can also produce distortions in self-report data (Krosnick, 1999; Schuman & Kalton, 1985). Respondents misunderstand questionnaire

items surprisingly often, and the way questions are worded can shape subjects' responses (Schwarz, 1999). Memory errors can undermine the accuracy of verbal reports. Response sets are yet another problem. **A response set is a tendency to respond to questions in a particular way that is unrelated to the content of the questions.** For example, some people tend to agree with nearly everything on a questionnaire (Krosnick & Fabrigar, 1998). Obviously, distortions like these can produce inaccurate results. Although researchers have devised ways to neutralize these problems—such as carefully pretesting survey instruments—we should be cautious in drawing conclusions from self-report data (Schaeffer, 2000).

Experimenter Bias

As scientists, psychologists try to conduct their studies in an objective, unbiased way so that their own views will not influence the results. However, objectivity is a *goal* that scientists strive for, not an accomplished fact that can be taken for granted (MacCoun, 1998). In reality, most researchers have an emotional investment in the outcome of their research. Often they are testing hypotheses that they have developed themselves and that they would like to see supported by the data. It is understandable, then, that *experimenter bias* is a possible source of error in research.

Experimenter bias occurs when a researcher's expectations or preferences about the outcome of a study influence the results obtained. Experimenter bias can slip through to influence studies in many subtle ways. One problem is that researchers, like others, sometimes *see what they want to see*. For instance, when experimenters make apparently honest mistakes in recording subjects' responses, the mistakes tend to be heavily slanted in favor of supporting the hypothesis (O'Leary, Kent, & Kanowitz, 1975).

Research by Robert Rosenthal (1976) suggests that experimenter bias may lead researchers to unintentionally influence the behavior of their subjects. In one study, Rosenthal and Fode (1963) recruited undergraduate psychology students to serve as the "experimenters." The students were told that they would be collecting data for a study of how participants rated the success of people portrayed in photographs. In a pilot study, photos were selected that generated (on the average) neutral ratings on a scale extending from -10 (extreme failure) to $+10$ (extreme success). Rosenthal and Fode then manipulated the expectancies of their experimenters. Half of them were told that, based on pilot data, they would probably obtain average ratings of -5 . The other half were led to expect average ratings of $+5$. The experimenters were forbidden from conversing with their subjects except

for reading some standardized instructions. Even though the photographs were exactly the same for both groups, the experimenters who *expected* positive ratings *obtained* significantly higher ratings than those who expected negative ratings.

How could the experimenters have swayed the participants' ratings? According to Rosenthal, the experimenters may have unintentionally influenced their subjects by sending subtle nonverbal signals as the experiment progressed. Without realizing it, they may have smiled, nodded, or sent other positive cues when participants made ratings that were in line with the experimenters' expectations. Thus, experimenter bias may influence both researchers' observations and their subjects' behavior (Rosenthal, 1994, 2002).

The problems associated with experimenter bias can be neutralized by using a double-blind procedure. **The double-blind procedure is a research strategy in which neither subjects nor experimenters know which subjects are in the experimental or control groups.** It's not particularly unusual for participants to be "blind" about their treatment condition. However, the double-blind procedure keeps the experimenter in the dark as well. Of course, a member of



ROBERT ROSENTHAL

"Quite unconsciously, a psychologist interacts in subtle ways with the people he is studying so that he may get the response he expects to get."

concept check 2.4



Detecting Flaws in Research

Check your understanding of how to conduct sound research by looking for methodological flaws in the following studies. You'll find the answers in Appendix A.

Study 1. A researcher announces that he will be conducting an experiment to investigate the detrimental effects of sensory deprivation on perceptual-motor coordination. The first 40 students who sign up for the study are assigned to the experimental group, and the next 40 who sign up serve in the control group. The researcher supervises all aspects of the study's execution. Experimental subjects spend two hours in a sensory deprivation chamber, where sensory stimulation is minimal. Control subjects spend two hours in a waiting room that contains magazines and a TV. All subjects then perform ten 1-minute trials on a pursuit-rotor task that requires them to try to keep a stylus on a tiny rotating target. The dependent variable is their average score on the pursuit-rotor task.

Study 2. A researcher wants to know whether there is a relationship between age and racial prejudice. She designs a survey in which respondents are asked to rate their prejudice against six different ethnic groups. She distributes the survey to over 500 people of various ages who are approached at a shopping mall in a low-income, inner-city neighborhood.

Check the flaws that are apparent in each study.

Methodological flaw	Study 1	Study 2
Sampling bias	_____	_____
Placebo effects	_____	_____
Distortions in self-report	_____	_____
Confounding of variables	_____	_____
Experimenter bias	_____	_____

the research team who isn't directly involved with subjects keeps track of who is in which group.

REVIEW OF KEY POINTS

- Scientists often try to replicate research findings to double-check their validity. Although this process leads to some contradictory findings, science works toward reconciling and explaining inconsistent results.

- Sampling bias occurs when a sample is not representative of the population of interest. Placebo effects occur when participants' expectations cause them to change their behavior in response to a fake treatment.
- Distortions in self-reports, such as response sets and the social desirability bias, are a source of concern whenever questionnaires and personality inventories are used to collect data. Experimenter bias occurs when researchers' expectations and desires distort their observations or unintentionally influence their subjects' behavior.

Looking at Ethics: Do the Ends Justify the Means?

PREVIEW QUESTIONS

- What are the arguments against using deception in research?
- What are the arguments in favor of allowing deception in research?
- Why are many people opposed to animal research?
- How do animal researchers defend their work?
- What are the major ethical principles that govern behavioral research?

Think back to Stanley Schachter's (1959) study on anxiety and affiliation. Imagine how you would have felt if you had been one of the subjects in Schachter's high-anxiety group. You show up at a research laboratory, expecting to participate in a harmless experiment. The room you are sent to is full of unusual electronic equipment. An official-looking man in a lab coat announces that this equipment will be used to give you a series of painful electric shocks. His statement that the shocks will leave "no permanent tissue damage" is hardly reassuring. Surely, you think, there must be a mistake. All of a sudden, your venture into research has turned into a nightmare! Your stomach knots up in anxiety. The researcher explains that there will be a delay while he prepares his apparatus. He asks you to fill out a short questionnaire about whether you would prefer to wait alone or with others. Still reeling in dismay at the prospect of being shocked, you fill out the questionnaire. He takes it and then announces that you won't be shocked after all—it was all a hoax! Feelings of relief wash over you, but they're mixed with feelings of anger. You feel as though the experimenter has just made a fool out of you, and you're embarrassed and resentful.

Should researchers be allowed to play with your feelings in this way? Should they be permitted to deceive subjects in such a manner? Is this the cost that must be paid to advance scientific knowledge? As these questions indicate, the research enterprise sometimes presents scientists with difficult ethical dilemmas. *These dilemmas reflect concern about the possibility for inflicting harm on participants.* In psychological research, the major ethical dilemmas center on the use of deception and the use of animals.

The Question of Deception

Elaborate deception, such as that seen in Schachter's study, has been fairly common in psychological re-

search since the 1960s, especially in the area of social psychology (Epley & Huff, 1998; Korn, 1997). Over the years, psychologists have faked fights, thefts, muggings, faintings, epileptic seizures, rapes, and automobile breakdowns to explore a host of issues. They have led participants to believe that they were hurting others with electrical shocks, that they had homosexual tendencies, and that they were overhearing negative comments about themselves. Why have psychologists used so much deception in their research? Quite simply, they are trying to deal with the methodological problems discussed in the previous section. Deception is used to avoid or reduce problems resulting from placebo effects, the unreliability of self-reports, and the like.

Critics argue against the use of deception on several grounds (Baumrind, 1985; Kelman, 1982; Ortmann & Hertwig, 1997). First, they assert that deception is only a nice word for lying, which they see as inherently immoral. Second, they argue that by deceiving unsuspecting participants, psychologists may undermine many individuals' trust in others. Third, they point out that many deceptive studies produce distress for participants who were not forewarned about that possibility. Specifically, subjects may experience great stress during a study or be made to feel foolish when the true nature of a study is explained.

Those who defend the use of deception in research maintain that many important issues could not be investigated if experimenters were not permitted to mislead participants (Bröder, 1998). They argue that most research deceptions involve "white lies" that are not likely to harm participants. Moreover, they point out that critics have *assumed* that deception studies are harmful to subjects, without collecting empirical data to document these detrimental effects. In reality, the relevant research suggests that deception studies are *not* harmful to participants (Christensen, 1988). Indeed, most subjects who participate in experiments

Web Link 2.6



The Troubling Legacy of the Tuskegee Syphilis Study

The enduring damage of unethical scientific and medical research—here seen in the infamous 1932–1972 Tuskegee Syphilis Study among 399 poor African American men in Alabama—is detailed in several government reports and a rare presidential apology to the victims.

involving deception report that they enjoyed the experience and that they didn't mind being misled. Moreover, the empirical evidence does not support the notions that deceptive research undermines subjects' trust in others or their respect for psychology or scientific research (Kimmel, 1996; Sharpe, Adair, & Roese, 1992). Curiously, the weight of the evidence suggests that researchers are more concerned about the negative effects of deception on participants than the participants themselves are (Fisher & Fyrberg, 1994; Korn, 1987). Finally, researchers who defend deception argue that the benefits—advances in knowledge that often improve human welfare—are worth the costs. They assert that it would be unethical *not* to conduct effective research on conformity, obedience, aggression, and other important social issues.

The issue of deception creates a difficult dilemma for scientists, pitting honesty against the desire to advance knowledge. Today, institutions that conduct research have committees that evaluate the ethics of research proposals before studies are allowed to proceed. These committees have often blocked studies requiring substantial deception. Many psychologists believe that this conservatism has obstructed important lines of research and slowed progress in the field. Although this belief may be true, it is not easy to write off the points made by the critics of deception. Warwick (1975) states the issue eloquently: "If it is all right to use deceit to advance knowledge, then why not for reasons of national security, for maintaining the Presidency, or to save one's own hide?" (p. 105). That's a tough question regarding a tough dilemma that will probably generate heated debate for a long time to come.

The Question of Animal Research

Psychology's other major ethics controversy concerns the use of animals in research. Psychologists use animals as research subjects for several reasons. Sometimes they simply want to know more about the behavior of a specific type of animal. In other instances, they want to see whether certain laws of behavior apply to both humans and animals. Finally, in some cases psychologists use animals because they can expose them to treatments that clearly would be unacceptable with human subjects. For example, most of the research on the relationship between deficient maternal nutrition during pregnancy and the incidence of birth defects has been done with animals.

It's this third reason for using animals that has generated most of the controversy. Some people maintain that it is wrong to subject animals to harm

or pain for research purposes. Essentially, they argue that animals are entitled to the same rights as humans (Regan, 1997). They accuse researchers of violating these rights by subjecting animals to unnecessary cruelty in many "trivial" studies (Bowd & Shapiro, 1993; Hollands, 1989). They also assert that most animal studies are a waste of time because the results may not even apply to humans (Millstone, 1989). For example, Ulrich (1991) argues that "pigeons kept confined at 80% body weight in home cages that don't allow them ever to spread their wings, take a bath, or relate socially to other birds provide questionable models for humans" (pp. 200–201).

Although some animal rights activists simply advocate more humane treatment of research animals, a survey of 402 activists questioned at a Washington, D.C. rally found that 85% wanted to eliminate *all* research with animals (Plous, 1991). Some of the more militant animal rights activists have broken into laboratories, destroyed scientists' equipment and research records, and stolen experimental animals. The animal rights movement has enjoyed considerable success. For example, membership in People for the Ethical Treatment of Animals (PETA) grew from 8,000 in 1984 to 750,000 in 2003 (Herzog, 2005). David Johnson (1990) noted that "the single issue citizens write about most often to their congresspersons and the president is not homelessness, not the drug problem, not crime. It is animal welfare" (p. 214).

In spite of the great furor, only 7%–8% of all psychological studies involve animals (mostly rodents and birds). Relatively few of these studies require subjecting the animals to painful or harmful manipulations (American Psychological Association, 1984). Psychologists who defend animal research point to the major advances attributable to psychological research on animals, which many people are unaware of (Baldwin, 1993; Compton, Dietrich, & Smith, 1995). Among them are advances in the treatment of mental disorders, neuromuscular disorders, strokes, brain injuries, visual defects, headaches, memory defects, high blood pressure, and problems with pain (Carroll & Overmier, 2001; Domjan & Purdy, 1995). To put the problem in context, Neal Miller (1985), a prominent psychologist who has done pioneering work in several areas, noted the following:

At least 20 million dogs and cats are abandoned each year in the United States; half of them are killed in pounds and shelters, and the rest are hit by cars or die of neglect. Less than 1/10,000 as many dogs and cats were used in psychological laboratories. . . . Is it worth sacrificing the lives of our children in order to stop experiments, most of which involve no pain, on a vastly smaller number of mice, rats, dogs, and cats? (p. 427)

Web Link 2.7



Animal Welfare Information Center
This site, maintained by the U.S. Department of Agriculture, is an excellent jumping-off point for information relating to all aspects of how animals are (and should be) cared for in research, laboratory, and other settings.



Image Not Available

NEAL MILLER

"Who are the cruel and inhumane ones, the behavioral scientists whose research on animals led to the cures of the anorexic girl and the vomiting child, or those leaders of the radical animal activists who are making an exciting career of trying to stop all such research and are misinforming people by repeatedly asserting that it is without any value?"



Office of

Research Integrity

Anyone who needs a comprehensive, up-to-date overview of ethical concerns in research from the perspective of the U.S. government should consider visiting this site. Although the Office of Research Integrity (ORI) deals with research sponsored by the U.S. Public Health Service, it also offers links to parallel offices and resources in many other agencies.

Far more compelling than Miller are the advocates for disabled people who have entered the fray to campaign against the animal rights movement in recent years. For example, Dennis Feeney (1987), a psychologist disabled by paraplegia, quotes a newsletter from an organization called The Incurably Ill for Animal Research:

No one has stopped to think about those of us who are incurably ill and are desperately waiting for new research results that can only be obtained through the use of animals. We have seen successful advances toward other diseases, such as polio, diphtheria, mumps, measles, and hepatitis through animal research. We want the same chance for a cure, but animal rights groups would deny us this chance. (p. 595)

As you can see, the manner in which animals can ethically be used for research is a highly charged controversy. Psychologists are becoming increasingly sensitive to this issue. Although animals continue to be used in research, strict regulations have been imposed that govern nearly every detail of how laboratory animals can be used for research purposes (Ator, 2005; Garnett, 2005).

Ethical Principles in Research

The ethics issues that we have discussed in this section have led the APA to develop a set of ethical standards

for researchers (American Psychological Association, 2002; see Figure 2.17). Although most psychological studies are fairly benign, these ethical principles are intended to ensure that both human and animal subjects are treated with dignity. Some of the most important guidelines for research with human participants include the following: (1) people's participation in research should always be voluntary and they should be allowed to withdraw from a study at any time, (2) participants should not be subjected to harmful or dangerous treatments, (3) if a study requires deception, participants should be debriefed (informed of the true nature and purpose of the research) as soon as possible, and (4) participants' right to privacy should never be compromised. Crucial guidelines for research with animals include: (1) harmful or painful procedures cannot be justified unless the potential benefits of the research are substantial, and (2) research animals are entitled to decent living conditions.

In regard to research ethics, the newest source of concern and debate centers around social scientists' increased use of the Internet as a tool for collecting data (Keller & Lee, 2003; Pittenger, 2003). The emergence of the Internet has created a variety of new opportunities for behavioral researchers. For instance, researchers can post surveys on the web and gather data from larger and more diverse samples than ever before. Chat rooms and other types of virtual communities provide remarkable opportunities for naturalistic observation of group processes in action. Psychologists are moving quickly to take advantage of

Figure 2.17

Ethics in research. Key ethical principles in psychological research, as set forth by the American Psychological Association (2002), are summarized here. These principles are meant to ensure the welfare of both human and animal subjects.

APA Ethical Guidelines for Research

- 1 A subject's participation in research should be voluntary and based on informed consent. Subjects should never be coerced into participating in research. They should be informed in advance about any aspects of the study that might be expected to influence their willingness to cooperate. Furthermore, they should be permitted to withdraw from a study at any time if they so desire.
- 2 Participants should not be exposed to harmful or dangerous research procedures. This guideline is intended to protect subjects from psychological as well as physical harm. Thus, even stressful procedures that might cause emotional discomfort are largely prohibited. However, procedures that carry a modest risk of moderate mental discomfort may be acceptable.
- 3 If an investigation requires some deception of participants (about matters that do not involve risks), the researcher is required to explain and correct any misunderstandings as soon as possible. The deception must be disclosed to subjects in "debriefing" sessions as soon as it is practical to do so without compromising the goals of the study.
- 4 Subjects' rights to privacy should never be violated. Information about a subject that might be acquired during a study must be treated as highly confidential and should never be made available to others without the consent of the participant.
- 5 Harmful or painful procedures imposed upon animals must be thoroughly justified in terms of the knowledge to be gained from the study. Furthermore, laboratory animals are entitled to decent living conditions that are spelled out in detailed rules that relate to their housing, cleaning, feeding, and so forth.
- 6 Prior to conducting studies, approval should be obtained from host institutions and their research review committees. Research results should be reported fully and accurately, and raw data should be promptly shared with other professionals who seek to verify substantive claims. Retractions should be made if significant errors are found in a study subsequent to its publication.

these opportunities, but this new venue for research sometimes raises complicated questions about how the APA's ethical guidelines should be applied. Is interaction on the Internet similar to interaction in a public location like a park or sidewalk, open to observation? Or is it more like interaction on a phone line where one would expect some privacy? Is it acceptable for researchers to lurk in chat rooms and systematically record interactions? What if they pose as group members and provoke discussion of specific issues? If an Internet study includes deception, then participants must be debriefed. But given the anonymity of the Internet, how can researchers debrief subjects who abandon their study midway and cannot be located? As you can see, the use of the Internet for research poses complex new ethical dilemmas for researchers.

REVIEW OF KEY POINTS

- Research sometimes raises complex ethical issues. Critics argue that it is unethical to deceive subjects and to expose animals to harmful treatments.
- Those who defend deception in research argue that many important issues could not be investigated without misleading subjects. Psychologists who defend animal research argue that it has brought major advances that are worth the costs.
- The APA has formulated ethical principles to serve as guidelines for researchers. However, the emergence of the Internet as a research tool has raised complicated new ethical dilemmas.

Reflecting on the Chapter's Themes

Two of our seven unifying themes emerged strongly in this chapter. First, the entire chapter is a testimonial to the idea that psychology is empirical. Second, we saw numerous examples of how people's experience of the world can be highly subjective. Let's examine each of these points in more detail.

As explained in Chapter 1, the empirical approach entails testing ideas, basing conclusions on systematic observation, and relying on a healthy brand of skepticism. All those features of the empirical approach have been apparent in our review of the research enterprise in psychology.

As you have seen, psychologists test their ideas by formulating clear hypotheses that involve predictions about relations between variables. They then use a variety of research methods to collect data so they can see whether their predictions are supported. The data collection methods are designed to make researchers' observations systematic and precise. The entire venture is saturated with skepticism. Psychologists are impressed only by research results that are highly unlikely to have occurred by chance. In planning and executing their research, they are constantly on the lookout for methodological flaws. They submit their articles to a demanding peer review process so that other experts can subject their methods and conclusions to critical scrutiny. Collectively, these procedures represent the essence of the empirical approach.

The subjectivity of personal experience was apparent in our discussion of how adversaries overestimate the gap between their views, and in our Featured Study, which showed that two people experiencing the same event can have different feelings about it because of differing expectations. Subjective perception was also prominent in our coverage of methodological problems, especially placebo effects and experimenter bias. When subjects report beneficial effects from a fake treatment (the placebo), it's because they expected to see these effects. As pointed out in Chapter 1, psychologists and other scientists are not immune to the effects of subjective experience. Although they are trained to be objective, even scientists may see what they expect to see or what they want to see. This is one reason that the empirical approach emphasizes precise measurement and a skeptical attitude. The highly subjective nature of experience is exactly what the empirical approach attempts to neutralize.

The publication of empirical studies allows us to apply a critical eye to the research enterprise. However, you cannot critically analyze studies unless you know where and how to find them. In the upcoming Personal Application, we will discuss where studies are published, how to find studies on specific topics, and how to read research reports. In the subsequent Critical Thinking Application, we'll analyze the shortcomings of anecdotal evidence, which should help you to appreciate the value of empirical evidence.



Empiricism



Subjectivity of Experience

PERSONAL Application

Finding and Reading Journal Articles

Answer the following “yes” or “no.”

- ___ 1 I have read about scientific studies in newspapers and magazines and sometimes wondered, “How did they come to those conclusions?”
- ___ 2 When I go to the library, I often have difficulty figuring out how to find information based on research.
- ___ 3 I have tried to read scientific reports and found them to be too technical and difficult to understand.

If you responded “yes” to any of the above statements, you have struggled with the information explosion in the sciences. We live in a research-oriented society. The number of studies conducted in most sciences is growing at a dizzying pace. This expansion has been particularly spectacular in psychology. Moreover, psychological research increasingly commands attention from the popular press because it is often relevant to people’s personal concerns.

This Personal Application is intended to help you cope with the information explosion in psychology. It assumes that there may come a time when you need to examine original psychological research. Perhaps it will be in your role as a student (working on a term paper, for instance), in another role (parent, teacher, nurse, administrator), or merely out of curiosity. In any case, this Personal Application explains the nature of technical journals and discusses how to find and read articles in them. You can learn more about how to use library resources in

psychology from an excellent little book titled *Library Use: A Handbook for Psychology* (Reed & Baxter, 2003).

The Nature of Technical Journals



As you will recall from earlier in the chapter, a *journal* is a periodical that publishes technical and scholarly material, usually in a narrowly defined area of inquiry. Scholars in most fields—whether economics, chemistry, education, or psychology—publish the bulk of their work in these journals. Journal articles represent the core of intellectual activity in any academic discipline.

In general, journal articles are written for other professionals in the field. Hence, authors assume that their readers are other interested economists or chemists or psychologists. Because journal articles are written in the special language unique to a particular discipline, they are often difficult for non-professionals to understand. You will be learning a great deal of psychology’s special language in this course, which will improve your ability to understand articles in psychology journals.

In psychology, most journal articles are reports that describe original empirical studies. These reports permit researchers to disseminate their findings to the scientific community. Another common type of article is the review article. *Review articles* summarize and reconcile the findings of a large num-

ber of studies on a specific issue. Some psychology journals also publish comments or critiques of previously published research, book reviews, theoretical treatises, and descriptions of methodological innovations.

Finding Journal Articles



Reports of psychological research are commonly mentioned in newspapers and popular magazines. These summaries can be helpful to readers, but they often embrace the most sensational conclusions that might be drawn from the research. They also tend to include many oversimplifications and factual errors. Hence, if a study mentioned in the press is of interest to you, you may want to track down the original article to ensure that you get accurate information.

Most discussions of research in the popular press do not mention where you can find the original technical article. However, there is a way to find out. A computerized database called PsycINFO makes it possible to locate journal articles by specific researchers or scholarly work on specific topics. This huge online database, which is updated constantly, contains brief summaries, or *abstracts*, of journal articles, books, and chapters in edited books, reporting, reviewing, or theorizing about psychological research. Over 1900 journals are checked regularly to select items for inclusion. The abstracts are concise—about 75 to 175 words. They briefly describe the hypotheses, methods, results,



Craig McClain

and conclusions of the studies. Each abstract should allow you to determine whether an article is relevant to your interests. If it is, you should be able to find the article in your library (or to order it) because a complete bibliographic reference is provided.

Although news accounts of research rarely mention where a study was published, they often mention the name of the researcher. If you have this information, the easiest way to find a specific article is to search PsycINFO for materials published by that researcher. For example, let's say you read a news report that summarized the survey study that we described earlier on the correlation between height and income (Judge & Cable, 2004; see p. 50). Let's assume that the news report mentioned the name of Timothy Judge as the lead author and indicated that the article was published in 2004. To track down the original article, you would search for journal articles published by Timothy Judge in 2004. If you conducted this search, you would turn up a list of 12 articles. The information for the first six articles in this list is shown in **Figure 2.18**. The second item in the list appears to be the article you are interested in. **Figure 2.19** on the next page shows what you would see if you clicked to obtain the Abstract and Citation for this article. As you can see, the abstract shows that the original report was published in the June 2004 issue of the *Journal of Applied Psychology*. Armed with this information, you could obtain the article easily.

You can also search PsycINFO for research literature on particular topics, such as achievement motivation, aggressive behavior, alcoholism, appetite disorders, or artistic ability. These computerized literature searches can be much more powerful, precise, and thorough than traditional, manual searches in a library. PsycINFO can sift through several million articles in a matter of seconds to identify *all* the articles on a subject, such as alcoholism. Obviously, there is no way you can match this efficiency stumbling around in the stacks at your library. Moreover, the computer allows you to pair up topics to swiftly narrow your search to exactly those issues that interest you. For example, **Figure 2.20** on the next page shows a PsycINFO search that identified all the articles on mar-

APA e-Products

for APA Members

American Psychological Association

PsycINFO: Search Results

Your query: ((timothy judge):author) AND (2004<=Year<=2004)
Results: 12 documents (12 on this page)

- Intelligence and Leadership: A Quantitative Review and Test of Theoretical Propositions.**
 By Judge, Timothy A.; Colbert, Amy E.; Ilies, Remus
Journal of Applied Psychology. 89(3), Jun 2004, 542-552.
[Citation and Abstract](#) | [Expanded Record](#) | [Expanded Record with References](#) | [View Article \(HTML\)](#) | [View Article \(PDF\)](#)
- The Effect of Physical Height on Workplace Success and Income: Preliminary Test of a Theoretical Model.**
 By Judge, Timothy A.; Cable, Daniel M.
Journal of Applied Psychology. 89(3), Jun 2004, 428-441.
[Citation and Abstract](#) | [Expanded Record](#) | [Expanded Record with References](#) | [View Article \(HTML\)](#) | [View Article \(PDF\)](#)
- Organizational Justice and Stress: The Mediating Role of Work-Family Conflict.**
 By Judge, Timothy A.; Colquitt, Jason A.
Journal of Applied Psychology. 89(3) Jun 2004, 395-404.
[Citation and Abstract](#) | [Expanded Record](#) | [Expanded Record with References](#) | [View Article \(HTML\)](#) | [View Article \(PDF\)](#)
- Employee attitudes and job satisfaction.**
 By Saari, Lise M.; Judge, Timothy A.
Human Resource Management. 43(4), Win 2004, 395-407.
[Citation and Abstract](#) | [Expanded Record](#) | [Expanded Record with References](#)
- Personality and Transformational and Transactional Leadership: A Meta-Analysis.**
 By Bono, Joyce E.; Judge, Timothy A.
Journal of Applied Psychology. 89(5) Oct 2004, 901-910.
[Citation and Abstract](#) | [Expanded Record](#) | [Expanded Record with References](#) | [View Article \(HTML\)](#) | [View Article \(PDF\)](#)
- Transformational and Transactional Leadership: A Meta-Analytic Test of Their Relative Validity.**
 By Judge, Timothy A.; Piccolo, Ronald F.
Journal of Applied Psychology. 89(5) Oct 2004, 755-768.
[Citation and Abstract](#) | [Expanded Record](#) | [Expanded Record with References](#) | [View Article \(HTML\)](#) | [View Article \(PDF\)](#)

ijuana and memory. If you were preparing a term paper on whether marijuana affects memory, this precision would be invaluable.

The PsycINFO database can be accessed online at many libraries or via the Internet (see Web Link 2.2 for a description of PsycINFO Direct). The database is also available at some libraries that have the information stored on CD-ROM discs. This version of the database is updated monthly. The summaries contained in PsycINFO can also be found in a monthly print journal called

Psychological Abstracts, but fewer and fewer libraries are subscribing to this traditional publication because it cannot match the swift and efficient search capabilities of PsycINFO.

Reading Journal Articles

Once you find the journal articles you want to examine, you need to know how to decipher them. You can process the information in such articles more efficiently if you

Figure 2.19

Example of a PsycINFO abstract. This information is what you would see if you clicked to see the abstract of item 2 in the list shown in Figure 2.18. It is a typical abstract from the online PsycINFO database. Each abstract in PsycINFO provides a summary of a specific journal article, book, or chapter in an edited book, and complete bibliographical information.

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PsycINFO: Citation and Abstract

Title

The Effect of Physical Height on Workplace Success and Income: Preliminary Test of a Theoretical Model.

Abstract

In this article, the authors propose a theoretical model of the relationship between physical height and career success. We then test several linkages in the model based on a meta-analysis of the literature, with results indicating that physical height is significantly related to measures of social esteem ($p = .41$), leader emergence ($p = .24$), and performance ($p = .18$). Height was somewhat more strongly related to success for men ($p = .29$) than for women ($p = .21$), although this difference was not significant. Finally, given that almost no research has examined the relationship between individuals' physical height and their incomes, we present four large-sample studies (total $N = 8,590$) showing that height is positively related to income ($\beta = .26$) after controlling for sex, age, and weight. Overall, this article presents the most comprehensive analysis of the relationship of height to workplace success to date, and the results suggest that tall individuals have advantages in several important aspects of their careers and organizational lives (PsycINFO Database Record © 2004 APA, all rights reserved)

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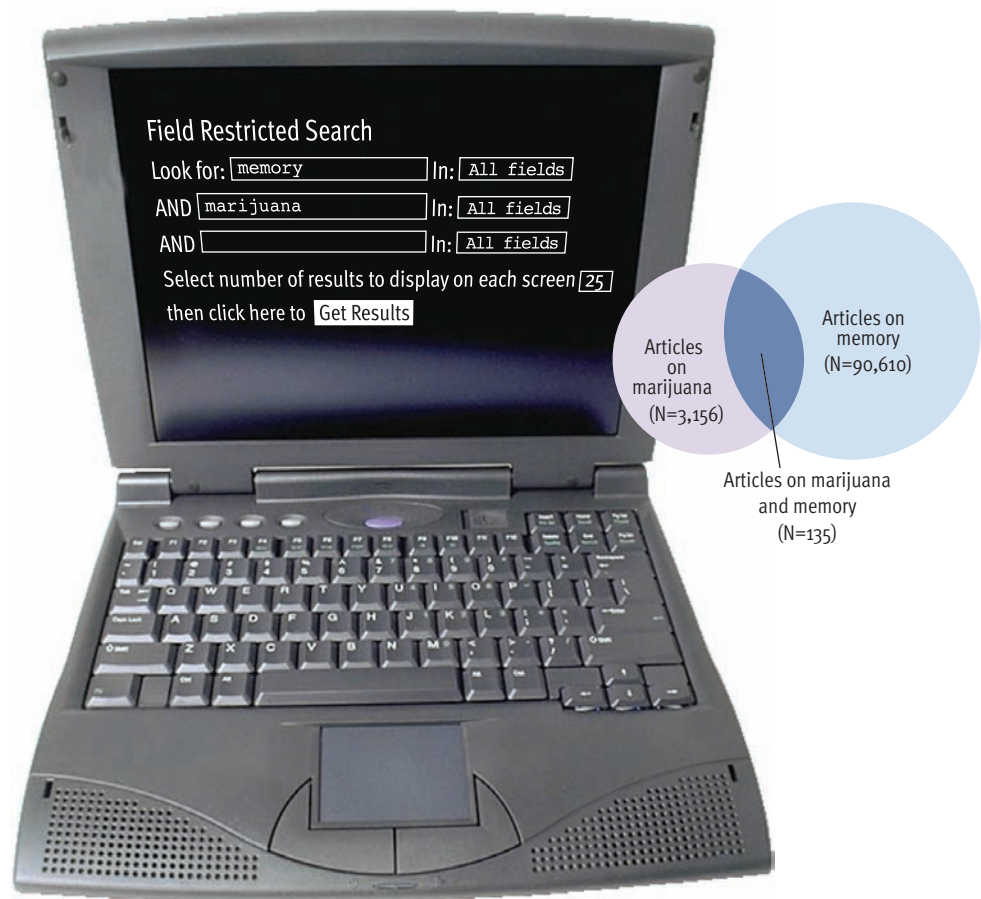
Source

Journal of Applied Psychology. 89(3), Jun 2004, 428–441.

Figure 2.20

Combining topics in a PsycINFO search.

A computerized literature search can be a highly efficient way to locate the specific research that you need. For example, if you had set out in May of 2005 to find all the journal articles on marijuana and memory, using PsycINFO, you would have obtained the results summarized here. At that time, the database contained 90,610 articles related to memory and 3,156 articles related to marijuana. The search depicted on the left yielded 135 abstracts that relate to both marijuana and memory. Thus, in a matter of moments, the computer can sift through nearly 2 million abstracts to find those that are most germane to a specific question, such as: Does marijuana affect memory?



understand how they are organized. Depending on your needs and purpose, you may want to simply skim through some of the sections. Journal articles follow a fairly standard organization, which includes the following sections and features.

Abstract

Most journals print a concise summary at the beginning of each article. This abstract allows readers scanning the journal to quickly decide whether articles are relevant to their interests.

Introduction

The introduction presents an overview of the problem studied in the research. It mentions relevant theories and quickly reviews previous research that bears on the problem, usually citing shortcomings in previous research that necessitate the present study. This review of the current state of knowledge on the topic usually progresses to a specific and precise statement regarding the hypotheses under investigation.

Method

The method section provides a thorough description of the research methods used in

the study. Information is provided on the subjects used, the procedures followed, and the data collection techniques employed. This description is made detailed enough to permit another researcher to attempt to replicate the study.

Results

The data obtained in the study are reported in the results section. This section often creates problems for novice readers because it includes complex statistical analyses, figures, tables, and graphs. This section does *not* include any inferences based on the data, as such conclusions are supposed to follow in the next section. Instead, it simply contains a concise summary of the raw data and the statistical analyses.

Discussion

In the discussion section you will find the conclusions drawn by the author(s). In contrast to the results section, which is a straightforward summary of empirical observations, the discussion section allows for interpretation and evaluation of the data. Implications for theory and factual knowledge in the discipline are discussed. Conclusions are usually qualified carefully, and any limitations in the study may be acknowledged. This sec-

tion may also include suggestions for future research on the issue.

References

At the end of each article you will find a list of bibliographic references for any studies cited. This list permits you to examine first-hand other relevant studies mentioned in the article. The references list is often a rich source of leads about other articles that are germane to the topic that you are looking into.

➤ REVIEW OF KEY POINTS

- Journals publish technical and scholarly material. Usually they are written for other professionals in a narrow area of inquiry. In psychology, most journal articles are reports of original research.
- PsycINFO is a computerized database that contains brief summaries of journal articles, books, and chapters in edited books. Works on specific topics and publications by specific authors can be found by using the search mechanisms built into the database.
- Computerized literature searches can be much more powerful and precise than manual searches. The information contained in PsycINFO is also available in a monthly print journal called *Psychological Abstracts*.
- Journal articles are easier to understand if one is familiar with the standard format. Most articles include six elements: abstract, introduction, method, results, discussion, and references.

CRITICAL THINKING Application

The Perils of Anecdotal Evidence: “I Have a Friend Who . . .”

Here’s a tough problem. Suppose you are the judge in a family law court. As you look over the cases that will come before you today, you see that one divorcing couple have managed to settle almost all of the important decisions with minimal conflict—such as who gets the house, who gets the car and the dog, and who pays which bills. However, there is one crucial issue left: Each parent wants custody of the children, and because they could not reach an agreement on their own, the case is now in your court. You will need the wisdom of the legendary King Solomon for this decision. How can you determine what is in the best interests of the children?

Child custody decisions have major consequences for all of the parties involved. As you review the case records, you see that both parents are loving and competent, so there are no obvious reasons for selecting one parent over the other as the primary caretaker. In considering various alternatives, you mull over the possibility of awarding *joint custody*, an arrangement in which the children spend half their time with each parent, instead of the more usual arrangement where one parent has primary custody and the other has visitation rights. Joint custody seems to have some obvious benefits, but you are not sure how well these arrangements actually work. Will the children feel more attached to both parents if the parents share custody equally? Or will the children feel hassled by always moving around, perhaps spending half the week at one parent’s home and half at the other parent’s home? Can parents who are already feuding over child custody issues make these complicated arrangements work? Or is joint custody just too disruptive to everyone’s life? You really don’t know the answer to any of these vexing questions.

One of the lawyers involved in the case knows that you are thinking about the possibility of joint custody. She also understands that you want more information about how

well joint custody tends to work before you render a decision. To help you make up your mind, she tells you about a divorced couple that has had a joint custody arrangement for many years and offers to have them appear in court to describe their experiences “first-hand.” They and their children can answer any questions you might have about the pros and cons of joint custody. They should be in the best position to know how well joint custody works because they are living it. Sounds like a reasonable plan. What do you think?

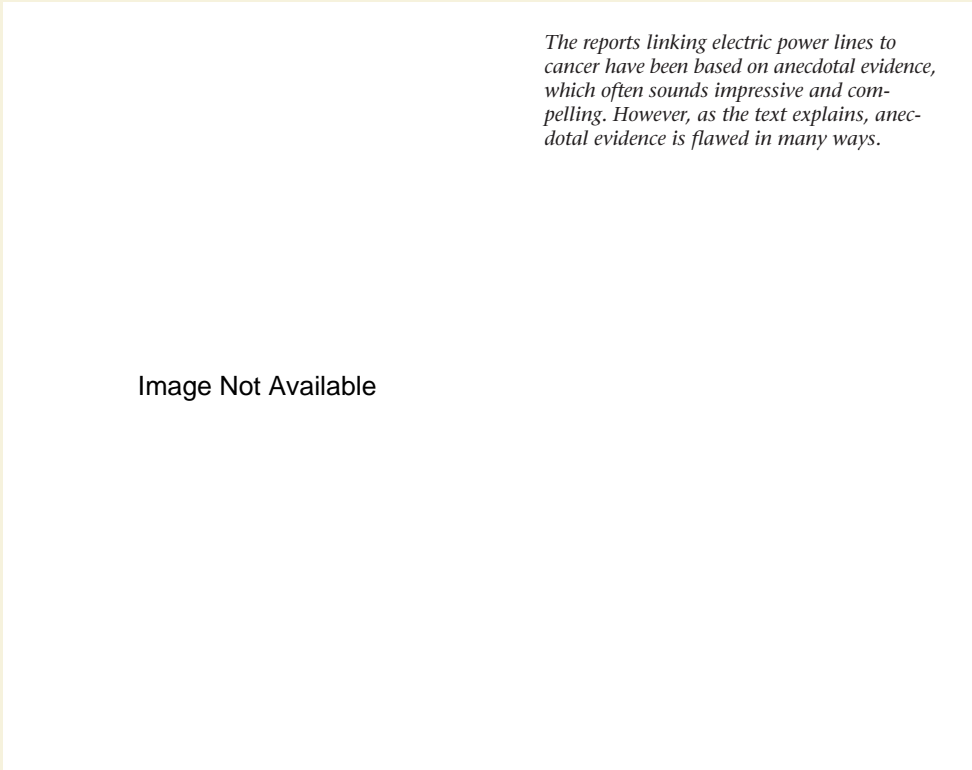
I hope you said, “No, no, no!” What’s wrong with asking someone who’s been there how well joint custody works? The crux of the problem is that the evidence a single family brings to the question of joint custody is ***anecdotal evidence, which consists of personal stories about specific incidents and experiences.*** Anecdotal evidence can be seductive. For example, one study found that psychology majors’ choices of future courses to enroll in were influenced more by a couple of students’ brief anecdotes than by extensive statistics on many other students’ ratings of the courses from the previous term (Borgida & Nisbett, 1977). Anecdotes readily sway people because they often are concrete, vivid, and memorable. Indeed, people tend to be influenced by anecdotal information even when

they are explicitly forewarned that the information is *not* representative (Hammill, Wilson, & Nisbett, 1980). Many politicians are keenly aware of the power of anecdotes and frequently rely on a single vivid story rather than solid data to sway voters’ views. However, anecdotal evidence is fundamentally flawed (Ruscio, 2002; Stanovich, 2004).

What, exactly, is wrong with anecdotal evidence? Let’s use some of the concepts introduced in the main body of the chapter to analyze its shortcomings. First, in the language of research designs, the anecdotal experiences of one family resemble a single *case study*. The story they tell about their experiences with joint custody may be quite interesting, but their experiences—good or bad—cannot be used to generalize to other couples. Why not? Because they are only one family, and they may be unusual in some way that affects how well they manage joint custody. To draw general conclusions based on the case study approach, you need a systematic *series* of case studies, so you can look for threads of consistency. A single family is a sample size of one, which surely is not large enough to derive broad principles that would apply to other families.

Second, anecdotal evidence is similar to *self-report data*, which can be distorted for a variety of reasons, such as people’s tendency to give socially approved information about

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The reports linking electric power lines to cancer have been based on anecdotal evidence, which often sounds impressive and compelling. However, as the text explains, anecdotal evidence is flawed in many ways.

themselves (the *social desirability bias*). When researchers use tests and surveys to gather self-report data, they can take steps to reduce or assess the impact of distortions in their data, but there are no comparable safeguards with anecdotal evidence. Thus, the family that appears in your courtroom may be eager to make a good impression and unknowingly slant their story accordingly.

Anecdotes are often inaccurate and riddled with embellishments. We will see in Chapter 7 that memories of personal experiences are far more malleable and far less reliable than widely assumed (Loftus, 2004; Schacter, 2001). And, although it would not be an issue in this case, in other situations *anecdotal evidence often consists of stories that people have heard about others' experiences*. Hearsay evidence is not accepted in courtrooms for good reason. As stories are passed on from one person to another, they often become increasingly distorted and inaccurate.

Can you think of any other reasons for being wary of anecdotal evidence? After reading the chapter, perhaps you thought about the possibility of *sampling bias*. Do

you think that the lawyer will pick a couple at random from all those who have been awarded joint custody? It seems highly unlikely. If she wants you to award joint custody, she will find a couple for whom this arrangement worked very well, while if she wants you to award sole custody to her client, she will find a couple whose inability to make joint custody work had dire consequences for their children. One reason people love to work with anecdotal evidence is that it is so readily manipulated; they can usually find an anecdote or two to support their position, whether or not these anecdotes are representative of most people's experiences.

If the testimony of one family cannot be used in making this critical custody decision, what sort of evidence should you be looking for? One goal of effective critical thinking is to make decisions based on solid evidence. This process is called *evidence-based decision making*. In this case, you would need to consider the overall experiences of a large sample of families who have tried joint custody arrangements. In general, across many different families, did the children in joint custody develop well? Was there a disproportionately high rate of emotional problems or other signs of stress for the children or the parents? Was the percentage of families who returned to court at a later date to change their joint custody arrangements higher than for other types of custody arrangements? You can probably think of additional information that you would want to collect regarding the outcomes of various custody arrangements.

In examining research reports, many people recognize the need to evaluate the evidence by looking for the types of flaws described in the main body of the chapter (sampling bias, experimenter bias, and so forth). Curiously, though, many of the same people then fail to apply the same principles of good evidence to their personal decisions in everyday life. The tendency to rely on the anecdotal experiences of a small number of people is sometimes called the "*I have a friend who*" syndrome, because no matter what the topic is, it seems that someone will provide a personal story about a friend as evidence for his or her particular point of view. In short, when you hear people support their assertions with personal stories, a little skepticism is in order.

Table 2-3 Critical Thinking Skills Discussed in This Application

Skill	Description
Recognizing the limitations of anecdotal evidence	The critical thinker is wary of anecdotal evidence, which consists of personal stories used to support one's assertions. Anecdotal evidence tends to be unrepresentative, inaccurate, and unreliable.
Using evidence-based decision making	The critical thinker understands the need to seek sound evidence to guide decisions in everyday life.

CHAPTER 2 *Recap*

Key Ideas

Looking for Laws: The Scientific Approach to Behavior

- The scientific approach assumes that there are laws of behavior that can be discovered through empirical research. The goals of the science of psychology include (1) the measurement and description of behavior, (2) the understanding and prediction of behavior, and (3) the application of this knowledge to the task of controlling behavior.
- By integrating apparently unrelated facts into a coherent whole, theories permit psychologists to make the leap from the description of behavior to understanding behavior.
- A scientific investigation follows a systematic pattern that includes five steps: (1) formulate a testable hypothesis, (2) select the research method and design the study, (3) collect the data, (4) analyze the data and draw conclusions, and (5) report the findings. The two major advantages of the scientific approach are its clarity in communication and its relative intolerance of error.

Looking for Causes: Experimental Research

- Experimental research involves the manipulation of an independent variable to determine its effect on a dependent variable. This research is usually done by comparing experimental and control groups, which must be alike in regard to important extraneous variables.
- Experimental designs may vary. For example, sometimes an experimental group serves as its own control group. And many experiments have more than one independent variable or more than one dependent variable. In our first Featured Study, Shepperd and McNulty (2002) used the experimental method to demonstrate that emotional reactions to events depend on people's expectations.
- An experiment is a powerful research method that permits conclusions about cause-effect relationships between variables. However, the experimental method is often not usable for a specific problem, and many experiments tend to be artificial.

Looking for Links: Descriptive/Correlational Research

- Psychologists rely on descriptive/correlational research when they are unable to manipulate the variables they want to study. Key descriptive methods include naturalistic observation, case studies, and surveys.
- Descriptive/correlational research methods allow psychologists to explore issues that might not be open to experimental investigation. However, these research methods cannot demonstrate cause-effect relationships.

Looking for Conclusions: Statistics and Research

- Psychologists use descriptive statistics, such as measures of central tendency and variability, to organize and summarize their numerical data. The mean, median, and mode are widely used measures of central tendency. Variability is usually measured with the standard deviation.
- Correlations may be either positive (when two variables co-vary in the same direction) or negative (when two variables co-vary in the opposite direction). The closer a correlation is to either +1.00 or -1.00, the stronger the association. Higher correlations yield greater predictability. However, a correlation is no assurance of causation.
- Hypothesis testing involves deciding whether observed findings support the researcher's hypothesis. Findings are statistically significant only when they are unlikely to be due to chance.

Looking for Flaws: Evaluating Research

- Scientists often try to replicate research findings to double-check their validity. Sampling bias occurs when a sample is not representative of the population of interest. Placebo effects occur when subjects' expectations cause them to change their behavior in response to a fake treatment.

- Distortions in self-reports are a source of concern whenever questionnaires and personality inventories are used to collect data. Experimenter bias occurs when researchers' expectations and desires distort their observations or unintentionally influence their subjects' behavior.

Looking at Ethics: Do the Ends Justify the Means?

- Research sometimes raises complex ethical issues. In psychology, the key questions concern the use of deception with human subjects and the use of harmful or painful manipulations with animal subjects. The APA has formulated ethical principles to serve as guidelines for researchers.

PERSONAL APPLICATION • Finding and Reading Journal Articles

- Journals publish technical and scholarly material. Usually they are written for other professionals in a narrow area of inquiry.
- PsycINFO is a computerized database that contains brief summaries of published journal articles, books, and chapters in edited books. Works on specific topics and publications by specific authors can be found by using the search mechanisms built into the database.
- Journal articles are easier to understand if one is familiar with the standard format. Most articles include six elements: abstract, introduction, method, results, discussion, and references.

CRITICAL THINKING APPLICATION • The Perils of Anecdotal Evidence: "I Have a Friend Who . . ."

- Anecdotal evidence consists of personal stories about specific incidents and experiences. Anecdotes often influence people because they tend to be concrete, vivid, and memorable.
- However, anecdotal evidence is usually based on the equivalent of a single case study, which is not an adequate sample, and there are no safeguards to reduce the distortion often found in self-report data. Many anecdotes are inaccurate, second-hand reports of others' experiences. Effective critical thinking depends on evidence-based decision making.

Key Terms

- Anecdotal evidence (p. 68)
- Case study (p. 49)
- Confounding of variables (p. 44)
- Control group (p. 43)
- Correlation (p. 53)
- Correlation coefficient (p. 53)
- Data collection techniques (p. 40)
- Dependent variable (p. 43)
- Descriptive statistics (p. 52)
- Double-blind procedure (p. 59)
- Experiment (p. 42)
- Experimental group (p. 43)
- Experimenter bias (p. 59)
- Extraneous variables (p. 44)
- Hypothesis (p. 38)
- Independent variable (p. 43)
- Inferential statistics (p. 56)
- Journal (p. 41)
- Mean (p. 52)
- Median (p. 52)
- Mode (p. 52)
- Naturalistic observation (p. 48)
- Operational definition (p. 39)
- Participants (p. 40)
- Placebo effects (p. 58)
- Population (p. 57)
- Random assignment (p. 44)
- Replication (p. 57)
- Research methods (p. 42)
- Response set (p. 59)
- Sample (p. 57)
- Sampling bias (p. 57)
- Social desirability bias (p. 58)
- Standard deviation (p. 53)
- Statistical significance (p. 56)
- Statistics (p. 52)
- Subjects (p. 40)
- Survey (p. 50)
- Theory (p. 38)
- Variability (p. 53)
- Variables (p. 38)

Key People

- Neal Miller (p. 61)
- Robert Rosenthal (p. 59)
- Stanley Schachter (p. 42)

CHAPTER 2 Practice Test

1. A tentative prediction about the relationship between two variables is:
 - A. a confounding of variables.
 - B. an operational definition.
 - C. a theory.
 - D. a hypothesis.
2. Researchers must describe the actions that will be taken to measure or control each variable in their studies. In other words, they must:
 - A. provide operational definitions of their variables.
 - B. decide if their studies will be experimental or correlational.
 - C. use statistics to summarize their findings.
 - D. decide how many subjects should participate in their studies.
3. A researcher found that clients who were randomly assigned to same-sex groups participated more in group therapy sessions than clients who were randomly assigned to coed groups. In this experiment, the independent variable was:
 - A. the amount of participation in the group therapy sessions.
 - B. whether or not the group was coed.
 - C. the clients' attitudes toward group therapy.
 - D. how much the clients' mental health improved.
4. A researcher wants to see whether a protein-enriched diet will enhance the maze-running performance of rats. One group of rats are fed the high-protein diet for the duration of the study; the other group continues to receive ordinary rat chow. In this experiment, the diet fed to the two groups of rats is the _____ variable.
 - A. correlated
 - B. control
 - C. dependent
 - D. independent
5. In a study of the effect of a new teaching technique on students' achievement test scores, an important extraneous variable would be the students':
 - A. hair color.
 - B. athletic skills.
 - C. IQ scores.
 - D. sociability.
6. Whenever you have a cold, you rest in bed, take aspirin, and drink plenty of fluids. You can't determine which remedy is most effective because of which of the following problems?
 - A. sampling bias
 - B. distorted self-report data
 - C. confounding of variables
 - D. experimenter bias
7. A psychologist monitors a group of nursery-school children, recording each instance of helping behavior as it occurs. The psychologist is using:
 - A. the experimental method.
 - B. naturalistic observation.
 - C. case studies.
 - D. the survey method.
8. Among the advantages of descriptive/correlational research is (are):
 - A. it allows investigators to isolate cause and effect.
 - B. it permits researchers to study variables that would be impossible to manipulate.
 - C. it can demonstrate conclusively that two variables are causally related.
 - D. both a and b.
9. Which of the following correlation coefficients would indicate the strongest relationship between two variables?
 - A. .58
 - B. .19
 - C. -.97
 - D. -.05
10. When psychologists say that their results are statistically significant, they mean that the results:
 - A. have important practical applications.
 - B. have important implications for scientific theory.
 - C. are unlikely to be due to the fluctuations of chance.
 - D. are all of the above.
11. Sampling bias exists when:
 - A. the sample is representative of the population.
 - B. the sample is not representative of the population.
 - C. two variables are confounded.
 - D. the effect of the independent variable can't be isolated.
12. The problem of experimenter bias can be avoided by:
 - A. not informing subjects of the hypothesis of the experiment.
 - B. telling the subjects that there are no "right" or "wrong" answers.
 - C. using a research strategy in which neither subjects nor experimenter know which subjects are in the experimental and control groups.
 - D. having the experimenter use only nonverbal signals when communicating with the subjects.
13. Critics of deception in research have assumed that deceptive studies are harmful to subjects. The empirical data on this issue suggest that:
 - A. many deceptive studies do produce significant distress for subjects who were not forewarned about the possibility of deception.
 - B. most participants in deceptive studies report that they enjoyed the experience and didn't mind being misled.
 - C. deceptive research seriously undermines subjects' trust in others.
 - D. both a and c are the case.
14. PsycINFO is:
 - A. a new journal that recently replaced *Psychological Abstracts*.
 - B. a computerized database containing abstracts of articles, chapters, and books reporting psychological research.
 - C. a reference book that explains the format and techniques for writing journal articles.
 - D. a computerized database containing information about studies that have not yet been published.
15. Anecdotal evidence:
 - A. is often concrete, vivid, and memorable.
 - B. tends to influence people.
 - C. is fundamentally flawed and unreliable.
 - D. is all of the above.

1 D. 38	6 C. 44	10 C. 56	15 D. 68-69
2 A. 39	7 B. 48-49	9 C. 54	14 B. 64-65
3 B. 43	8 B. 51-52	12 C. 59	13 B. 60-61
4 D. 43	11 B. 57		
5 C. 44			

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



<http://www.thomsonedu.com>

Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/

Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



CHAPTER

3

The Biological Bases of Behavior



Communication in the Nervous System

Nervous Tissue: The Basic Hardware
The Neural Impulse: Using Energy to Send Information
The Synapse: Where Neurons Meet
Neurotransmitters and Behavior

Organization of the Nervous System

The Peripheral Nervous System
The Central Nervous System

Looking Inside the Brain: Research Methods

Electrical Recordings
Lesioning
Electrical Stimulation of the Brain
Transcranial Magnetic Stimulation
Brain-Imaging Procedures

FEATURED STUDY • Probing the Anatomy of Sexual Arousal

The Brain and Behavior

The Hindbrain
The Midbrain
The Forebrain
The Plasticity of the Brain

Right Brain/Left Brain: Cerebral Laterality

Bisecting the Brain: Split-Brain Research
Hemispheric Specialization in the Intact Brain

The Endocrine System: Another Way to Communicate

Heredity and Behavior: Is It All in the Genes?

Basic Principles of Genetics
Investigating Hereditary Influence: Research Methods
The Interplay of Heredity and Environment

The Evolutionary Bases of Behavior

Darwin's Insights
Subsequent Refinements to Evolutionary Theory
Behaviors as Adaptive Traits

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Evaluating the Concept of "Two Minds in One"

Cerebral Specialization and Cognitive Processes
Complexities and Qualifications

CRITICAL THINKING APPLICATION • Building Better Brains: The Perils of Extrapolation

The Key Findings on Neural Development
The Tendency to Overextrapolate

Recap

Practice Test

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If you have ever visited an aquarium, you may have encountered one of nature's more captivating animals: the octopus. Although this jellylike mass of arms and head appears to be a relatively simple creature, it is capable of a number of interesting behaviors. The octopus has highly developed eyes that enable it to respond to stimuli in the darkness of the ocean. When threatened, it can release an inky cloud to befuddle enemies while it makes good its escape by a kind of rocket propulsion. If that doesn't work, it can camouflage itself by changing color and texture to blend into its surroundings. Furthermore, the animal is surprisingly intelligent. In captivity, an octopus can learn, for example, to twist the lid off a jar with one of its tentacles to get at a treat inside.

Despite its talents, there are many things an octopus cannot do. An octopus cannot study psychology, plan a weekend, dream about its future, or discover the Pythagorean theorem. Yet the biological processes that underlie these uniquely human behaviors are much the same as the biological processes that enable an octopus to escape from a predator or forage for food. Indeed, some of science's most important insights about how the nervous system works came from studies of a relative of the octopus, the squid.

Organisms as diverse as humans and squid share many biological processes. However, their unique behavioral capacities depend on the differences in their physiological makeup. You and I have a larger repertoire of behaviors than the octopus in large part because we come equipped with a more complex brain and nervous system. The activity of the human brain is so complex that no computer has ever come close to duplicating it. Your nervous system contains as many cells busily integrating and relaying information as there are stars in our galaxy. Whether you are scratching your nose or composing an essay, the activity of those cells underlies what you do. It is little wonder, then, that many psychologists have dedicated themselves to exploring the biological bases of behavior.

How do mood-altering drugs work? Are the two halves of the brain specialized to perform different functions? What happens inside the body when you feel a strong emotion? Are some mental illnesses the result of chemical imbalances in the brain? To what extent is intelligence determined by biological inheritance? These questions only begin to suggest the countless ways in which biology is fundamental to the study of behavior.

> Communication in the Nervous System

Imagine that you are watching a scary movie. As the tension mounts, your palms sweat and your heart beats faster. You begin shoveling popcorn into your mouth, carelessly spilling some in your lap. If someone were to ask you what you are doing at this moment, you would probably say, "Nothing—just watching the movie." Yet some highly complex processes are occurring without your thinking about them. A stimulus (the light from the screen) is striking your eyes. Almost instantaneously, your brain is interpreting the light stimulus, and signals are flashing to other parts of your body, leading to a flurry of activity. Your sweat glands are releasing perspiration, your heartbeat is quickening, and muscular movements are enabling your hand to find the popcorn and, more or less successfully, lift it to your mouth.

Even in this simple example, you can see that behavior depends on rapid information processing. Information travels almost instantaneously from your eyes to your brain, from your brain to the muscles of your arm and hand, and from your palms back to

your brain. In essence, your nervous system is a complex communication network in which signals are constantly being transmitted, received, and integrated. The nervous system handles information, just as the circulatory system handles blood. In this section, we take a close look at how communication occurs in the nervous system.

Nervous Tissue: The Basic Hardware



Your nervous system is living tissue composed of cells. The cells in the nervous system fall into two major categories: *neurons* and *glia*.

Neurons



Neurons are individual cells in the nervous system that receive, integrate, and transmit information.

They are the basic links that permit communication within the nervous system. The vast majority of them

PREVIEW QUESTIONS

- What are the key parts of the neuron, and what are their functions?
- How do glial cells contribute to the functioning of the nervous system?
- What is an action potential?
- How does synaptic transmission take place?
- Which neurotransmitters regulate which aspects of behavior?

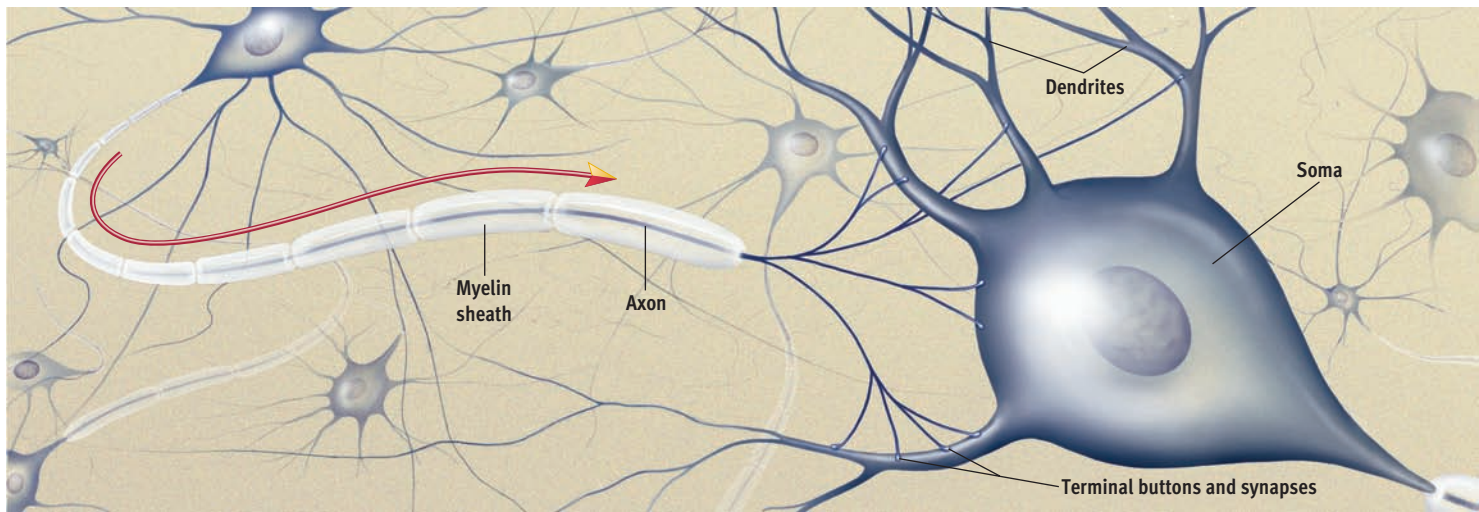


Figure 3.1

Structure of the neuron.

Neurons are the communication links of the nervous system. This diagram highlights the key parts of a neuron, including specialized receptor areas (dendrites), the cell body (soma), the axon fiber along which impulses are transmitted, and the terminal buttons, which release chemical messengers that carry signals to other neurons. Neurons vary considerably in size and shape and are usually densely interconnected.

communicate only with other neurons. However, a small minority receive signals from outside the nervous system (from sensory organs) or carry messages from the nervous system to the muscles that move the body.

A highly simplified drawing of two “typical” neurons is shown in **Figure 3.1**. Actually, neurons come in such a tremendous variety of types and shapes that no single drawing can adequately represent them. Trying to draw the “typical” neuron is like trying to draw the “typical” tree. In spite of this diversity, the drawing in **Figure 3.1** highlights some common features of neurons.

The soma, or cell body, contains the cell nucleus and much of the chemical machinery common to most cells (*soma* is Greek for “body”). The rest of the neuron is devoted exclusively to handling information. The neurons in **Figure 3.1** have a number of branched, feelerlike structures called *dendritic trees* (*dendrite* is a Greek word for “tree”). Each individual branch is a *dendrite*. **Dendrites are the parts of a neuron that are specialized to receive information.** Most neurons receive information from many other cells—sometimes thousands of others—and so have extensive dendritic trees.

From the many dendrites, information flows into the cell body and then travels away from the soma along the *axon* (from the Greek for “axle”). **The axon is a long, thin fiber that transmits signals away from the soma to other neurons or to muscles or glands.** Axons may be quite long (sometimes several feet), and they may branch off to communicate with a number of other cells.

In humans, many axons are wrapped in cells with a high concentration of a white, fatty substance called *myelin*. **The myelin sheath is insulating ma-**

terial that encases some axons. The myelin sheath speeds up the transmission of signals that move along axons. If an axon’s myelin sheath deteriorates, its signals may not be transmitted effectively. The loss of muscle control seen with the disease *multiple sclerosis* is due to a degeneration of myelin sheaths (Schwartz & Westbrook, 2000).

The axon ends in a cluster of **terminal buttons, which are small knobs that secrete chemicals called neurotransmitters.** These chemicals serve as messengers that may activate neighboring neurons. The points at which neurons interconnect are called *synapses*. **A synapse is a junction where information is transmitted from one neuron to another** (*synapse* is from the Greek for “junction”).

To summarize, information is received at the dendrites, is passed through the soma and along the axon, and is transmitted to the dendrites of other cells at meeting points called synapses. Unfortunately, this nice, simple picture has more exceptions than the U.S. Tax Code. For example, some neurons do not have an axon, while others have multiple axons. Also, although neurons typically synapse on the dendrites of other cells, they may also synapse on a soma or an axon.

Glia

Glia are cells found throughout the nervous system that provide various types of support for neurons. Glia (literally “glue”) tend to be much smaller than neurons, but they outnumber neurons by about 10 to 1, so glial cells appear to account for over 50% of the brain’s volume. Among other things, glial cells supply nourishment to neurons, help remove neurons’ waste products, and provide insulation around many axons. The myelin sheaths that encase some

Web Link 3.1



Neuropsychology Central

This content-rich site, maintained by Professor Jeffrey Browndyke of Louisiana State University, is dedicated to all aspects of human neuropsychology, from the perspectives of the experimental research laboratory as well as the applied clinical setting of the hospital and professional office.

axons are derived from special types of glial cells. Glia also play a complicated role in orchestrating the development of the nervous system in the human embryo.

These functions, which have been known for many years, made glial cells the unsung heroes of the nervous system. Until recently, it was thought that the “glamorous” work in the nervous system—the transmission and integration of informational signals—was the exclusive province of the neurons. New research, however, suggests that glia may also send and receive chemical signals (Fields, 2004; Fields & Stevens-Graham, 2002). Some types of glia can detect neural impulses and send signals to other glial cells. Surprised by this discovery, neuroscientists are now trying to figure out how this signaling system interfaces with the neural communication system.

Although glia may contribute to information processing in the nervous system, the bulk of this crucial work is handled by the neurons. Thus, we need to examine the process of neural activity in more detail.

The Neural Impulse: Using Energy to Send Information



What happens when a neuron is stimulated? What is the nature of the signal—the *neural impulse*—that moves through the neuron? These were the questions that Alan Hodgkin and Andrew Huxley set out to answer in their groundbreaking experiments with axons removed from squid. Why did they choose to work with squid axons? Because the squid has a pair of “giant” axons that are about a hundred times larger than those in humans (which still makes them only about as thick as a human hair). Their large size permitted Hodgkin and Huxley to insert fine wires called *microelectrodes* into them. By using the microelectrodes to record the electrical activity in individual neurons, Hodgkin and Huxley unraveled the mystery of the neural impulse.

The Neuron at Rest: A Tiny Battery



Hodgkin and Huxley (1952) learned that the neural impulse is a complex electrochemical reaction. Both inside and outside the neuron are fluids containing electrically charged atoms and molecules called *ions*. Positively charged sodium and potassium ions and negatively charged chloride ions flow back and forth across the cell membrane, but they do not cross at the same rate. The difference in flow rates leads to a slightly higher concentration of negatively charged

ions inside the cell. The resulting voltage means that the neuron at rest is a tiny battery, a store of potential energy. **The resting potential of a neuron is its stable, negative charge when the cell is inactive.** As shown in **Figure 3.2(a)**, this charge is about -70 millivolts, roughly one-twentieth of the voltage of a flashlight battery.

The Action Potential

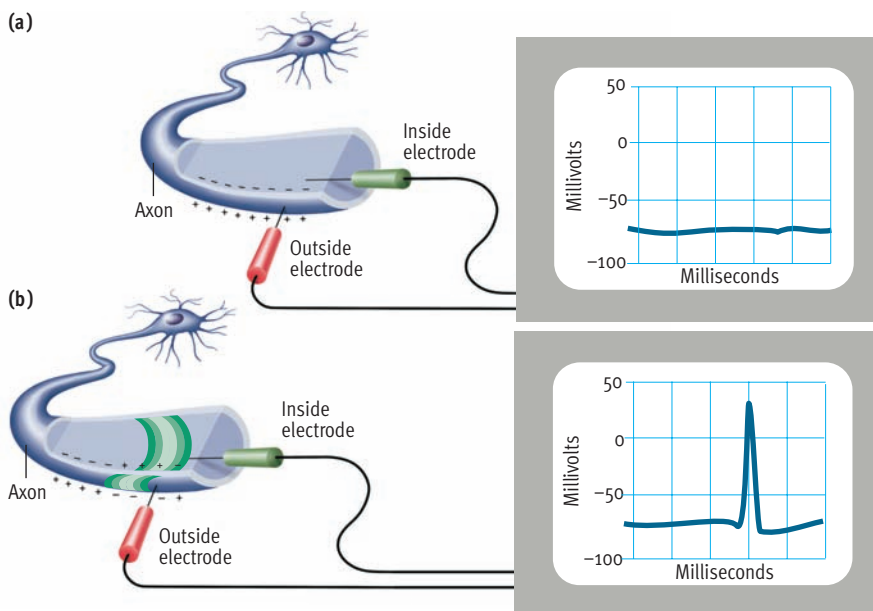


As long as the voltage of a neuron remains constant, the cell is quiet, and no messages are being sent. When the neuron is stimulated, channels in its cell membrane open, briefly allowing positively charged sodium ions to rush in. For an instant, the neuron's charge is less negative, or even positive, creating an action potential (Koester & Siegelbaum, 2000). **An action potential is a very brief shift in a neuron's electrical charge that travels along an axon.** The firing of an action potential is reflected in the voltage spike shown in **Figure 3.2 (b)**. Like a spark traveling along a trail of gunpowder, the voltage change races down the axon.

After the firing of an action potential, the channels in the cell membrane that opened to let in sodium close up. Some time is needed before they

Figure 3.2.

The neural impulse. The electrochemical properties of the neuron allow it to transmit signals. The electric charge of a neuron can be measured with a pair of electrodes connected to an oscilloscope, as Hodgkin and Huxley showed with a squid axon. Because of its exceptionally thick axons, the squid has frequently been used by scientists studying the neural impulse. **(a)** At rest, the neuron's voltage hovers around -70 millivolts. **(b)** When a neuron is stimulated, a brief jump occurs in the neuron's voltage, resulting in a spike on the oscilloscope recording of the neuron's electrical activity. This change in voltage, called an action potential, travels along the axon like a spark traveling along a trail of gunpowder.



Web Link 3.2



Molecular Neurobiology: A Gallery of Animations Site editor and physician Neil Busis brings together a set of QuickTime animations demonstrating activities at the molecular level of the synapse, such as the fusion of synaptic vesicles with the presynaptic membrane.

are ready to open again, and until that time the neuron cannot fire. **The absolute refractory period is the minimum length of time after an action potential during which another action potential cannot begin.** This “down time” isn’t very long, only 1 or 2 milliseconds. It is followed by a brief *relative refractory period*, during which the neuron can fire, but its threshold for firing is elevated, so more intense stimulation is required to initiate an action potential.



The All-or-None Law

The neural impulse is an all-or-none proposition, like firing a gun. You can’t half-fire a gun. The same is true of the neuron’s firing of action potentials. Either the neuron fires or it doesn’t, and its action potentials are all the same size (Kandel, 2000). That is, weaker stimuli do not produce smaller action potentials.

Even though the action potential is an all-or-nothing event, neurons *can* convey information about the strength of a stimulus. They do so by varying the *rate* at which they fire action potentials. In general, a stronger stimulus will cause a cell to fire a more rapid volley of neural impulses than a weaker stimulus will.

Various neurons transmit neural impulses at different speeds. For example, thicker axons transmit neural impulses more rapidly than thinner ones do. Although neural impulses do not travel as fast as electricity along a wire, they *are* very fast, moving at up to 100 meters per second, which is equivalent to more than 200 miles per hour. The entire, complicated process of neural transmission takes only a few thousandths of a second. In the time it has taken you

to read this description of the neural impulse, billions of such impulses have been transmitted in your nervous system!

The Synapse: Where Neurons Meet



In the nervous system, the neural impulse functions as a signal. For that signal to have any meaning for the system as a whole, it must be transmitted from the neuron to other cells. As noted earlier, this transmission takes place at special junctions called *synapses*, which depend on *chemical* messengers.

Sending Signals: Chemicals as Couriers



A “typical” synapse is shown in **Figure 3.3**. The first thing that you should notice is that the two neurons don’t actually touch. They are separated by the ***synaptic cleft, a microscopic gap between the terminal button of one neuron and the cell membrane of another neuron.*** Signals have to jump this gap to permit neurons to communicate. In this situation, the neuron that sends a signal across the gap is called the *presynaptic neuron*, and the neuron that receives the signal is called the *postsynaptic neuron*.

How do messages travel across the gaps between neurons? The arrival of an action potential at an axon’s terminal buttons triggers the release of ***neurotransmitters—chemicals that transmit information from one neuron to another.*** Within the buttons, most of these chemicals are stored in small sacs,

concept check 3.1



Understanding Nervous System Hardware Using Metaphors

A useful way to learn about the structures and functions of parts of the nervous system is through metaphors. Check your understanding of the basic components of the nervous system by matching the metaphorical descriptions below with the correct terms in the following list: (a) glia, (b) neuron, (c) soma, (d) dendrite, (e) axon, (f) myelin, (g) terminal button, (h) synapse. You’ll find the answers in Appendix A.

- _____ 1. Like a tree. Also, each branch is a telephone wire that carries incoming messages to you.
- _____ 2. Like the insulation that covers electrical wires.
- _____ 3. Like a silicon chip in a computer that receives and transmits information between input and output devices as well as between other chips.
- _____ 4. Like an electrical cable that carries information.
- _____ 5. Like the maintenance personnel who keep things clean and in working order so the operations of the enterprise can proceed.
- _____ 6. Like the nozzle at the end of a hose, from which water is squirted.
- _____ 7. Like a railroad junction, where two trains may meet.

called *synaptic vesicles*. The neurotransmitters are released when a vesicle fuses with the membrane of the presynaptic cell and its contents spill into the synaptic cleft. After their release, neurotransmitters diffuse across the synaptic cleft to the membrane of the receiving cell. There they may bind with special molecules in the postsynaptic cell membrane at various *receptor sites*. These sites are specifically “tuned” to recognize and respond to some neurotransmitters but not to others.

Receiving Signals: Postsynaptic Potentials



When a neurotransmitter and a receptor molecule combine, reactions in the cell membrane cause a **postsynaptic potential (PSP)**, a voltage change at a receptor site on a postsynaptic cell membrane. Postsynaptic potentials do *not* follow the all-or-none law as action potentials do. Instead, postsynaptic potentials are *graded*. That is, they vary in size and they increase or decrease the *probability* of a neural impulse in the receiving cell in proportion to the amount of voltage change.

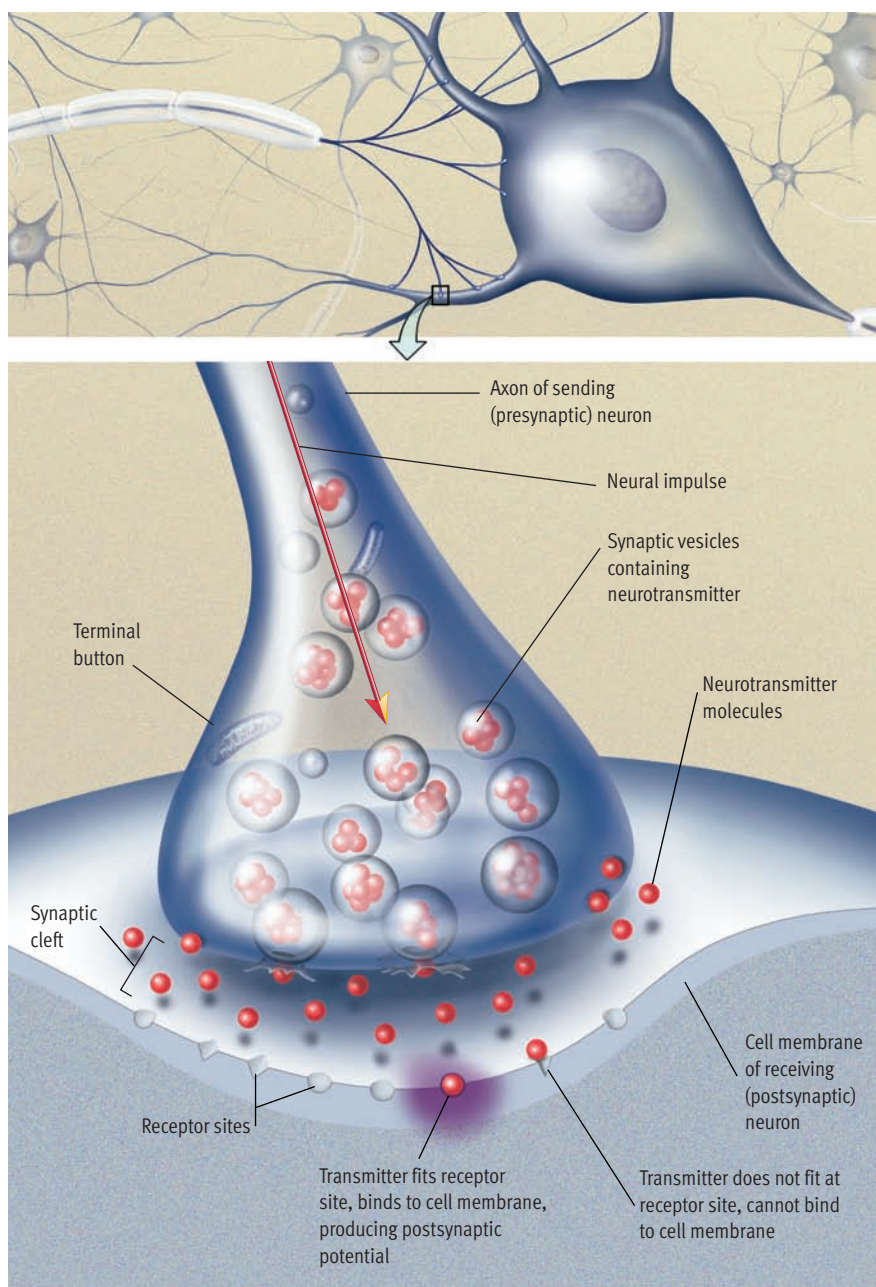
Two types of messages can be sent from cell to cell: excitatory and inhibitory. **An excitatory PSP is a positive voltage shift that increases the likelihood that the postsynaptic neuron will fire action potentials.** **An inhibitory PSP is a negative voltage shift that decreases the likelihood that the postsynaptic neuron will fire action potentials.** The direction of the voltage shift, and thus the nature of the PSP (excitatory or inhibitory), depends on which receptor sites are activated in the postsynaptic neuron (Kandel, 2000).

The excitatory or inhibitory effects produced at a synapse last only a fraction of a second. Then neurotransmitters drift away from receptor sites or are inactivated by enzymes that metabolize (convert) them into inactive forms. Most are reabsorbed into the presynaptic neuron through **reuptake**, a process in which neurotransmitters are sponged up from the synaptic cleft by the presynaptic membrane. Reuptake allows synapses to recycle their materials. Reuptake and the other key processes in synaptic transmission are summarized in **Figure 3.4** on the next page.

Integrating Signals: Neural Networks



A neuron may receive a symphony of signals from *thousands* of other neurons. The same neuron may pass its messages along to thousands of neurons as well. Thus, a neuron must do a great deal more than



simply relay messages it receives. It must *integrate* signals arriving at many synapses before it “decides” whether to fire a neural impulse. If enough excitatory PSPs occur in a neuron, the electrical currents can add up, causing the cell’s voltage to reach the threshold at which an action potential will be fired. However, if many inhibitory PSPs also occur, they will tend to cancel the effects of excitatory PSPs. Thus, the state of the neuron is a weighted balance between excitatory and inhibitory influences (Kandel & Siegelbaum, 2000).

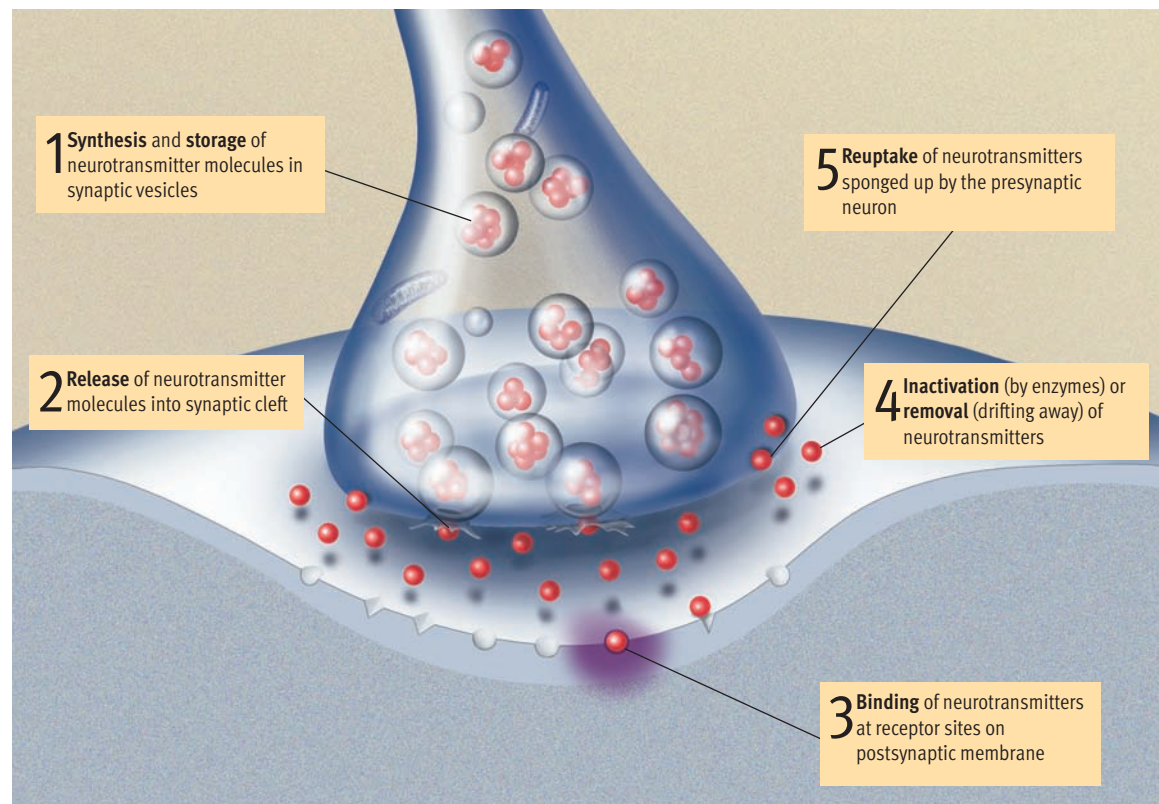
As Rita Carter (1998) has pointed out in *Mapping the Mind*, “The firing of a single neuron is not enough

Figure 3.3

The synapse. When a neural impulse reaches an axon’s terminal buttons, it triggers the release of chemical messengers called neurotransmitters. The neurotransmitter molecules diffuse across the synaptic cleft and bind to receptor sites on the postsynaptic neuron. A specific neurotransmitter can bind only to receptor sites that its molecular structure will fit into, much like a key must fit a lock.

Figure 3.4

Overview of synaptic transmission. The main elements in synaptic transmission are summarized here, superimposed on a blowup of the synapse seen in Figure 3.3. The five key processes involved in communication at synapses are (1) synthesis and storage, (2) release, (3) binding, (4) inactivation or removal, and (5) reuptake of neurotransmitters. As you'll see in this chapter and the remainder of the book, the effects of many phenomena—such as pain, drug use, and some diseases—can be explained in terms of how they alter one or more of these processes (usually at synapses releasing a specific neurotransmitter).



to create the twitch of an eyelid in sleep, let alone a conscious impression. . . . Millions of neurons must fire in unison to produce the most trifling thought" (p. 19). Most neurons are interlinked in complex chains, pathways, circuits, and networks. Our perceptions, thoughts, and actions depend on *patterns* of neural activity in elaborate neural networks. These networks consist of interconnected neurons that frequently fire together or sequentially to perform certain functions (Song et al., 2005). The links in these networks are fluid, as new synaptic connections may

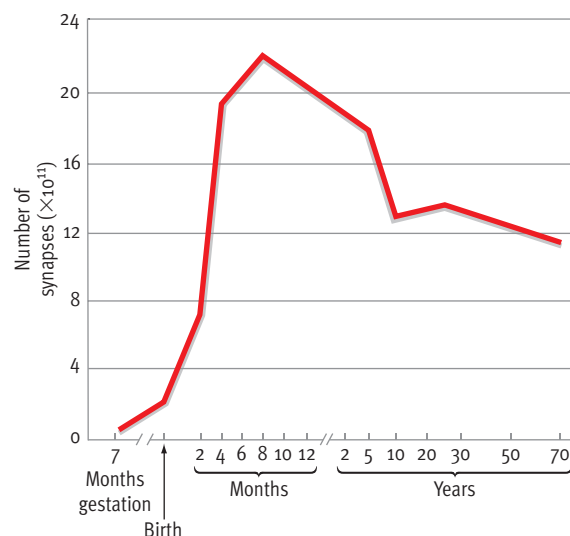
be made while some old connections whither away (Hua & Smith, 2004).

Ironically, the *elimination of old synapses* appears to play a larger role in the sculpting of neural networks than the *creation of new synapses*. The nervous system normally forms more synapses than needed and then gradually eliminates the less-active synapses. For example, the number of synapses in the human visual cortex peaks at around age one and then declines, as diagrammed in Figure 3.5 (Huttenlocher, 1994). Thus, *synaptic pruning* is a key process in the formation of the neural networks that are crucial to communication in the nervous system.

Figure 3.5

Synaptic pruning. This graph summarizes data on the estimated number of synapses in the human visual cortex as a function of age (Huttenlocher, 1994). As you can see, the number of synapses in this area of the brain peaks around age 1 and then mostly declines over the course of the life span. This decline reflects the process of *synaptic pruning*, which involves the gradual elimination of less active synapses.

Source: Data based on Huttenlocher, P. R. (1994). Synaptogenesis in human cerebral cortex. In G. Dawson & K. W. Fischer (Eds.), *Human behavior and the developing brain*. New York: Guilford Press. Graphic adapted from Kolb, B. & Whishaw, I. Q. (2001). *An introduction to brain and behavior*. New York: Worth Publishers.



Neurotransmitters and Behavior



As we have seen, the nervous system relies on chemical couriers to communicate information between neurons. These *neurotransmitters* are fundamental to behavior, playing a key role in everything from muscle movements to moods and mental health.

You might guess that the nervous system would require only two neurotransmitters—one for excitatory potentials and one for inhibitory potentials. In reality, there are nine well-established, classic (small-molecule) transmitters, about 40 additional neuropeptide chemicals that function, at least part-time,

as neurotransmitters, and a variety of recently recognized “novel” neurotransmitters (Schwartz, 2000; Snyder, 2002). As scientists continue to discover new and increasingly diverse transmitter substances, they are being forced to reevaluate their criteria regarding what qualifies as a neurotransmitter (Snyder & Ferris, 2000).

Specific neurotransmitters work at specific kinds of synapses. You may recall that transmitters deliver their messages by binding to receptor sites on the post-synaptic membrane. However, a transmitter cannot bind to just any site. The binding process operates much like a lock and key, as was shown in **Figure 3.3**. Just as a key has to fit a lock to work, a transmitter has to fit into a receptor site for binding to occur. As a result, specific transmitters can deliver signals only at certain locations on cell membranes.

Why are there many neurotransmitters, each of which works only at certain synapses? This variety and specificity reduces crosstalk between densely packed neurons, making the nervous system’s communication more precise. Let’s briefly review some of the most interesting findings about how neurotransmitters regulate behavior, which are summarized in **Table 3.1**.

Acetylcholine



The discovery that cells communicate by releasing chemicals was first made in connection with the transmitter *acetylcholine* (ACh). ACh has been found throughout the nervous system. It is the only transmitter between motor neurons and voluntary muscles. Every move you make—typing, walking, talking, breathing—depends on ACh released to your muscles by motor neurons (Kandel & Siegelbaum, 2000). ACh also appears to contribute to attention, arousal, and perhaps memory.

The activity of ACh (and other neurotransmitters) may be influenced by other chemicals in the brain. Although synaptic receptor sites are sensitive to specific neurotransmitters, sometimes they can be “fooled” by other chemical substances. For example, if you smoke tobacco, some of your ACh synapses will be stimulated by the nicotine that arrives in your brain. At these synapses, the nicotine acts like ACh itself. It binds to receptor sites for ACh, causing post-synaptic potentials (PSPs). In technical language, nicotine is an ACh agonist. **An agonist is a chemical that mimics the action of a neurotransmitter.**

Not all chemicals that fool synaptic receptors are agonists. Some chemicals bind to receptors but fail to produce a PSP (the key slides into the lock, but it doesn’t work). In effect, they temporarily *block* the action of the natural transmitter by occupying its receptor sites, rendering them unusable. Thus, they act

Table 3.1 Common Neurotransmitters and Some of Their Functions

Neurotransmitter	Functions and Characteristics
Acetylcholine (ACh)	Released by motor neurons controlling skeletal muscles Contributes to the regulation of attention, arousal, and memory Some ACh receptors stimulated by nicotine
Dopamine (DA)	Contributes to control of voluntary movement, pleasurable emotions Decreased levels associated with Parkinson’s disease Overactivity at DA synapses associated with schizophrenia Cocaine and amphetamines elevate activity at DA synapses
Norepinephrine (NE)	Contributes to modulation of mood and arousal Cocaine and amphetamines elevate activity at NE synapses
Serotonin	Involved in regulation of sleep and wakefulness, eating, aggression Abnormal levels may contribute to depression and obsessive-compulsive disorder Prozac and similar antidepressant drugs affect serotonin circuits
GABA	Serves as widely distributed inhibitory transmitter Valium and similar antianxiety drugs work at GABA synapses
Endorphins	Resemble opiate drugs in structure and effects Contribute to pain relief and perhaps to some pleasurable emotions

as antagonists. **An antagonist is a chemical that opposes the action of a neurotransmitter.** For example, the drug *curare* is an ACh antagonist. It blocks action at the same ACh synapses that are fooled by nicotine. As a result, muscles are unable to move. Some South American natives put a form of curare on arrow tips. If they wound an animal, the curare blocks the synapses from nerve to muscle, paralyzing the animal.

Monoamines



The *monoamines* include three neurotransmitters: dopamine, norepinephrine, and serotonin. Neurons using these transmitters regulate many aspects of everyday behavior. Dopamine (DA), for example, is used by neurons that control voluntary movements. The degeneration of such neurons apparently causes *Parkinsonism*, a disease marked by tremors, muscular rigidity, and reduced control over voluntary movements (DeLong, 2000).



© 2002 AP/Wide World Photos

Muhammed Ali and Michael J. Fox are two well-known victims of Parkinson’s disease. Roughly one million Americans suffer from Parkinson’s disease, which is caused by a decline in the synthesis of the neurotransmitter dopamine. The reduction in dopamine synthesis occurs because of the deterioration of a structure located in the midbrain.



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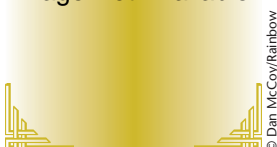


CANDACE PERT

"When human beings engage in various activities, it seems that neurojuices are released that are associated with either pain or pleasure."



Image Not Available



SOLOMON SNYDER

"Brain research of the past decade, especially the study of neurotransmitters, has proceeded at a furious pace, achieving progress equal in scope to all the accomplishments of the preceding 50 years—and the pace of discovery continues to accelerate."

Web Link 3.3



Neurosciences on the Internet

Dr. Neil Busis has gathered what appears to be the largest collection of neuroscience links currently on the web and provided a search engine to help visitors.

Although other neurotransmitters are also involved, serotonin-releasing neurons appear to play a prominent role in the regulation of sleep and wakefulness (Vodelholzer et al., 1998) and eating behavior (Blundell & Halford, 1998). Considerable evidence also suggests that neural circuits using serotonin modulate aggressive behavior in animals, and some preliminary evidence relates serotonin activity to aggression and impulsive behavior in humans (Dolan, Anderson, & Deakin, 2001; Douzenis et al., 2004).

Abnormal levels of monoamines in the brain have been related to the development of certain psychological disorders. For example, people who suffer from depression appear to have lowered levels of activation at norepinephrine (NE) and serotonin synapses. Although a host of other biochemical changes may also contribute to depression, abnormalities at NE and serotonin synapses appear to play a central role, as most antidepressant drugs exert their main effects at these synapses (Sher & Mann, 2003; Thase, Jindal, & Howland, 2002).

In a similar fashion, abnormalities in activity at dopamine synapses have been implicated in the development of *schizophrenia*. This severe mental illness is marked by irrational thought, hallucinations, poor contact with reality, and deterioration of routine adaptive behavior. Afflicting roughly 1% of the population, schizophrenia requires hospitalization more often than any other psychological disorder (see Chapter 14). Studies suggest, albeit with many complications, that overactivity at DA synapses is the neurochemical basis for schizophrenia. Why? Primarily because the therapeutic drugs that tame schizophrenic symptoms are known to be DA antagonists that reduce the neurotransmitter's activity (Tamminga & Carlsson, 2003).

Temporary alterations at monoamine synapses also appear to account for the powerful effects of some widely abused drugs, including amphetamines and cocaine. These stimulants seem to exert most of their effects by creating a storm of increased activity at dopamine and norepinephrine synapses (Repetto & Gold, 2005; King & Ellinwood, 2005).

GABA

Another group of transmitters consists of *amino acids*. Two of these, *gamma-aminobutyric acid* (GABA) and *glycine*, are notable in that they seem to produce only *inhibitory* postsynaptic potentials. Some transmitters, such as ACh and NE, are versatile. They can produce either excitatory or inhibitory PSPs, depending on the synaptic receptors they bind to. However, GABA and glycine appear to have inhibitory effects at virtually all synapses where either is present. GABA receptors are widely distributed in the brain and may

be present at 40% of all synapses. GABA appears to be responsible for much of the inhibition in the central nervous system. Studies suggest that GABA contributes to the regulation of anxiety in humans and that it plays a central role in the expression of seizures (Shank, Smith-Swintosky, & Twyman, 2000; Skolnick, 2003). GABA also plays a significant role in the modulation of sleep (Siegel, 2004).

Endorphins

In 1970, after a horseback-riding accident, Candace Pert, a graduate student in neuroscience, lay in a hospital bed receiving frequent shots of *morphine*, a pain-killing drug derived from the opium plant. This experience left her with a driving curiosity about how morphine works. A few years later, she and Solomon Snyder rocked the scientific world by showing that *morphine exerts its effects by binding to specialized receptors in the brain* (Pert & Snyder, 1973).

This discovery raised a perplexing question: Why would the brain be equipped with receptors for morphine, a powerful, addictive opiate drug not normally found in the body? It occurred to Pert and others that the nervous system must have its own, endogenous (internally produced) morphinelike substances. Investigators dubbed these as-yet undiscovered substances **endorphins—internally produced chemicals that resemble opiates in structure and effects**. A search for the body's natural opiate ensued. In short order, a number of endogenous, opiatelike substances were identified (Hughes et al., 1975). Subsequent studies revealed that endorphins and their receptors are widely distributed in the human body and that they clearly contribute to the modulation of pain, as well as a variety of other phenomena (Basbaum & Jessell, 2000).

In this section we have highlighted just a few of the more interesting connections between neurotransmitters and behavior. These highlights barely begin to convey the rich complexity of biochemical processes in the nervous system. Most aspects of behavior are probably regulated by several types of transmitters. To further complicate matters, researchers are finding fascinating *interactions* between various neurotransmitter systems (Frazer et al., 2003). Although scientists have learned a great deal about neurotransmitters and behavior, much still remains to be discovered.

REVIEW OF KEY POINTS

- Behavior depends on complex information processing in the nervous system. Neurons receive, integrate, and transmit information. Glial cells provide various types of support for neurons and may contribute to signal transmission in the nervous system.



- The neural impulse is a brief change in a neuron's electrical charge that moves along an axon. An action potential is an all-or-none event. Neurons convey information about the strength of a stimulus by variations in their rate of firing.
- Action potentials trigger the release of chemicals called neurotransmitters that diffuse across a synapse to communicate with other neurons. Transmitters bind with receptors in the postsynaptic cell membrane, causing excitatory or inhibitory PSPs.
- Whether the postsynaptic neuron fires a neural impulse depends on the balance of excitatory and inhibitory PSPs. Our thoughts and actions depend on patterns of activity in neural circuits and networks.
- The transmitter ACh plays a key role in muscular movement. Serotonin circuits may contribute to the regulation of sleep, eating, and aggression. Depression is associated with reduced activation at norepinephrine and serotonin synapses.
- Schizophrenia has been linked to overactivity at dopamine synapses. Cocaine and amphetamines appear to exert their main effects by altering activity at DA and NE synapses. GABA is an important inhibitory transmitter. Endorphins, which resemble opiates, contribute to pain relief.

concept check 3.2



Linking Brain Chemistry to Behavior

Check your understanding of relations between brain chemistry and behavior by indicating which neurotransmitters have been linked to the phenomena listed below. Choose your answers from the following list: (a) acetylcholine, (b) norepinephrine, (c) dopamine, (d) serotonin, (e) endorphins. Indicate your choice (by letter) in the spaces on the left. You'll find the answers in Appendix A.

- _____ 1. A transmitter involved in the regulation of sleep, eating, and aggression.
- _____ 2. The two monoamines that have been linked to depression.
- _____ 3. Chemicals that resemble opiate drugs in structure and that are involved in pain relief.
- _____ 4. A neurotransmitter for which abnormal levels have been implicated in schizophrenia.
- _____ 5. The only neurotransmitter between motor neurons and voluntary muscles.

> Organization of the Nervous System

Clearly, communication in the nervous system is fundamental to behavior. So far we have looked at how individual cells communicate with one another. In this section, we examine the organization of the nervous system as a whole.

Experts believe that there are roughly *100 billion* neurons in the human brain (Kandel, 2000). Obviously, this is only an *estimate*. If you counted them nonstop at the rate of one per second, you'd be counting for over 3000 years! And, remember, most neurons have synaptic connections to many other neurons, so there may be *100 trillion* synapses in a human brain!

The fact that our neurons and synapses are so abundant as to be uncountable is probably why it is widely believed that "we only use 10% of our brains." This curious tidbit of folk wisdom is utter nonsense (McBurney, 1996). There is no way to quantify the percentage of the brain that is "in use" at any specific time. And think about, if 90% of the human brain consists of unused "excess baggage," localized brain damage would not be a problem much of the time. In reality, damage in even very tiny areas of the brain usually has severe, disruptive effects (Zillmer & Spiers, 2001). The 10% myth appeals to people because it suggests that they have a huge reservoir of untapped potential. Hucksters selling self-improvement programs often disseminate the 10% myth because it makes their claims and promises seem more plausible ("Unleash your potential!").

In any event, the multitudes of neurons in your nervous system have to work together to keep infor-

mation flowing effectively. To see how the nervous system is organized to accomplish this end, we will divide it into parts. In many instances, the parts will be divided once again. **Figure 3.6** (on the next page) presents an organizational chart that shows the relationships of all the parts of the nervous system.

The Peripheral Nervous System



The first and most important division separates the *central nervous system* (the brain and spinal cord) from the *peripheral nervous system* (see **Figure 3.7** on the next page). **The peripheral nervous system is made up of all those nerves that lie outside the brain and spinal cord. Nerves are bundles of neuron fibers (axons) that are routed together in the peripheral nervous system.** This portion of the nervous system is just what it sounds like: the part that extends outside the central nervous system. The peripheral nervous system can be subdivided into the *somatic nervous system* and the *autonomic nervous system*.

The Somatic Nervous System



The somatic nervous system is made up of nerves that connect to voluntary skeletal muscles and to sensory receptors. These nerves are the cables that carry information from receptors in the skin, muscles, and joints to the central nervous system (CNS) and that carry commands from the CNS to the muscles.

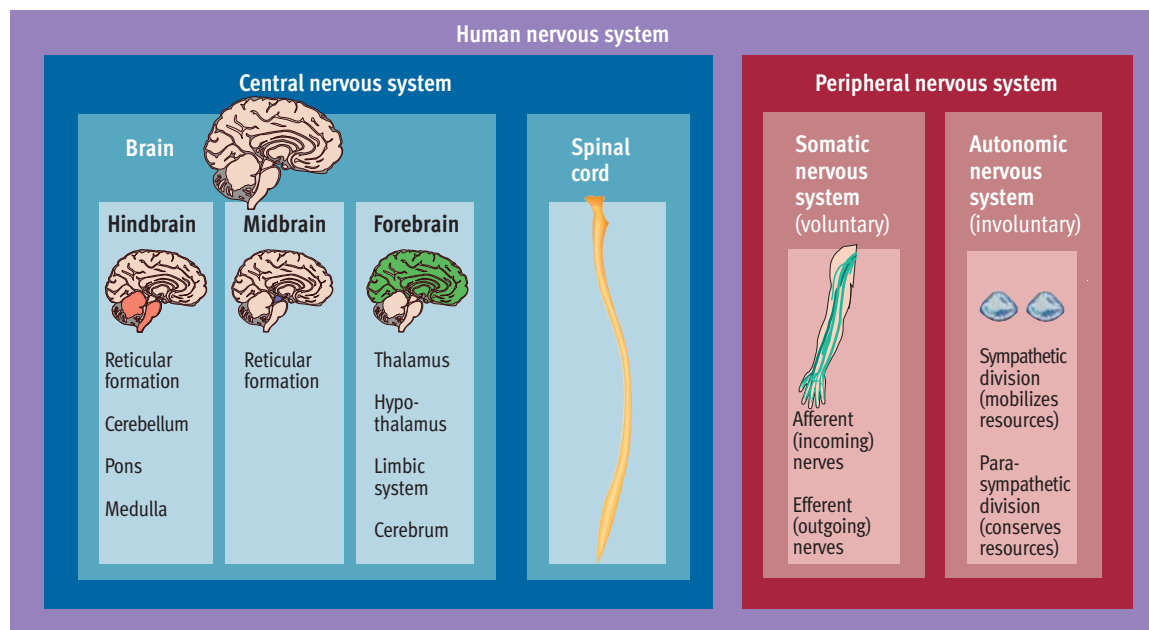
PREVIEW QUESTIONS

- What are the subdivisions of the peripheral nervous system?
- What is the difference between afferent and efferent nerves?
- What does the autonomic nervous system regulate, and what are its subdivisions?
- What is the central nervous system made up of?

Figure 3.6

Organization of the human nervous system.

This overview of the human nervous system shows the relationships of its various parts and systems. The brain is traditionally divided into three regions: the hindbrain, the midbrain, and the forebrain. The reticular formation runs through both the midbrain and the hindbrain on its way up and down the brainstem. These and other parts of the brain are discussed in detail later in the chapter. The peripheral nervous system is made up of the somatic nervous system, which controls voluntary muscles and sensory receptors, and the autonomic nervous system, which controls the involuntary activities of smooth muscles, blood vessels, and glands (adrenal glands shown).



These functions require two kinds of nerve fibers. *Afferent nerve fibers* are axons that carry information inward to the central nervous system from the periphery of the body. *Efferent nerve fibers* are axons that carry information outward from the central nervous system to the periphery of the body. Each body nerve contains many axons of each type. Thus,

somatic nerves are “two-way streets” with incoming (afferent) and outgoing (efferent) lanes. The somatic nervous system lets you feel the world and move around in it.

The Autonomic Nervous System



The *autonomic nervous system (ANS)* is made up of nerves that connect to the heart, blood vessels, smooth muscles, and glands. As its name hints, the autonomic system is a separate (autonomous) system, although it is ultimately governed by the central nervous system. The autonomic nervous system controls automatic, involuntary, visceral functions that people don’t normally think about, such as heart rate, digestion, and perspiration (see **Figure 3.8**).

The autonomic nervous system mediates much of the physiological arousal that occurs when people experience emotions. For example, imagine that you are walking home alone one night when a seedy-looking character falls in behind you and begins to follow you. If you feel threatened, your heart rate and breathing will speed up. Your blood pressure may surge, you may get goosebumps, and your palms may begin to sweat. These difficult-to-control reactions are aspects of autonomic arousal.

Walter Cannon (1932), one of the first psychologists to study this reaction, called it the *fight-or-flight response*. Cannon carefully monitored this response in cats—after confronting them with dogs. He concluded that organisms generally respond to threat by preparing physiologically for attacking (fight) or fleeing from (flight) the enemy. Unfortunately, as you will see in Chapter 13, this fight-or-flight response

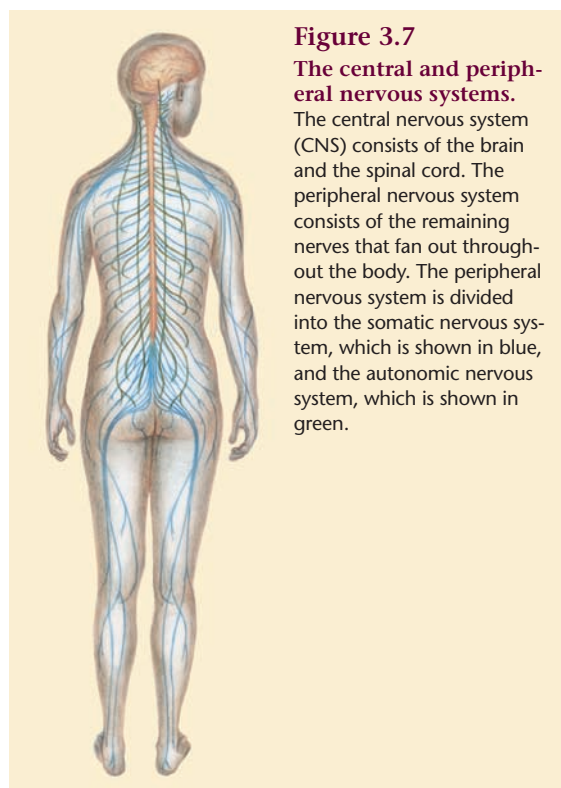


Figure 3.7

The central and peripheral nervous systems.

The central nervous system (CNS) consists of the brain and the spinal cord. The peripheral nervous system consists of the remaining nerves that fan out throughout the body. The peripheral nervous system is divided into the somatic nervous system, which is shown in blue, and the autonomic nervous system, which is shown in green.

can backfire if stress leaves a person in a chronic state of autonomic arousal. Prolonged autonomic arousal can eventually contribute to the development of physical diseases (Selye, 1974).

The autonomic nervous system can be subdivided into two branches: the sympathetic division and the parasympathetic division (see **Figure 3.8**). **The sympathetic division is the branch of the autonomic nervous system that mobilizes the body's resources for emergencies.** It creates the fight-or-flight response. Activation of the sympathetic division slows digestive processes and drains blood from the periphery, lessening bleeding in the case of an injury. Key sympathetic nerves send signals to the adrenal glands, triggering the release of hormones that ready the body for exertion. In contrast, **the parasympathetic division is the branch of the autonomic nervous system that generally conserves bodily resources.** It activates processes that allow the body to save and store energy. For example, actions by parasympathetic nerves slow heart rate, reduce blood pressure, and promote digestion.

The Central Nervous System



The central nervous system is the portion of the nervous system that lies within the skull and spinal column (see **Figure 3.7**). Thus, **the central nervous system (CNS) consists of the brain and the spinal cord.** It is protected by enclosing sheaths called the *meninges* (hence *meningitis*, the name for the disease in which the meninges become inflamed). In addition, the central nervous system is bathed in its own special nutritive “soup,” the cerebrospinal fluid. **The cerebrospinal fluid (CSF) nourishes the brain and provides a protective cushion for it.** The hollow cavities in the brain that are filled with CSF are called *ventricles* (see **Figure 3.9**).

The Spinal Cord

The *spinal cord* connects the brain to the rest of the body through the peripheral nervous system. Although the spinal cord looks like a cable from which the somatic nerves branch, it is part of the central nervous system. Like the brain, it is enclosed by the meninges and bathed in CSF. In short, the spinal cord is an extension of the brain.

The spinal cord runs from the base of the brain to just below the level of the waist. It houses bundles of axons that carry the brain's commands to peripheral nerves and that relay sensations from the periphery of the body to the brain. Many forms of paralysis result from spinal cord damage, a fact that underscores

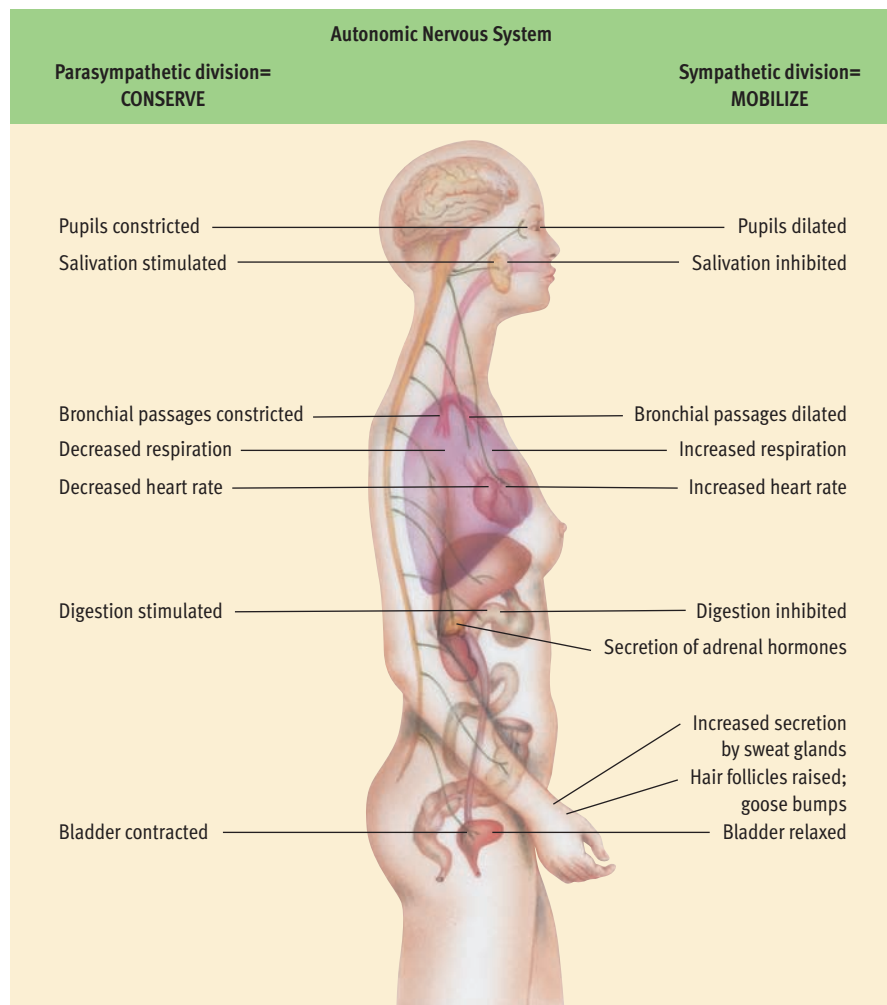


Figure 3.8

The autonomic nervous system (ANS). The ANS is composed of the nerves that connect to the heart, blood vessels, smooth muscles, and glands. The ANS is divided into the sympathetic division, which mobilizes bodily resources in times of need, and the parasympathetic division, which conserves bodily resources. Some of the key functions controlled by each division of the ANS are summarized in the diagram.

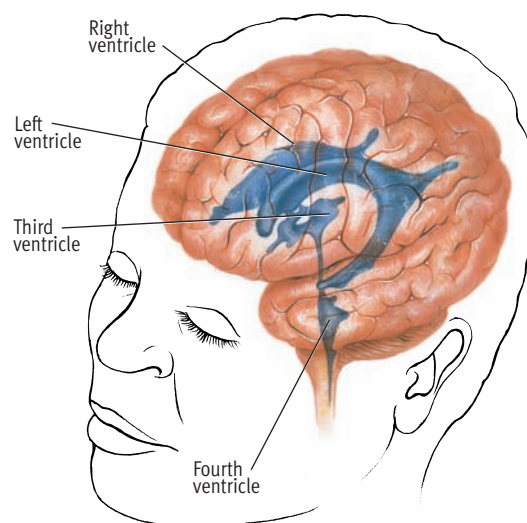


Figure 3.9

The ventricles of the brain. Cerebrospinal fluid (CSF) circulates around the brain and the spinal cord. The hollow cavities in the brain filled with CSF are called ventricles. The four ventricles in the human brain are depicted here.

Web Link 3.4



The Visible Human Project

This site from the National Library of Medicine provides a rich collection of online resources related to the highly detailed visual analysis of two human cadavers—a male and female—that has been carried out over the last decade. This site is a good place to explore advanced techniques in the imaging of the human body, including the central nervous system.

the critical role the spinal cord plays in transmitting signals from the brain to the motor neurons that move the body's muscles.

The Brain

The crowning glory of the central nervous system is, of course, the *brain*. Anatomically, the brain is the part of the central nervous system that fills the upper portion of the skull. Although it weighs only about three pounds and could be held in one hand, the brain contains billions of interacting cells that integrate information from inside and outside the body, coordinate the body's actions, and enable human beings to talk, think, remember, plan, create, and dream.

Because of its central importance for behavior, the brain is the subject of the next three sections of the chapter. We begin by looking at the remarkable meth-

ods that have enabled researchers to unlock some of the brain's secrets.

REVIEW OF KEY POINTS

- The nervous system can be divided into two main subdivisions, the central nervous system and the peripheral nervous system. The central nervous system consists of the brain and spinal cord.
- The peripheral nervous system consists of the nerves that lie outside the brain and spinal cord. It can be subdivided into the somatic nervous system, which connects to muscles and sensory receptors, and the autonomic nervous system, which connects to blood vessels, smooth muscles, and glands.
- The autonomic nervous system mediates the largely automatic arousal that accompanies emotion and the fight-or-flight response to stress. The ANS is divided into the sympathetic division, which mobilizes bodily resources, and the parasympathetic division, which conserves bodily resources.

Looking Inside the Brain: Research Methods

PREVIEW QUESTIONS

- What is an EEG and what is its output?
- How are lesioning and electrical stimulation used to study brain function?
- What is transcranial magnetic stimulation, and how is it used in research on the brain?
- Which brain-imaging procedures provide information about brain structure or brain function?

Scientists who want to find out how parts of the brain are related to behavior are faced with a formidable task. The geography, or *structure*, of the brain can be mapped out relatively easily by examining and dissecting brains removed from animals or from deceased humans who have donated their bodies to science. Mapping of brain *function*, however, requires a working brain. Thus, special research methods are needed to discover relations between brain activity and behavior.

Investigators who conduct research on the brain or other parts of the nervous system are called *neuroscientists*. Often, brain research involves collaboration by neuroscientists from several disciplines, including anatomy, physiology, biology, pharmacology, neurology, neurosurgery, psychiatry, and psychology. Neuroscientists use many specialized techniques to investigate connections between the brain and behavior. Among the methods they have depended on most heavily are electrical recordings, lesioning, and electrical stimulation. In addition, brain-imaging techniques have enhanced neuroscientists' ability to observe brain structure and function.

Electrical Recordings



The electrical activity of the brain can be recorded, much as Hodgkin and Huxley recorded the electrical activity of individual neurons. Recordings of single cells in the brain have proven valuable, but scientists also need ways to record the simultaneous activity

of many of the billions of neurons in the brain. Fortunately, in 1929 a German psychiatrist named Hans Berger invented a machine that could record broad patterns of brain electrical activity. **The *electroencephalograph (EEG)* is a device that monitors the electrical activity of the brain over time by means of recording electrodes attached to the surface of the scalp** (see **Figure 3.10**). An EEG electrode sums and amplifies electric potentials occurring in many thousands of brain cells.

Usually, six to ten recording electrodes are attached (with paste) at various places on the skull. The resulting EEG recordings are translated into line tracings, commonly called *brain waves*. These brain-wave recordings provide a useful overview of the electrical activity in the brain. Different brain-wave patterns are associated with different states of mental activity (Martin, 1991; Westbrook, 2000), as shown in **Figure 3.10**. The EEG is often used in the clinical diagnosis of brain damage, epilepsy, and other neurological disorders. In research applications, the EEG can be used to identify patterns of brain activity that occur when participants engage in specific behaviors or experience specific emotions. For example, in one study, researchers used EEG recordings to investigate how meditation affects brain activity (Takahashi et al., 2005). Overall, EEG technology has contributed greatly to our understanding of brain-behavior relations (Eastman, 2004; Rosler, 2005), and as you'll see in Chapter 5, the EEG has been particularly valuable to researchers exploring the neural bases of sleep.

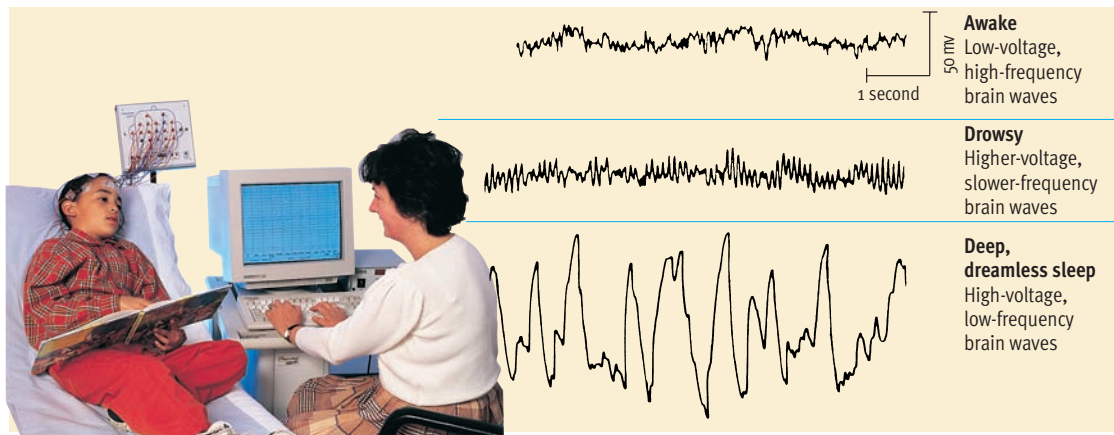


Figure 3.10
The electroencephalograph (EEG). Recording electrodes attached to the surface of the scalp permit the EEG to record electrical activity in the cortex over time. The EEG provides output in the form of line tracings called brain waves. Brain waves vary in frequency (cycles per second) and amplitude (measured in voltage). Various states of consciousness are associated with different brain waves. Characteristic EEG patterns for alert wakefulness, drowsiness, and deep, dreamless sleep are shown here. The use of the EEG in research is discussed in more detail in Chapter 5.

Source: Brain wave graphic adapted from Hauri, P. (1982). *Current concepts: The sleep disorders*. Kalamazoo, MI: The Upjohn Company. Reprinted by permission.

Lesioning



Brain tumors, strokes, head injuries, and other misfortunes often produce brain damage in people. Many major insights about brain-behavior relations have resulted from observations of behavioral changes in people who have suffered damage in specific brain areas. However, this type of research has its limitations. Subjects are not plentiful, and neuroscientists can't control the location or severity of their subjects' brain damage. Furthermore, variations in the participants' histories create a host of extraneous variables that make it difficult to isolate cause-and-effect relationships between brain damage and behavior.

To study the relations between brain and behavior more precisely, scientists sometimes observe what happens when specific brain structures in animals are purposely disabled. **Lesioning involves destroying a piece of the brain.** It is typically done by inserting an electrode into a brain structure and passing a high-frequency electric current through it to burn the tissue and disable the structure.

Lesioning requires researchers to get an electrode to a particular place buried deep inside the brain. They do so with a stereotaxic instrument, a device used to implant electrodes at precise locations in the brain. The use of this surgical device is described in **Figure 3.11**. Of course, appropriate anesthetics are used to minimize pain and discomfort for the animals. The lesioning of brain structures in animals has proven invaluable in neuroscientists' research on brain functioning.

Electrical Stimulation of the Brain



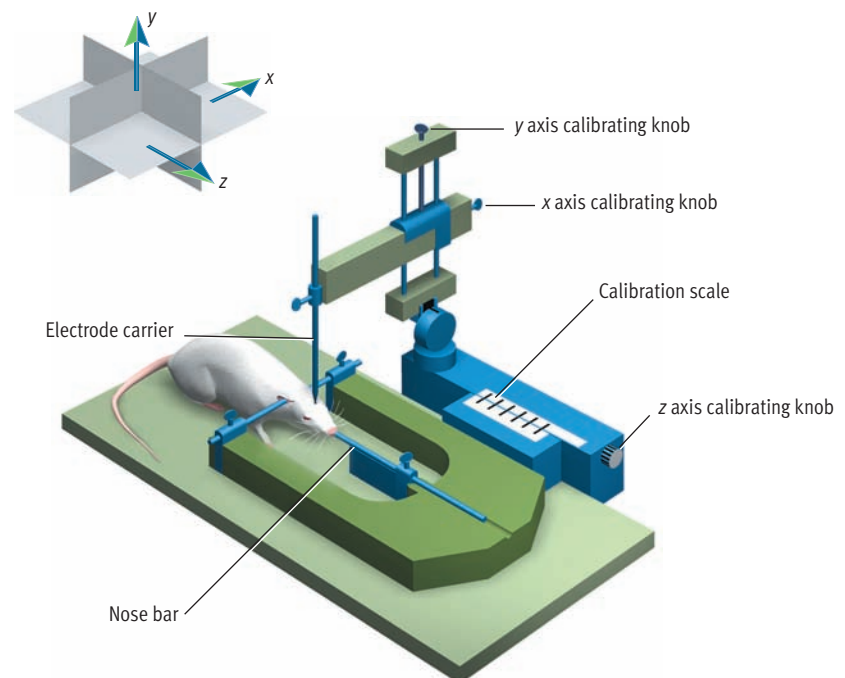
Electrical stimulation of the brain (ESB) involves sending a weak electric current into a brain structure to stimulate (activate) it. The current is deliv-

ered through an electrode, but the current is different from that used in lesioning. This sort of electrical stimulation does not exactly duplicate normal signals in the brain. However, it is usually a close enough approximation to activate the brain structures in which the electrodes are lodged. If areas deep within the brain are to be stimulated, the electrodes are implanted with the same stereotaxic techniques used in lesioning procedures.

Most ESB research is conducted with animals. However, ESB is occasionally used on humans in the context of brain surgery required for medical purposes (see Moriarty et al., 2001 for an example). After

Figure 3.11

An anesthetized rat in a stereotaxic instrument. This rat is undergoing brain surgery. After consulting a detailed map of the rat brain, researchers use the control knobs on the apparatus to position an electrode along the three axes (x , y , and z) shown in the upper left corner. This precise positioning allows researchers to implant the electrode in an exact location in the rat's brain.



a patient's skull is opened, the surgeons may stimulate areas to map the individual patient's brain (to some extent, each of us is unique), so that they don't slice through critical areas. ESB research has led to advances in the understanding of many aspects of brain-behavior relations (Berman, 1991; Yudofsky, 1999).

Transcranial Magnetic Stimulation

Transcranial magnetic stimulation (TMS) is a new technique that permits scientists to temporarily enhance or depress activity in a specific area of the brain. In TMS, a magnetic coil mounted on a small paddle is held over a specific area of a subject's head (see **Figure 3.12**). The coil creates a magnetic field that penetrates to a depth of two centimeters. By varying the timing and duration of the magnetic pulses, a researcher can either increase or decrease the excitability of neurons in the local tissue (Sack & Linden, 2003). Thus far, researchers have mostly been

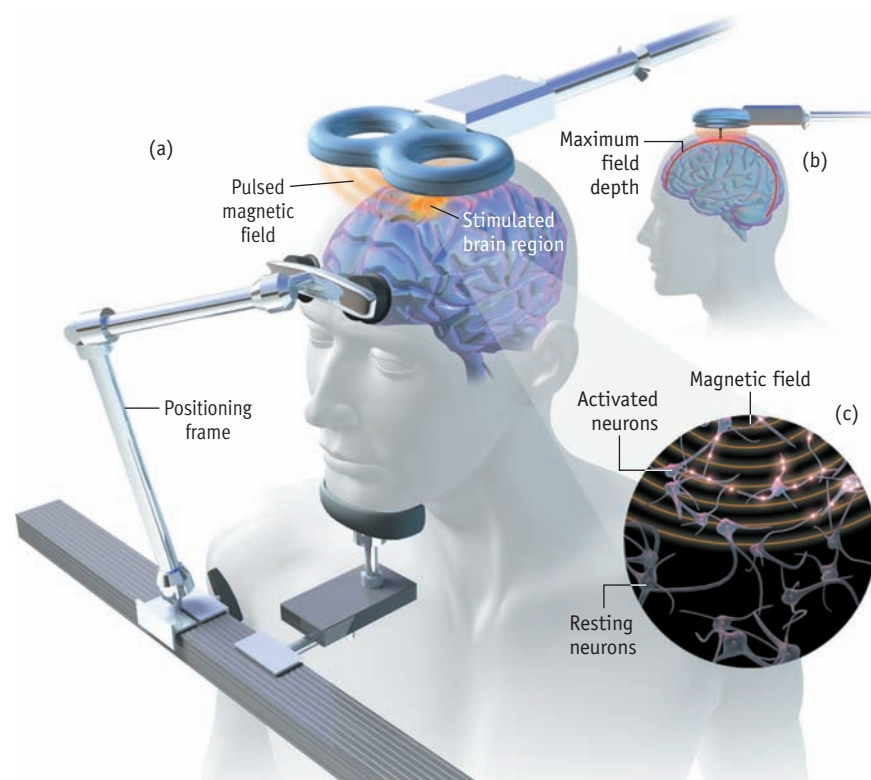
interested in temporarily deactivating discrete areas of the brain to learn more about their functions. In essence, this technology allows scientists to create "virtual lesions" in human subjects for short periods of time, using a painless, noninvasive method. Moreover, this approach circumvents the host of uncontrolled variables that plague the study of natural lesions in humans who have experienced brain damage (Rafal, 2001).

In using TMS to investigate brain function, researchers typically suppress activity in a discrete area of the brain and then put subjects to work on a specific type of perceptual or cognitive task to see if the virtual lesion interferes with performance of the task. For example, this approach has been used to explore whether specific areas of the brain are involved in visuospatial processing (Sack et al., 2002), memory for objects (Oliveri et al., 2001), and language (Knecht et al., 2002). The chief limitation of TMS is that it cannot be used to study areas deep within the brain. Still, its potential as a research tool is enormous (Hilgetag, 2004), and scientists are studying whether it might have potential as a therapeutic treatment for various disorders, such as depression, schizophrenia, and cerebral palsy (Hampton, 2005).

Figure 3.12

Transcranial magnetic stimulation (TMS). In TMS, magnetic pulses are delivered to a localized area of the brain from a magnet mounted on a small paddle (**a**). The magnetic field only penetrates to a depth of two centimeters (**b**). This technique can be used to either increase or decrease the excitability of the affected neurons. The inset at bottom right depicts neurons near the surface of the brain being temporarily activated by TMS (**c**).

Adapted from Bremner, J. D. (2005). *Brain imaging handbook*. New York: W. W. Norton, p. 34. Illustration © Bryan Christie Design.



Brain-Imaging Procedures



In recent decades, the invention of new brain-imaging devices has led to spectacular advances in science's ability to look into the brain (Dougherty & Rauch, 2003). The *CT (computerized tomography) scan* is a computer-enhanced X ray of brain structure. Multiple X rays are shot from many angles, and the computer combines the readings to create a vivid image of a horizontal slice of the brain (see **Figure 3.13**). The entire brain can be visualized by assembling a series of images representing successive slices of the brain. Of the new brain-imaging techniques, the CT scan is the least expensive, and it has been widely used in research. For example, many researchers have used CT scans to look for abnormalities in brain structure among people suffering from specific types of mental illness, especially schizophrenia. This research has uncovered an interesting association between schizophrenic disturbance and enlargement of the brain's ventricles (Andreasen, 2001). Scientists are currently trying to determine whether this ventricular enlargement is a cause or a consequence of schizophrenia (see Chapter 14).

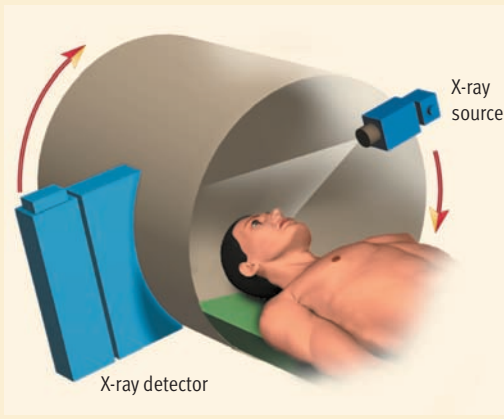
In research on how brain and behavior are related, *PET (positron emission tomography) scanning* is proving especially valuable (Nahas et al., 1998). Whereas CT scans can portray only brain *structure*, PET scans

(a) The patient's head is positioned in a large cylinder, as shown here.

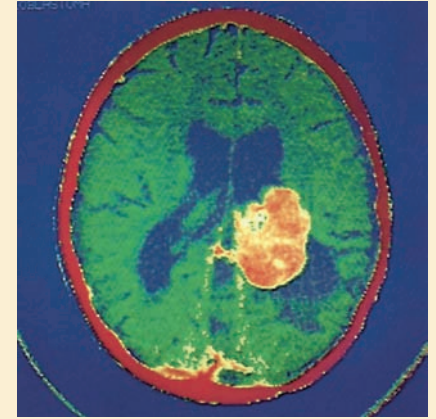


© Alvis Uplis/Image Bank—Getty Images

(b) An X-ray beam and X-ray detector rotate around the patient's head, taking multiple X rays of a horizontal slice of the patient's brain.



(c) A computer combines X rays to create an image of a horizontal slice of the brain. This scan shows a tumor (in red) on the right.



© Dan McCoy/Rainbow

can examine brain *function*, mapping actual *activity* in the brain over time. In PET scans, radioactively tagged chemicals are introduced into the brain. They serve as markers of blood flow or metabolic activity in the brain, which can be monitored with X rays. Thus, a PET scan can provide a color-coded map indicating which areas of the brain become active when subjects clench their fist, sing, or contemplate the mysteries of the universe (see **Figure 3.14**). In this way, neuroscientists are using PET scans to better pinpoint the brain areas that handle various types of mental activities (Craik et al., 1999; Raichle, 1994). Because PET scans monitor chemical processes, they can also be used to study the activity of specific neurotransmitters. For example, PET scans have helped researchers determine how amphetamines affect activity in dopamine circuits in the human brain (Oswald et al., 2005).

Research with PET scans has given neuroscientists a new appreciation of the complexity and interdependence of brain organization. The opportunity to look at ongoing brain function has revealed that even simple, routine mental operations depend on coordinated activation of several or more areas in the brain (Posner & Raichle, 1994).

The *MRI (magnetic resonance imaging) scan* uses magnetic fields, radio waves, and computerized enhancement to map out brain structure. MRI scans provide much better images of brain structure than CT scans (Bohning et al., 1998), producing three-dimensional pictures of the brain that have remarkably high resolution (see **Figure 3.15a** on the next page). *Functional magnetic resonance imaging (fMRI)* consists of several new variations on MRI technology that monitor blood and oxygen flow in the brain to identify areas of high

activity (Dougherty & Rauch, 2003). This technology is exciting because it can provide both *functional and structural* information in the same image and monitor changes in brain activity in real time (see **Figure 3.15b**). For example, using fMRI scans, researchers have identified patterns of brain activity associated with cocaine craving in cocaine addicts (Wexler et al., 2001). Both types of MRI technology have proven extremely valuable in behavioral research in the last decade. Our Featured Study for this chapter is a recent functional MRI study that investigated whether males' and females' brains may be wired somewhat differently.

Figure 3.14

PET scans. PET scans are used to map brain activity rather than brain structure. They provide color-coded maps that show areas of high activity in the brain over time. The PET scan shown here pinpointed two areas of high activity (indicated by the red and green colors) when a research participant worked on a verbal short-term memory task.



© Wellcome Department of Cognitive Neurology/Science Photo Library/Photo Researchers, Inc.

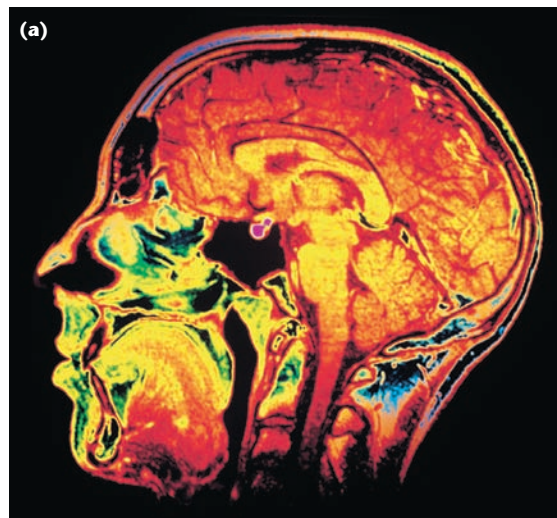
Figure 3.13

CT technology. CT scans can be used in research to examine aspects of brain structure. They provide computer-enhanced X rays of horizontal slices of the brain. **(a)** The patient's head is positioned in a large cylinder, as shown here. **(b)** An X-ray beam and X-ray detector rotate around the patient's head, taking multiple X rays of a horizontal slice of the patient's brain. **(c)** A computer combines X rays to create an image of a horizontal slice of the brain. This scan shows a tumor (in red) on the right.

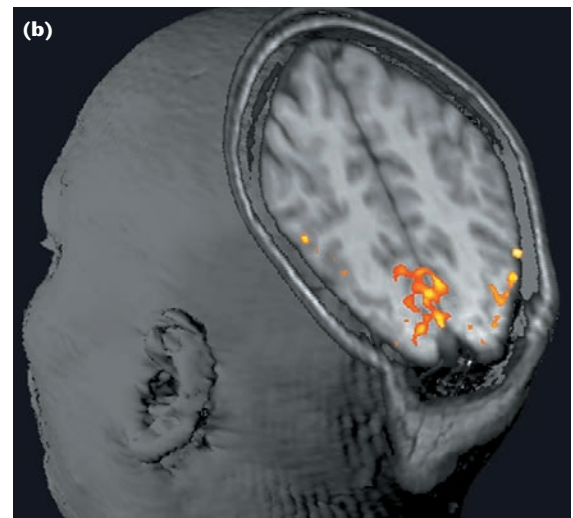
Figure 3.15

MRI and fMRI scans.

(a) MRI scans can be used to produce remarkably high-resolution pictures of brain structure. A vertical view of a brain from the left side is shown here. **(b)** Like PET scans, functional MRIs can monitor chemical activity in the brain. This image shows regions of the brain that were activated by the visual stimulus of a flashing light.



© ISM-Sovereign/Photo Take



Courtesy and by permission of Dr. Jack Belliveau, Chief, NMR, MGH.

FEATURED Study

Source: Hamann, S., Herman, R. A., Nolan, C. L., & Wallen, K. (2004). Men and women differ in amygdala response to visual sexual stimuli. *Nature Neuroscience*, 7, 411–416.

Probing the Anatomy of Sexual Arousal

Many interesting differences exist between males and females in typical patterns of sexual behavior, as you will learn in upcoming chapters (see Chapter 10 in particular). One well-known disparity between the sexes is that men tend to be more interested than women in visually depicted sexual stimuli. Many theorists believe that males' fondness for visual sexual stimuli has been hardwired into the male brain by evolutionary forces, but other theorists argue that this gender gap could be a product of learning and socialization. The present study was a pioneering effort to harness fMRI technology to shed some new light on this complicated question. Stephan Hamann and his colleagues at Emory University set out to see if they could find a neuroanatomical basis for gender differences in responsiveness to visual sexual stimuli. Based on existing knowledge of brain function, they hypothesized that males might show greater activation than females in the *amygdala* and *hypothalamus*, areas of the brain thought to be implicated in the modulation of emotion and sexual motivation (consult **Figure 3.16** on page 91).

Method

Participants. Potential subjects were prescreened to verify that they were heterosexual and that they found visual erotica sexually arousing (people who found such material to be offensive would not make good subjects). The nature of the study was described to them in advance so they could provide informed consent. The final subject pool consisted of 14 females (mean age 25.0 years) and 14 males (mean age 25.9 years).

Materials. Four types of visual stimuli were presented: (1) pictures of heterosexual couples engaged in explicit sexual activity, (2) pictures of attractive, opposite-sex nudes in modeling poses, (3) pictures of clothed males and females in nonsexual interactions, and (4) a plain

cross that subjects were asked to fixate on. The sexual stimuli were carefully screened in a pilot study to ensure that female subjects would find them arousing (pornographic images are generally geared toward men, which would have biased the results).

Procedure. Stimuli were presented on viewing screens inside special goggles to accommodate the fMRI recording equipment. Subjects were instructed to view each stimulus attentively. A brain scan was completed for each stimulus presentation, and subjects rated the stimuli on various dimensions.

Results

Males and females returned similar ratings of how attractive and how arousing both types of sexual stimuli were. For the most part, the sexual stimuli evoked similar patterns of brain activation in the male and female subjects. Both sexes showed roughly equal activation of areas associated with visual processing, attention, and reward. Against this backdrop of similarities, however, some important disparities were found. As predicted, in response to sexual stimuli males exhibited greater activation than females in the hypothalamus and the right and left amygdala.

Discussion

The authors assert that "the current findings suggest a possible neural basis for the greater role of visual stimuli in human male sexual behavior" (p. 415). In other words, they conclude that their findings provide some preliminary support for the notion that males' and females' brains may be wired somewhat differently. However, they are quick to note that this sex difference could be attributable to either genetics (nature) or experience (nurture).

Comment

This study was featured because it is a particularly interesting example of how new brain-imaging techniques are being used to investigate brain-behavior relations. Science depends on observation. Improvements in scientists' ability to observe the brain have resulted in new opportunities to explore how brain structure and function are related to psychological phenomena. It is an exciting time for the neurosciences, and great advances in our understanding of the brain may be on the horizon.

That said, I hasten to add that brain-imaging techniques suffer from more technical and interpretive problems than is widely appreciated. The stunning images yielded by these incredibly sophisticated devices suggest that their measurements of brain structure and function are more precise, reliable, and unambiguous than they actually are. In reality, brain-imaging procedures, especially those that map brain function, provide only a rough approximation of what is going on inside a subject's brain. PET and fMRI scans do not measure neural activity directly. They only show areas of increased metabolic activity in relation to some baseline condition (in this

case, viewing the fixation cross). The areas that "light up" depend to some extent on what was chosen as a baseline for comparison (Uttal, 2001, 2002). More important, increased metabolic activity in an area does not prove that the area plays a crucial role in a particular psychological function (Sack et al., 2003).

Brain scans also require numerous arcane technical decisions that can influence the results obtained (Hardcastle & Stewart, 2002). For example, the thresholds for what will be accepted as various levels of "activation" are somewhat arbitrary and vary from one study to the next, leading to "mushy" measurement. These problems (and many other complications) probably explain why the results of brain scan studies have turned out to be less consistent than expected (Cabeza & Nyberg, 2000).

Caveats aside, brain-imaging procedures have greatly enhanced our ability to look inside the brain. These remarkable techniques are permitting scientists to explore questions that would otherwise be impossible to investigate—such as whether males' and females' brains are wired differently. But the results of such studies should be scrutinized with a critical eye, just like any other research.

➤ REVIEW OF KEY POINTS

- Neuroscientists use a variety of methods to investigate brain-behavior relations. The EEG can record broad patterns of electrical activity in the brain. Different EEG brain waves are associated with different states of consciousness.
- Lesioning involves destroying a piece of the brain to see the effect on behavior. Another technique is electrical stimulation of areas in the brain in order to activate them. Both techniques depend on the use of stereotaxic instruments that permit researchers to implant electrodes at

precise locations in animals' brains. Transcranial magnetic stimulation is a new, noninvasive technique that permits scientists to create temporary virtual lesions in human subjects.

- In recent years, new brain-imaging procedures have been developed, including CT scans, PET scans, MRI scans, and fMRI scans. These techniques have enormous potential for exploring brain-behavior relations, as we saw in our Featured Study. However, brain scans are not as precise and unambiguous as they appear to be.

➤ The Brain and Behavior

Now that we have examined selected techniques of brain research, let's look at what researchers have discovered about the functions of various parts of the brain.

The brain can be divided into three major regions: the hindbrain, the midbrain, and the forebrain. The principal structures found in each of these regions are listed in the organizational chart of the nervous system in **Figure 3.6**. You can see where these regions are located in the brain by looking at **Figure 3.16** on page 91. They can be found easily in relation to the *brainstem*. The brainstem looks like its name—it appears to be a stem from which the rest of the brain "flowers," like a head of cauliflower. At its lower end it is contiguous with the spinal cord. At its higher end it lies deep within the brain.

We'll begin at the brain's lower end, where the spinal cord joins the brainstem. As we proceed upward, notice how the functions of brain structures go from the regulation of basic bodily processes to the control of "higher" mental processes.

The Hindbrain



The hindbrain includes the cerebellum and two structures found in the lower part of the brainstem: the medulla and the pons. The *medulla*, which attaches to the spinal cord, controls largely unconscious but vital functions, including circulating blood, breathing, maintaining muscle tone, and regulating reflexes such as sneezing, coughing, and salivating.

PREVIEW QUESTIONS

- What are some functions of the medulla, pons, and cerebellum?
- What are some functions of the midbrain, and which structure is the brain's relay center?
- What does the hypothalamus regulate?
- What are some functions of the limbic system?
- What is each lobe in the brain known for?
- What does it mean to say that the brain is characterized by "plasticity?"

Web Link 3.5



The Whole Brain Atlas
Here visitors will find a comprehensive and fascinating set of images of the brains of both normal individuals and those impaired by various types of neuropsychological disorders. Modern techniques of brain research and diagnosis are well illustrated and explained.

The *pons* (literally “bridge”) includes a bridge of fibers that connects the brainstem with the cerebellum. The pons also contains several clusters of cell bodies involved with sleep and arousal.

The *cerebellum* (literally “little brain”) is a relatively large and deeply folded structure located adjacent to the back surface of the brainstem. The cerebellum is critical to the coordination of movement and to the sense of equilibrium, or physical balance (Ghez & Thach, 2000). Although the actual commands for muscular movements come from higher brain centers, the cerebellum plays a key role in organizing the sensory information that guides these movements. It is your cerebellum that allows you to hold your hand out to the side and then smoothly bring your finger to a stop on your nose. This is a useful roadside test for drunken driving because the cerebellum is one of the structures first depressed by alcohol. Damage to the cerebellum disrupts fine motor skills, such as those involved in writing, typing, or playing a musical instrument.

The Midbrain



The *midbrain* is the segment of the brainstem that lies between the hindbrain and the forebrain. The midbrain contains an area that is concerned with integrating sensory processes, such as vision and hearing (Stein, Wallace, & Stanford, 2000). An important system of dopamine-releasing neurons that projects into various higher brain centers originates in the midbrain. Among other things, this dopamine system is involved in the performance of voluntary movements. The decline in dopamine synthesis that causes Parkinsonism is due to degeneration of a structure located in the midbrain (DeLong, 2000).

Running through both the hindbrain and the midbrain is the *reticular formation* (see Figure 3.16). Located at the central core of the brainstem, the reticular formation contributes to the modulation of muscle reflexes, breathing, and pain perception (Saper, 2000). It is best known, however, for its role in the regulation of sleep and arousal. Activity in the ascending fibers of the reticular formation contributes to arousal (Coenen, 1998).

The Forebrain



The *forebrain* is the largest and most complex region of the brain, encompassing a variety of structures, including the *thalamus*, *hypothalamus*, *limbic system*, and *cerebrum* (consult Figure 3.16 once again). The thalamus, hypothalamus, and limbic sys-

tem form the core of the forebrain. All three structures are located near the top of the brainstem. Above them is the *cerebrum*—the seat of complex thought. The wrinkled surface of the cerebrum is the *cerebral cortex*—the outer layer of the brain, which looks like a cauliflower.

The Thalamus: A Way Station



The *thalamus* is a structure in the forebrain through which all sensory information (except smell) must pass to get to the cerebral cortex. This way station is made up of clusters of cell bodies, or somas. Each cluster is concerned with relaying sensory information to a particular part of the cortex. However, it would be a mistake to characterize the thalamus as nothing more than a passive relay station. The thalamus also appears to play an active role in integrating information from various senses.

The Hypothalamus: A Regulator of Biological Needs



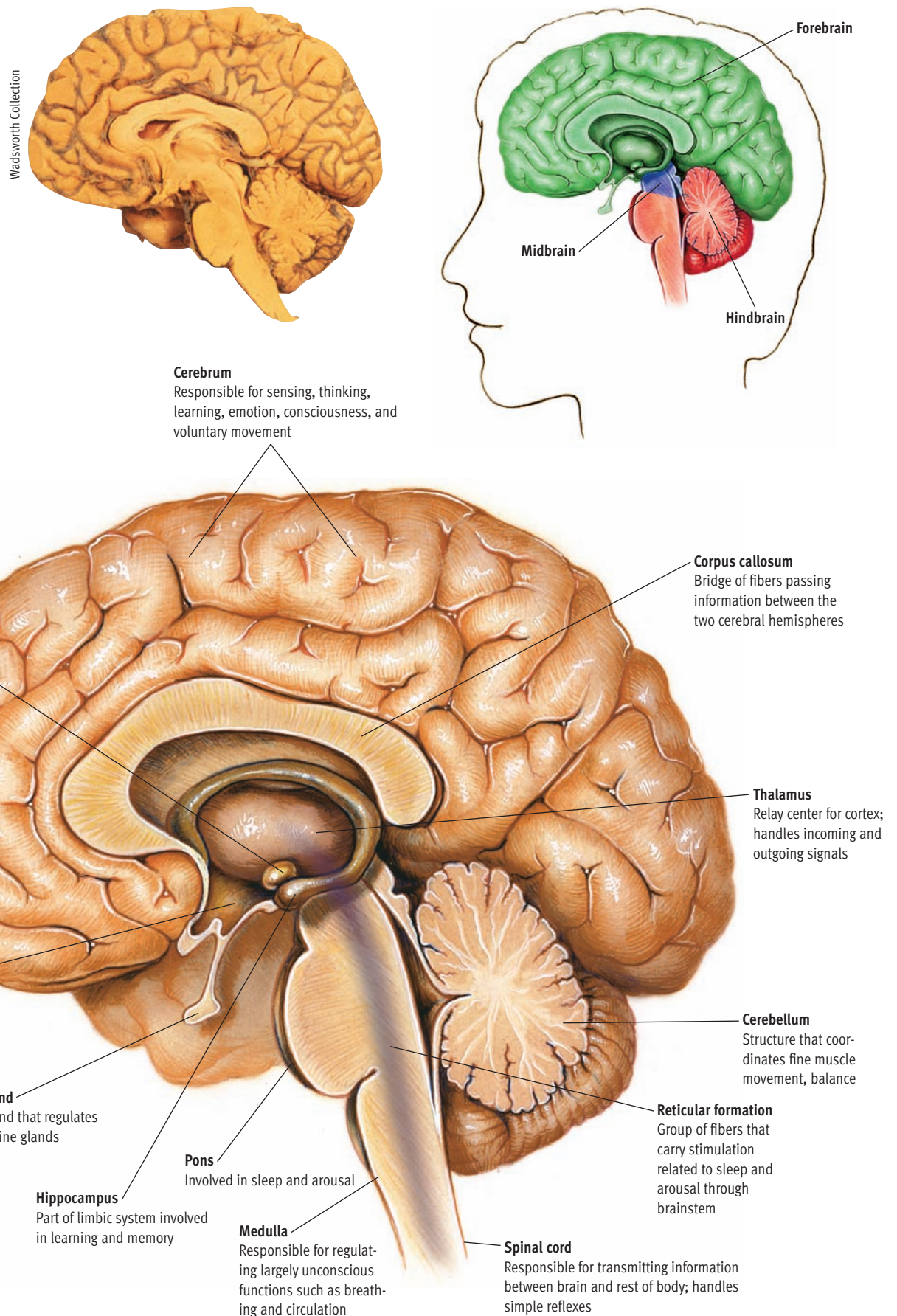
The *hypothalamus* is a structure found near the base of the forebrain that is involved in the regulation of basic biological needs. The hypothalamus lies beneath the thalamus (*hypo* means “under,” making the hypothalamus the area under the thalamus). Although no larger than a kidney bean, the hypothalamus contains various clusters of cells that have many key functions. One such function is to control the autonomic nervous system (Iversen, Iversen, & Saper, 2000). In addition, the hypothalamus serves as a vital link between the brain and the endocrine system (a network of hormone-producing glands, discussed later in this chapter).

The hypothalamus plays a major role in the regulation of basic biological drives related to survival, including the so-called “four F’s”: fighting, fleeing, feeding, and mating. For example, when researchers lesion the lateral areas (the sides) of the hypothalamus, animals lose interest in eating. The animals must be fed intravenously or they starve, even in the presence of abundant food. In contrast, when electrical stimulation (ESB) is used to *activate* the lateral hypothalamus, animals eat constantly and gain weight rapidly (Grossman et al., 1978; Keesey & Powley, 1975). Does this mean that the lateral hypothalamus is the “hunger center” in the brain? Not necessarily. The regulation of hunger turns out to be complex and multifaceted, as you’ll see in Chapter 10. Nonetheless, the hypothalamus clearly contributes to the control of hunger and other basic biological processes, including thirst, sexual motivation, and temperature regulation (Kupfermann, Kandel, & Iversen, 2000).

Figure 3.16

Structures and areas in the human brain.

(Top left) This photo of a human brain shows many of the structures discussed in this chapter. (Top right) The brain is divided into three major areas: the hindbrain, midbrain, and forebrain. These subdivisions actually make more sense for the brains of other animals than for the human brain. In humans, the forebrain has become so large it makes the other two divisions look trivial. However, the hindbrain and midbrain aren't trivial; they control such vital functions as breathing, waking, and maintaining balance. (Bottom) This cross section of the brain highlights key structures and some of their principal functions. As you read about the functions of a brain structure, such as the corpus callosum, you may find it helpful to visualize it.



The Limbic System: The Seat of Emotion



The *limbic system* is a loosely connected network of structures located roughly along the border between the cerebral cortex and deeper subcortical areas (hence the term *limbic*, which means “edge”). First described by Paul MacLean (1954), the limbic system is *not* a well-defined anatomical system with clear boundaries. Indeed, scientists disagree about which structures should be included in the limbic system (Van Hoesen, Morecraft, & Semendeferi, 1996). Broadly defined, the limbic system includes parts of the thalamus and hypothalamus, the hippocampus, the amygdala, and other structures. The limbic system is involved in the regulation of emotion, memory, and motivation.

The hippocampus and adjacent structures clearly play a role in memory processes, although the exact nature of that role is the subject of debate (Squire & Knowlton, 2000). Some theorists believe that the hippocampal region is responsible for the consolidation of memories for factual information (Gluck & Myers, 1997). In any event, many other brain structures contribute to memory processes, so the hippocampus is only one element in a complex system (see Chapter 7).

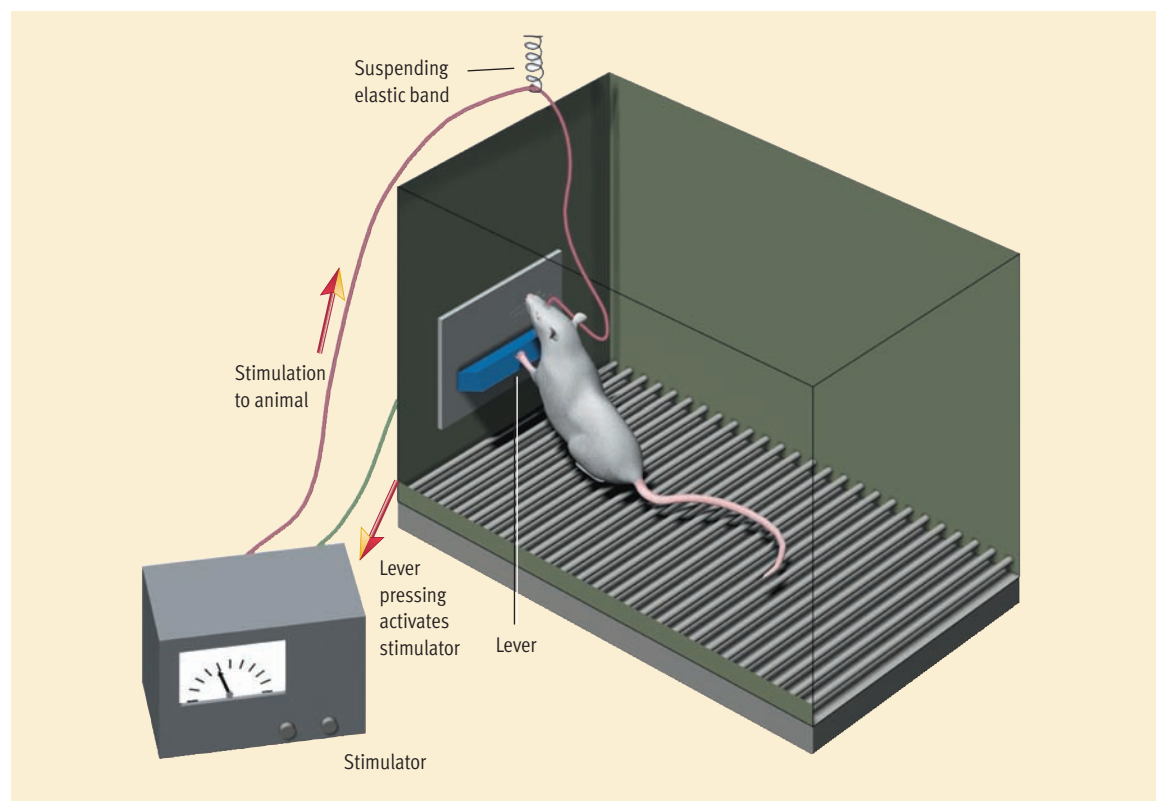
Similarly, there is ample evidence linking the limbic system to the experience of emotion, but the exact

mechanisms of control are not yet well understood (Mega et al., 1997; Paradiso et al., 1997). Recent evidence suggests that the *amygdala* may play a central role in the learning of fear and the processing of other basic emotional responses (Armony & LeDoux, 2000; Hamann et al., 2002). The limbic system is also one of the areas in the brain that appears to be rich in emotion-tinged “pleasure centers.” This intriguing possibility first surfaced, quite by chance, in brain stimulation research with rats. James Olds and Peter Milner (1954) accidentally discovered that a rat would press a lever repeatedly to send brief bursts of electrical stimulation to a specific spot in its brain where an electrode was implanted (see Figure 3.17). They thought that they had inserted the electrode in the rat’s reticular formation. However, they learned later that the electrode had been bent during implantation and ended up elsewhere (probably in the hypothalamus). Much to their surprise, the rat kept coming back for more self-stimulation in this area. Subsequent studies showed that rats and monkeys would press a lever *thousands of times per hour*, until they sometimes collapsed from exhaustion, to stimulate certain brain sites. Although the experimenters obviously couldn’t ask the animals about it, they *inferred* that the animals were experiencing some sort of pleasure.

Where are the self-stimulation centers located in the brain? Many self-stimulation sites have been

Figure 3.17

Electrical stimulation of the brain (ESB) in the rat. Olds and Milner (1954) were using an apparatus like that depicted here when they discovered self-stimulation centers, or “pleasure centers,” in the brain of a rat. In this setup, the rat’s lever pressing earns brief electrical stimulation that is sent to a specific spot in the rat’s brain where an electrode has been implanted.



found in the limbic system (Olds & Fobes, 1981). The heaviest concentration appears to be where the *medial forebrain bundle* (a bundle of axons) passes through the hypothalamus. The medial forebrain bundle is rich in dopamine-releasing neurons. The rewarding effects of ESB at self-stimulation sites may be largely mediated by the activation of these dopamine circuits (Nakajima & Patterson, 1997). The rewarding, pleasurable effects of opiate and stimulant drugs (cocaine and amphetamines) may also depend on excitation of this dopamine system, although this conclusion is the subject of some debate (Gratton, 1996; Wise, 1999). In any event, it is clear that this dopamine system is *not* the ultimate biological basis for *all* reward (Berridge & Robinson, 1998). That is not surprising, as the brain is never that simple. Nonetheless, recent evidence suggests that the so-called “pleasure centers” in the brain may not be anatomical centers so much as neural circuits releasing dopamine.

The Cerebrum: The Seat of Complex Thought



The *cerebrum* is the largest and most complex part of the human brain. It includes the brain areas that are responsible for the most complex mental activities, including learning, remembering, thinking, and consciousness itself. **The cerebral cortex is the convoluted outer layer of the cerebrum.** The cortex is folded and bent, so that its large surface area—about 1.5 square feet—can be packed into the limited volume of the skull (Hubel & Wiesel, 1979).

The cerebrum is divided into two halves called hemispheres. Hence, **the cerebral hemispheres are the right and left halves of the cerebrum** (see **Figure 3.18**). The hemispheres are separated in the center of the brain by a longitudinal fissure that runs from the front to the back of the brain. This fissure descends to a thick band of fibers called the *corpus callosum* (also shown in **Figure 3.18**). **The corpus callosum is the structure that connects the two cerebral hemispheres.** We’ll discuss the functional specialization of the cerebral hemispheres in the next section of this chapter. Each cerebral hemisphere is divided into four parts called *lobes*. To some extent, each of these lobes is dedicated to specific purposes. The location of these lobes can be seen in **Figure 3.19** (on the next page).

The *occipital lobe*, at the back of the head, includes the cortical area, where most visual signals are sent and visual processing is begun. This area is called the *primary visual cortex*. We will discuss how it is organized in Chapter 4.

The *parietal lobe* is forward of the occipital lobe. It includes the area that registers the sense of touch, called the *primary somatosensory cortex*. Various sections of this area receive signals from different regions of the body. When ESB is delivered in these parietal lobe areas, people report physical sensations—as if someone actually touched them on the arm or cheek, for example. The parietal lobe is also involved in integrating visual input and in monitoring the body’s position in space.

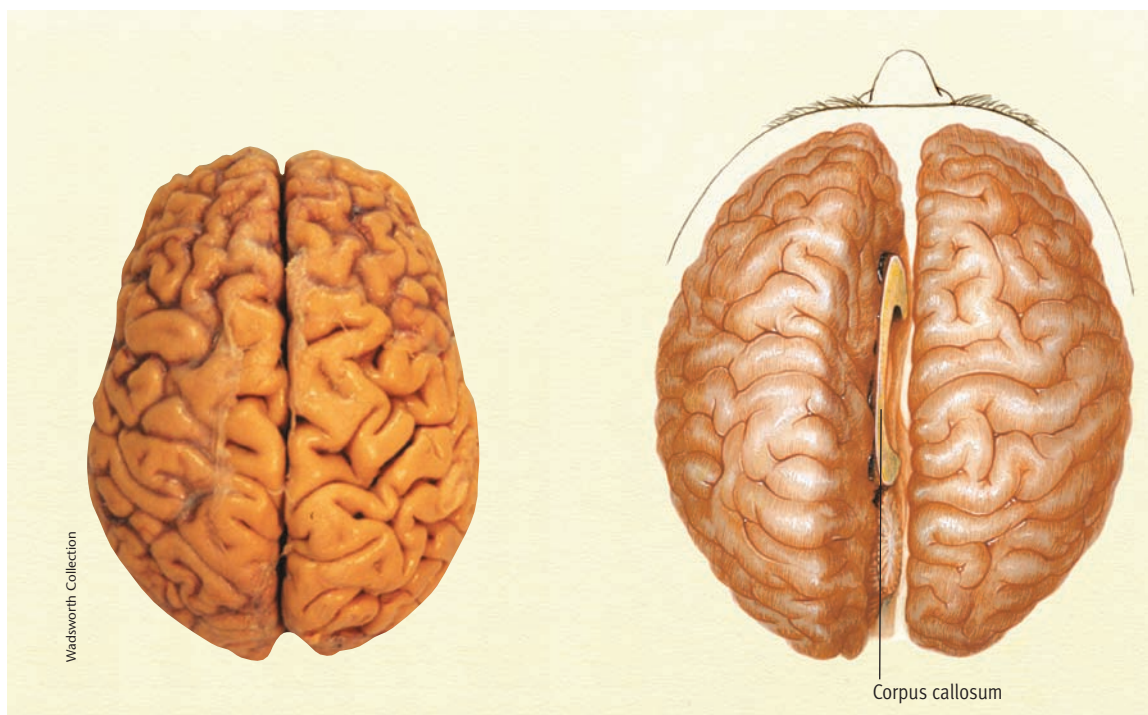


Figure 3.18
The cerebral hemispheres and the corpus callosum. (Left) As this photo shows, the longitudinal fissure running down the middle of the brain (viewed from above) separates the left and right halves of the cerebral cortex. (Right) In this drawing the cerebral hemispheres have been “pulled apart” to reveal the corpus callosum. This band of fibers is the communication bridge between the right and left halves of the human brain.

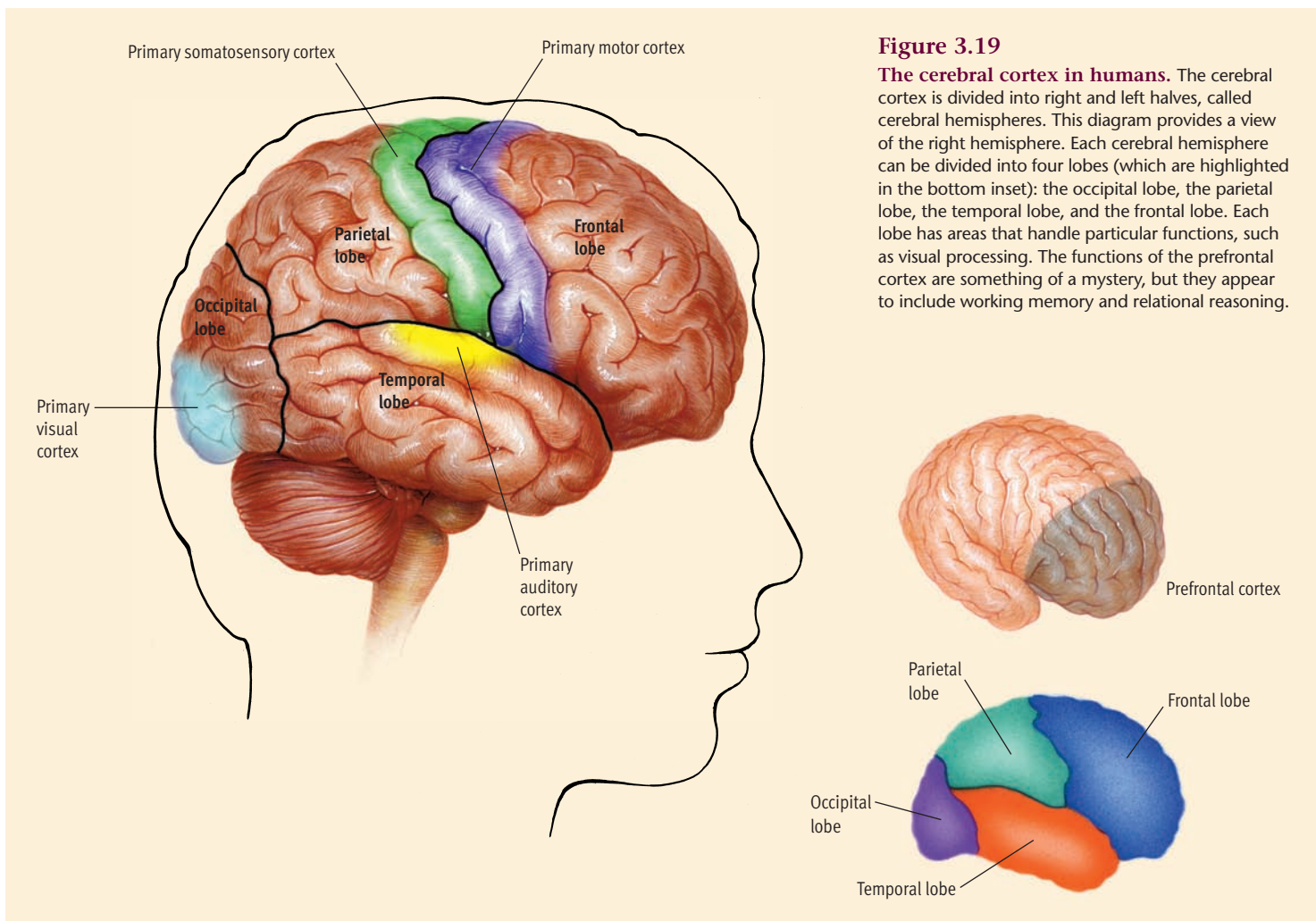


Figure 3.19

The cerebral cortex in humans. The cerebral cortex is divided into right and left halves, called cerebral hemispheres. This diagram provides a view of the right hemisphere. Each cerebral hemisphere can be divided into four lobes (which are highlighted in the bottom inset): the occipital lobe, the parietal lobe, the temporal lobe, and the frontal lobe. Each lobe has areas that handle particular functions, such as visual processing. The functions of the prefrontal cortex are something of a mystery, but they appear to include working memory and relational reasoning.

The *temporal lobe* (meaning “near the temples”) lies below the parietal lobe. Near its top, the temporal lobe contains an area devoted to auditory processing, called the *primary auditory cortex*. As we will see momentarily, damage to an area in the temporal lobe on the left side of the brain can impair the comprehension of speech and language.

Continuing forward, we find the *frontal lobe*, the largest lobe in the human brain. It contains the principal areas that control the movement of muscles, called the *primary motor cortex*. ESB applied in these areas can cause actual muscle contractions. The amount of motor cortex allocated to the control of a body part depends not on the part’s size but on the diversity and precision of its movements. Thus, more of the cortex is given to parts we have fine control over, such as fingers, lips, and the tongue. Less of the cortex is devoted to larger parts that make crude movements, such as the thighs and shoulders (see **Figure 3.20**).

The portion of the frontal lobe to the front of the motor cortex, which is called the *prefrontal cortex* (see

the inset in **Figure 3.19**), is something of a mystery. This area is disproportionately large in humans, accounting for about 28% of the human cerebral cortex (Shimamura, 1996). In light of this fact, it was once assumed to house the highest, most abstract intellectual functions, but this view was eventually dismissed as an oversimplification. Still, recent studies suggest that the prefrontal cortex *does* contribute to an impressive variety of higher-order functions, such as memory for temporal sequences (Kesner, 1998); working memory, which is a temporary buffer that processes current information (Goldman-Rakic, 1993, 1998); reasoning about relations between objects and events (Huettel, Mack, & McCarthy, 2002); and some types of decision making (Walton, Devlin, & Rushworth, 2004). Its contribution to working memory and relational reasoning have led some theorists to suggest that the prefrontal cortex houses some sort of “executive control system,” which is thought to monitor, organize, and direct thought processes (Kane & Engle, 2002; Shimamura, 1995). Consistent with this

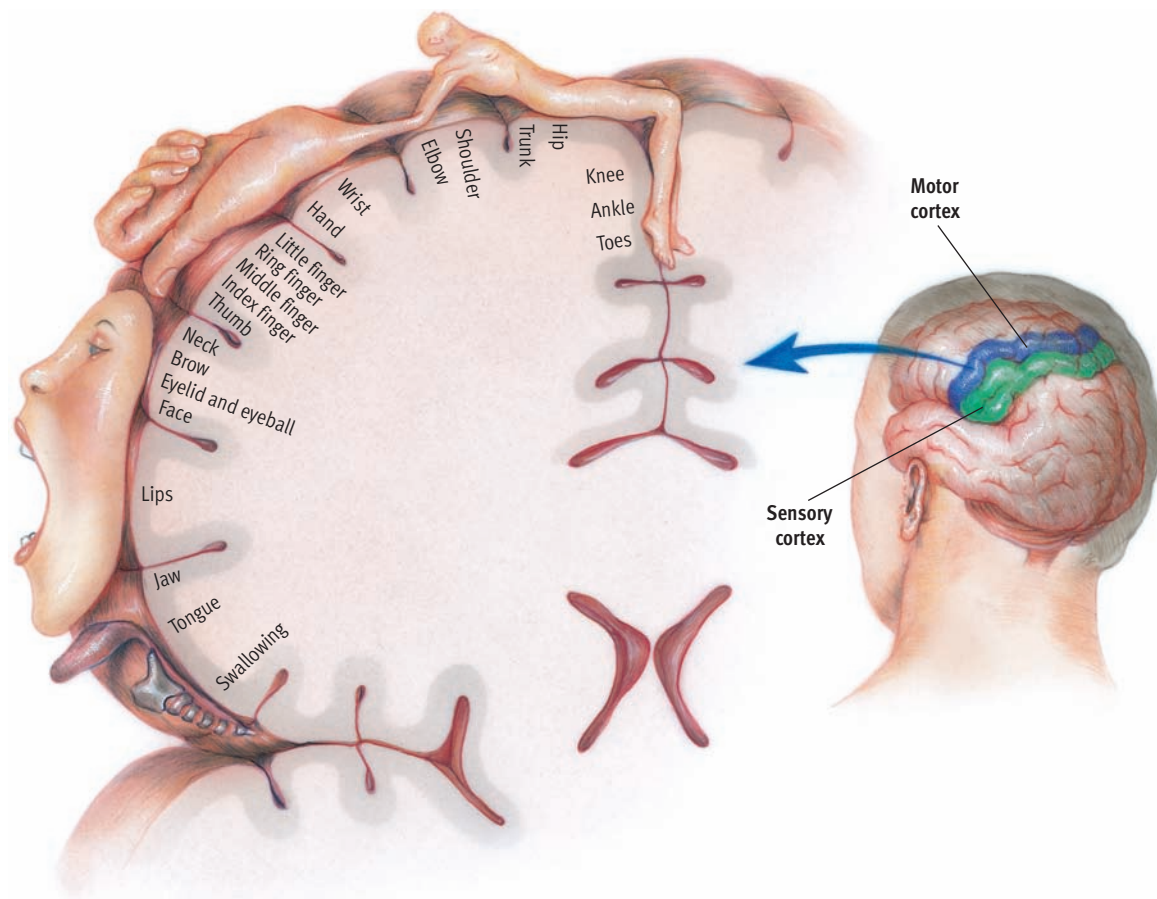


Figure 3.20
The primary motor cortex. This diagram shows the amount of motor cortex devoted to the control of various muscles and limbs. The anatomical features in the drawing are distorted because their size is proportional to the amount of cortex devoted to their control. As you can see, more of the cortex is allocated to controlling muscle groups that must make relatively precise movements.

hypothesis, people who suffer damage in the prefrontal cortex often show deficits in planning, paying attention, and getting organized (Fuster, 1996).

The Plasticity of the Brain

It was once believed that significant changes in the anatomy and organization of the brain were limited to early periods of development in both humans and animals. However, research has gradually demonstrated that the anatomical structure and functional organization of the brain is more “plastic” or malleable than widely assumed (Kolb, Gibb, & Robinson, 2003; Recanzone, 2000). This conclusion is based on several lines of research.

First, studies have shown that aspects of experience can sculpt features of brain structure. For example, neuroimaging studies have shown that an area in the somatosensory cortex that receives input from the fingers of the left hand is enlarged in string musicians who constantly use the left hand to finger the strings of their instruments (Elbert et al., 1995). In a similar vein, researchers find greater dendritic branching and synaptic density in rats raised in a stimulating,

concept check 3.3



Relating Disorders to the Nervous System

Imagine that you are working as a neuropsychologist at a clinic. You are involved in the diagnosis of the cases described below. You are asked to identify the probable cause(s) of the disorders in terms of nervous system malfunctions. Based on the information in this chapter, indicate the probable location of any brain damage or the probable disturbance of neurotransmitter activity. The answers can be found in the back of the book in Appendix A.

Case 1. Miriam is exhibiting language deficits. In particular, she does not seem to comprehend the meaning of words.

Case 2. Camille displays tremors and muscular rigidity and is diagnosed as having Parkinsonism.

Case 3. Ricardo, a 28-year-old computer executive, has gradually seen his strength and motor coordination deteriorate badly. He is diagnosed as having multiple sclerosis.

Case 4. Wendy is highly irrational, has poor contact with reality, and reports hallucinations. She is given a diagnosis of schizophrenic disorder.

Web Link 3.6



The Society for Neuroscience

The largest scientific association devoted solely to the study of the nervous system and its functioning has gathered a host of materials that will introduce visitors to the latest research on a full spectrum of brain-related topics.

enriched environment, as opposed to a dull, barren environment (Rosenzweig & Bennet, 1996; see the Critical Thinking Application for this chapter).

Second, research has shown that damage to incoming sensory pathways or the destruction of brain tissue can lead to neural reorganization. For example, when scientists amputated the third finger in an owl monkey, the part of its cortex that formerly responded to the third finger gradually became responsive to the second and fourth fingers (Kaas, 2000). Neural reorganization has also been seen in response to brain damage as healthy neurons attempt to compensate for the loss of nearby neurons (Cao et al., 1994; Gilbert, 1993).

Third, studies indicate that the adult brain can generate new neurons (Gage, 2002). Until relatively recently it was believed that the brain formed all its neurons by infancy at the latest. However, evidence suggests that adult humans can form new neurons in the hippocampus (Eriksson et al., 1998). Furthermore, Elizabeth Gould and her colleagues (1999, 2002) have found that adult monkeys form *thousands* of new brain cells each day in deep subcortical areas. These new neurons then migrate to areas in the cortex where they sprout axons and form new synapses with existing neurons.

In sum, research suggests that the brain is not “hard wired” the way a computer is. It appears that the neural wiring of the brain is flexible and constantly evolving. That said, this plasticity is not unlimited. Rehabilitation efforts with people who have suffered severe brain damage clearly demonstrate that there are limits on the extent to which the brain can re-

wire itself (Zillmer & Spiers, 2001). And the evidence suggests that the brain’s plasticity declines with age (Rains, 2002). Younger brains are more malleable than older brains. Still, the neural circuits of the brain show substantial plasticity, which certainly helps organisms adapt to their environments.

REVIEW OF KEY POINTS

- The brain has three major regions: the hindbrain, midbrain, and forebrain. Structures in the hindbrain include the medulla, pons, and cerebellum. These structures handle essential functions such as breathing, circulation, coordination of movement, and the rhythm of sleep and arousal.
- The midbrain contributes to the coordination of sensory processes. Deterioration of an area in the midbrain has been implicated as a factor in Parkinson’s disease. The forebrain includes many structures that handle higher functions. The thalamus is primarily a relay station. The hypothalamus is involved in the regulation of basic biological drives such as hunger and sex.
- The limbic system is a network of loosely connected structures located along the border between the cortex and deeper subcortical areas. It includes the hippocampus, which appears to play a role in memory; the amygdala, which is involved in the regulation of emotion; and areas rich in self-stimulation sites.
- The cerebrum is the brain area implicated in most complex mental activities. The cortex is the cerebrum’s convoluted outer layer, which is subdivided into four lobes.
- These lobes and their primary known functions are the occipital lobe (vision), the parietal lobe (touch), the temporal lobe (hearing), and the frontal lobe (movement of the body). The prefrontal cortex may contribute to working memory and relational reasoning. The structure and function of the brain appears to be more plastic than widely appreciated.

> Right Brain/Left Brain: Cerebral Laterality

PREVIEW QUESTIONS

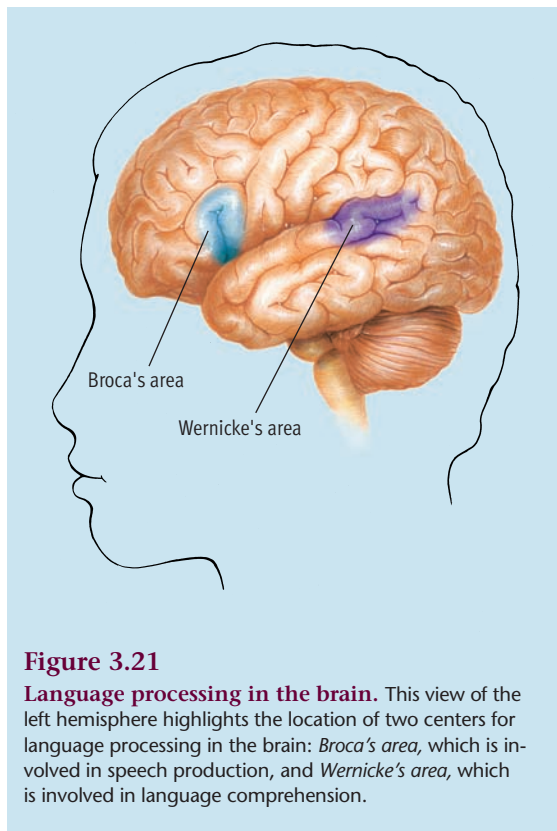
- How was the left hemisphere originally implicated in the control of language?
- How are sensory and motor information routed to the two hemispheres?
- What did split-brain research reveal about the right and left hemispheres of the brain?
- How do scientists study hemispheric specialization in normal subjects, and what have they learned?

As we saw in the previous section, the cerebrum—the seat of complex thought—is divided into two separate hemispheres (see **Figure 3.18**). Recent decades have seen an exciting flurry of research on the specialized abilities of the right and left cerebral hemispheres. Some theorists have gone so far as to suggest that we really have two brains in one!

Hints of this hemispheric specialization have been available for many years, from cases in which one side of a person’s brain has been damaged. The left hemisphere was implicated in the control of language as early as 1861, by Paul Broca, a French surgeon. Broca was treating a patient who had been unable to speak for 30 years. After the patient died, Broca showed that the probable cause of his speech deficit was a localized lesion on the left side of the frontal lobe. Since then, many similar cases have shown that this

area of the brain—known as *Broca’s area*—plays an important role in the *production* of speech (see **Figure 3.21**). Another major language center—*Wernicke’s area*—was identified in the temporal lobe of the left hemisphere in 1874. Damage in Wernicke’s area (see **Figure 3.21**) usually leads to problems with the *comprehension* of language.

Evidence that the left hemisphere usually processes language led scientists to characterize it as the “dominant” hemisphere. Because thoughts are usually coded in terms of language, the left hemisphere was given the lion’s share of credit for handling the “higher” mental processes, such as reasoning, remembering, planning, and problem solving. Meanwhile, the right hemisphere came to be viewed as the “non-dominant,” or “dumb,” hemisphere, lacking any special functions or abilities.



This characterization of the left and right hemispheres as major and minor partners in the brain's work began to change in the 1960s. It all started with landmark research by Roger Sperry, Michael Gazzaniga, and their colleagues who studied “split-brain” patients: individuals whose cerebral hemispheres had been surgically disconnected (Gazzaniga, 1970; Gazzaniga, Bogen, & Sperry, 1965; Levy, Trevarthen, & Sperry, 1972; Sperry, 1982). In 1981 Sperry received a Nobel prize in physiology/medicine for this work.

Bisecting the Brain: Split-Brain Research



In *split-brain surgery* the bundle of fibers that connects the cerebral hemispheres (the *corpus callosum*) is cut to reduce the severity of epileptic seizures. It is a radical procedure that is chosen only in exceptional cases that have not responded to other forms of treatment. But the surgery provides scientists with an unusual opportunity to study people who have had their brain literally split in two.

To appreciate the logic of split-brain research, you need to understand how sensory and motor information is routed to and from the two hemispheres. Each hemisphere's primary connections are to the opposite side of the body. Thus, the left hemisphere controls, and communicates with, the right hand, right

arm, right leg, right eyebrow, and so on. In contrast, the right hemisphere controls, and communicates with, the left side of the body.

Vision and hearing are more complex. Both eyes deliver information to both hemispheres, but there still is a separation of input. Stimuli in the right half of the *visual field* are registered by receptors on the left side of each eye, which send signals to the left hemisphere. Stimuli in the left half of the visual field are transmitted by both eyes to the right hemisphere (see Figure 3.22). Auditory inputs to each ear also go to both hemispheres. However, connections to the opposite hemisphere are stronger or more immediate. That is, sounds presented exclusively to the right ear

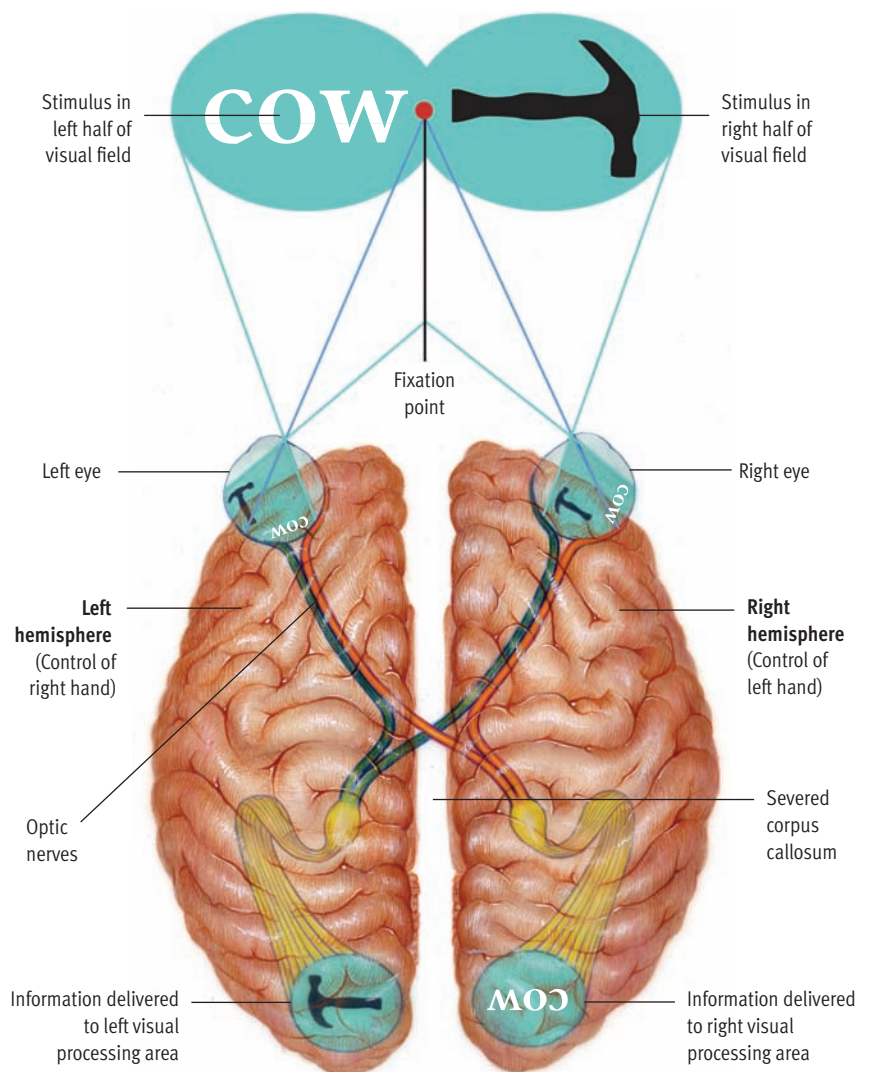
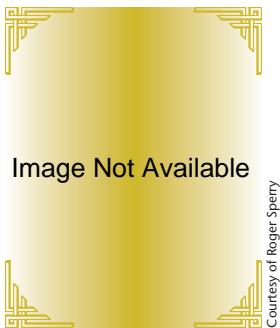


Figure 3.22

Visual input in the split brain. If a participant stares at a fixation point, the point divides the subject's visual field into right and left halves. Input from the right visual field (a picture of a hammer in this example) strikes the left side of each eye and is transmitted to the left hemisphere. Input from the left visual field strikes the right side of each eye and is transmitted to the right hemisphere. Normally, the hemispheres share the information from the two halves of the visual field, but in split-brain patients, the corpus callosum is severed, and the two hemispheres cannot communicate. Hence, the experimenter can present a visual stimulus to just one hemisphere at a time.



Courtesy of Roger Sperry

ROGER SPERRY

"Both the left and right hemispheres of the brain have been found to have their own specialized forms of intellect."

(through headphones) are registered in the left hemisphere first, while sounds presented to the left ear are registered more quickly in the right hemisphere.

For the most part, people don't notice this asymmetric, "crisscrossed" organization because the two hemispheres are in close communication with each other. Information received by one hemisphere is readily shared with the other via the corpus callosum. However, when the two hemispheres are surgically disconnected, the functional specialization of the brain becomes apparent.

In their classic study of split-brain patients, Gazzaniga, Bogen, and Sperry (1965) presented visual stimuli such as pictures, symbols, and words in a single visual field (the left or the right), so that the stimuli would be sent to only one hemisphere. The stimuli were projected onto a screen in front of the participants, who stared at a fixation point (a spot) in the center of the screen (see **Figure 3.23**). The images were flashed to the right or the left of the fixation point for only a split second. Thus, the subjects did not have a chance to move their eyes, and the stimuli were only glimpsed in one visual field.

When pictures were flashed in the right visual field and thus sent to the left hemisphere, the split-brain subjects were able to name and describe the objects depicted (such as a cup or spoon). However, the subjects were *not* able to name and describe the same objects when they were flashed in the left visual field and sent to the right hemisphere. In a similar fashion, an object placed out of view in the right hand (communicating with the left hemisphere) could be named. However, the same object placed in the left hand (right hemisphere) could not be. These findings supported the notion that language is housed in the left hemisphere.

Although the split-brain subjects' right hemisphere was not able to speak up for itself, further tests re-

vealed that it *was* processing the information presented. If subjects were given an opportunity to *point out a picture* of an object they had held in their left hand, they were able to do so. They were also able to point out pictures that had been flashed to the left visual field. Furthermore, the right hemisphere (left hand) turned out to be *superior* to the left hemisphere (right hand) in assembling little puzzles and copying drawings, even though the subjects were right-handed. These findings provided the first compelling demonstration that the right hemisphere has its own special talents. Subsequent studies of additional split-brain patients showed the right hemisphere to be better than the left on a variety of visual-spatial tasks, including discriminating colors, arranging blocks, and recognizing faces.

Hemispheric Specialization in the Intact Brain



The problem with the split-brain operation, of course, is that it creates an abnormal situation. The vast majority of us remain "neurologically intact." Moreover, the surgery is done only with people who suffer from prolonged, severe cases of epilepsy. These people may have had somewhat atypical brain organization even before the operation. Thus, theorists couldn't help wondering whether it was safe to generalize broadly from the split-brain studies. For this reason, researchers developed methods that allowed them to study cerebral specialization in the intact brain.

One method involves looking at **perceptual asymmetries**—left-right imbalances between the cerebral hemispheres in the speed of visual or auditory processing. As just discussed, it is possible to present visual stimuli to just one visual field at a time. In normal individuals, the input sent to one hemisphere is quickly shared with the other. However, subtle differences in the "abilities" of the two hemispheres can be detected by precisely measuring how long it takes subjects to recognize different types of stimuli.

For instance, when *verbal* stimuli are presented to the right visual field (and thus sent to the *left hemisphere* first), they are identified more quickly and more accurately than when they are presented to the left visual field (and sent to the right hemisphere first). The faster reactions in the left hemisphere presumably occur because it can recognize verbal stimuli on its own, while the right hemisphere has to take extra time to "consult" the left hemisphere. In contrast, the *right hemisphere* is faster than the left on *visual-spatial* tasks, such as locating a dot or recognizing a face (Bradshaw, 1989; Bryden, 1982).

Figure 3.23

Experimental apparatus in split-brain research.

On the left is a special slide projector that can present images very briefly, before the subject's eyes can move and thus change the visual field. Images are projected on one side of the screen to present stimuli to just one hemisphere. The portion of the apparatus beneath the screen is constructed to prevent participants from seeing objects that they may be asked to handle with their right or left hand, another procedure that can be used to send information to just one hemisphere.

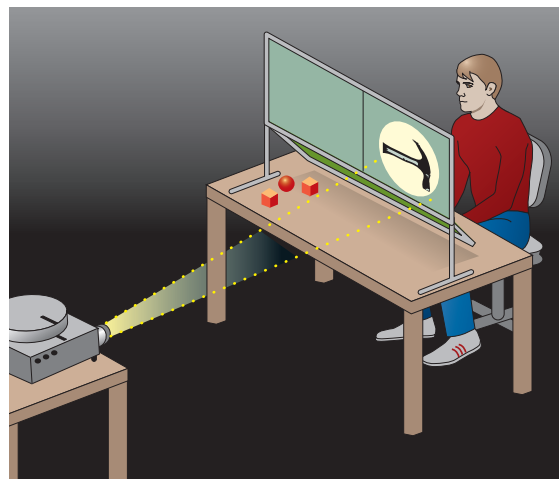


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Researchers have also used a variety of other approaches to explore hemispheric specialization in normal people. For the most part, their findings have converged nicely with the results of the split-brain studies (Reuter-Lorenz & Miller, 1998). Overall, the findings suggest that the two hemispheres are specialized, with each handling certain types of cognitive tasks better than the other (Corballis, 2003; Gazzaniga, 2000; Springer & Deutsch, 1998). *The left hemisphere usually is better on tasks involving verbal processing, such as language, speech, reading, and writing. The right hemisphere exhibits superiority on many tasks involving nonverbal processing, such as most spatial, musical, and visual recognition tasks.*

Some hemispheric specialization has also been found in regard to the processing and expression of emotions. The right hemisphere appears to play a larger role than the left in the *perception* of others' emotions (Narumoto et al., 2001). For example, a right-hemisphere advantage is seen when subjects attempt to judge others' emotions based on nonverbal signals (Adolphs, Damasio, & Tranel, 2002; Everhart & Harrison, 2000). Lateralization in the *experience and expression* of emotion appears to be more complex.

Negative emotions are associated with greater activation of the right hemisphere, but positive emotions tend to produce greater activation in the left hemisphere (Canli et al., 1998; Davidson, Shackman, & Maxwell, 2004).

Cerebral lateralization is a burgeoning area of research that has broad implications, which we will discuss further in the Personal Application. For now, however, let's leave the brain and turn our attention to the endocrine system.

➤ REVIEW OF KEY POINTS

- The cerebrum is divided into right and left hemispheres connected by the corpus callosum. Evidence that the left cerebral hemisphere usually processes language led scientists to view it as the dominant hemisphere.
- However, studies of split-brain patients revealed that the right and left halves of the brain each have unique talents, with the right hemisphere being specialized to handle visual-spatial functions.
- Studies of perceptual asymmetries in normal subjects also showed that the left hemisphere is better equipped to handle verbal processing, whereas the right hemisphere is more adept at nonverbal processing. The right hemisphere has a larger role than the left in the perception of emotion.

➤ The Endocrine System: Another Way to Communicate

The major way the brain communicates with the rest of the body is through the nervous system. However, the body has a second communication system that is also important to behavior. **The endocrine system consists of glands that secrete chemicals into the bloodstream that help control bodily functioning.** The messengers in this communication network are called hormones. **Hormones are the chemical substances released by the endocrine glands.** In a way, hormones are like neurotransmitters in the nervous system. They are stored

for subsequent release as chemical messengers, and once released, they diffuse through the bloodstream and bind to special receptors on target cells. In fact, some chemical substances do double duty, functioning as hormones when they're released in the endocrine system and as neurotransmitters in the nervous system (norepinephrine, for example). However, there are some important differences between hormones and neurotransmitters. Neural messages generally are transmitted short distances with lightning speed (measured in milliseconds) along very

PREVIEW QUESTIONS

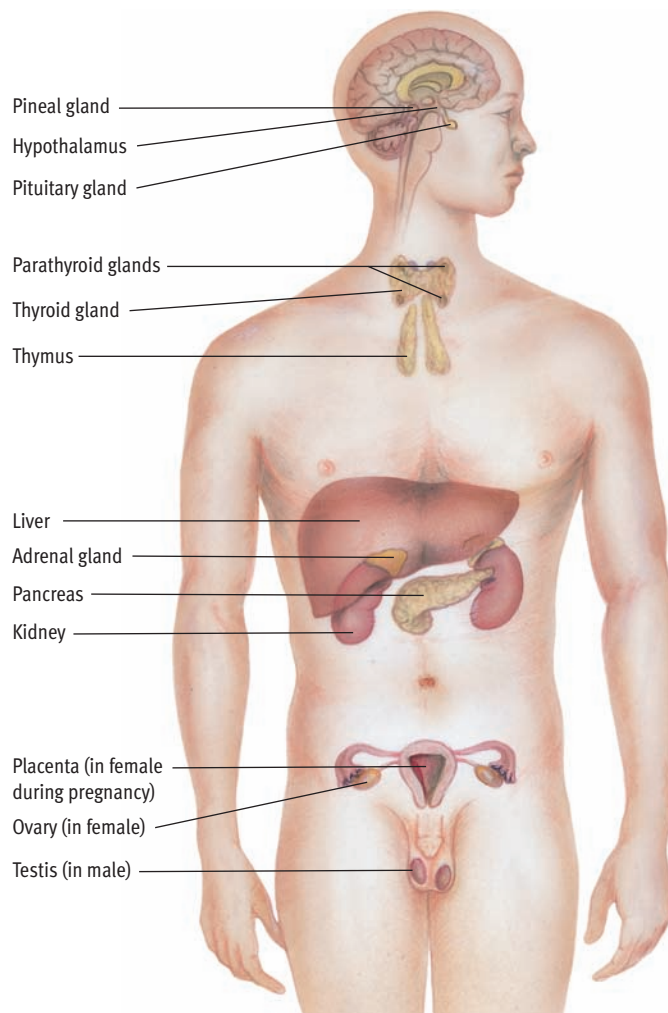
- What does the endocrine system consist of?
- What are hormones, and how do they resemble and differ from neurotransmitters?
- What is the master gland of the endocrine system?
- What are some aspects of behavior regulated by hormones?

specific pathways, whereas hormonal messages often travel to distant cells at a much slower speed (measured in seconds and minutes) and tend to be less specific, as they can act on many target cells throughout the body.

The major endocrine glands are shown in **Figure 3.24**. Some hormones are released in response to changing conditions in the body and act to regulate those conditions. For example, hormones released by the stomach and intestines help control digestion. Kidney hormones play a part in regulating blood pressure. And pancreatic hormone (insulin) is essential for cells to use sugar from the blood. Hormone release tends to be *pulsatile*. That is, hormones tend to be released several times per day in brief bursts or pulses that last only a few minutes. The levels of many hormones increase and decrease in a rhythmic pattern throughout the day.

Figure 3.24

The endocrine system. This graphic depicts most of the major endocrine glands. The endocrine glands secrete hormones into the bloodstream. These chemicals regulate a variety of physical functions and affect many aspects of behavior.



Much of the endocrine system is controlled by the nervous system through the *hypothalamus*. This structure at the base of the forebrain has intimate connections with the pea-sized *pituitary gland*. **The pituitary gland releases a great variety of hormones that fan out around the body, stimulating actions in the other endocrine glands.** In this sense, the pituitary is the “master gland” of the endocrine system, although the hypothalamus is the real power behind the throne.

The intermeshing of the nervous system and the endocrine system can be seen in the fight-or-flight response described earlier. In times of stress, the hypothalamus sends signals along two pathways—through the autonomic nervous system and through the pituitary gland—to the adrenal glands (Clow, 2001). In response, the adrenal glands secrete hormones that radiate throughout the body, preparing it to cope with an emergency (see Chapter 13). The communication between the brain and the endocrine system is not a one-way street, as hormonal fluctuations can trigger responses in the brain. For example, hormones secreted by the adrenal medulla in response to stress can signal the hypothalamus to inhibit further hormone output. The levels of many hormones are regulated through *negative feedback systems*. When a hormone increases to a certain level, signals are sent to the hypothalamus or the relevant endocrine gland to reduce or stop further secretion of that hormone.

Hormones play important roles in modulating human physiological development. For example, among the more interesting hormones released by the pituitary are the *gonadotropins*, which affect the *gonads*, or sexual glands. Prior to birth, these hormones direct the formation of the external sexual organs in the developing fetus (Gorski, 2000). Thus, your sexual identity as a male or female was shaped during prenatal development by the actions of hormones. At puberty, increased levels of sexual hormones are responsible for the emergence of secondary sexual characteristics, such as male facial hair and female breasts (Susman, Dorn, & Schiefelbein, 2003). The actions of other hormones are responsible for the spurt in physical growth that occurs around puberty (see Chapter 11).

These developmental effects of hormones illustrate how genetic programming has a hand in behavior. Obviously, the hormonal actions that shaped your sex were determined by your genetic makeup. Similarly, the hormonal changes in early adolescence that launched your growth spurt and aroused your interest in sexuality were preprogrammed over a decade earlier by your genetic inheritance, which brings us to the role of heredity in shaping behavior.

> Heredity and Behavior: Is It All in the Genes?

As you have learned throughout this chapter, your biological makeup is intimately related to your behavior. That is why your genetic inheritance, which shapes your biological makeup, may have much to do with your behavior. Most people realize that physical characteristics such as height, hair color, blood type, and eye color are largely shaped by heredity. But what about psychological characteristics, such as intelligence, moodiness, impulsiveness, and shyness? To what extent are people's behavioral qualities molded by their genes? These questions are the central focus of **behavioral genetics—an interdisciplinary field that studies the influence of genetic factors on behavioral traits.**

As we saw in Chapter 1, questions about the relative importance of heredity versus environment are very old ones in psychology. However, research in behavioral genetics has grown by leaps and bounds since the 1970s, and this research has shed new light on the age-old nature versus nurture debate. Ironically, although behavioral geneticists have mainly sought to demonstrate the influence of heredity on behavior, their recent work has also highlighted the importance of the environment, as we shall see in this section.

Basic Principles of Genetics

Every cell in your body contains enduring messages from your mother and father. These messages are found on the *chromosomes* that lie within the nucleus of each cell.

Chromosomes and Genes

Chromosomes are strands of DNA (deoxyribonucleic acid) molecules that carry genetic information (see Figure 3.25). Every cell in humans, except the sex cells (sperm and eggs), contains 46 chromosomes. These chromosomes operate in 23 pairs, with one chromosome of each pair being contributed by each parent. Parents make this contribution when fertilization creates a **zygote, a single cell formed by the union of a sperm and an egg.** The sex cells that form a zygote each have 23 chromosomes; together they contribute the 46 chromosomes that appear in the zygote and in all the body cells that develop from it. Each chromosome in turn contains thousands of biochemical messengers called genes. **Genes are DNA segments that serve as the key functional units in hereditary transmission.**

If all offspring are formed by a union of the parents' sex cells, why aren't family members identical

clones? The reason is that a single pair of parents can produce an extraordinary variety of combinations of chromosomes. When sex cells form in each parent, it is a matter of chance as to which member of each chromosome pair ends up in the sperm or egg. Each parent's 23 chromosome pairs can be scrambled in over 8 million (2^{23}) different ways, yielding roughly 70 trillion possible configurations (2^{46}) when sperm and egg unite. Actually, this is a conservative estimate. It doesn't take into account complexities such as *mutations* (changes in the genetic code) or *crossing over* during sex-cell formation (an interchange of material between chromosomes). Thus, genetic transmission is a complicated process, and everything is a matter of probability. Except for identical twins, each person ends up with a unique genetic blueprint.

Like chromosomes, genes operate in pairs, with one gene of each pair coming from each parent. **In the homozygous condition, the two genes in a specific pair are the same. In the heterozygous condition, the two genes in a specific pair are different** (see Figure 3.26 on the next page). In the simplest scenario, a single pair of genes determines a trait. Attached versus detached earlobes provide a nice example. When both parents contribute a gene for the same type of earlobe (the *homozygous* condition), the child will have an earlobe of that type. When the parents contribute genes for different types of earlobes (the *heterozygous* condition), one gene in the pair—called the *dominant gene*—overrides or masks the other, called the *recessive gene*. Thus, **a dominant gene is one that is expressed when paired genes are different. A recessive gene is one that is masked when paired genes are different.** In the case of earlobes, genes for detached earlobes are dominant over genes for attached earlobes.

Because genes operate in pairs, a child has a 50% probability of inheriting a specific gene in a particular gene pair from each parent. Thus, the *genetic relatedness* of parents and children is said to be 50%. The genetic relatedness of other types of relatives can be calculated in the same way; the results are shown in Figure 3.27 on the next page. As you can see, genetic relatedness ranges from 100% for identical twins

Figure 3.25

Genetic material. This series of enlargements shows the main components of genetic material. (Top) In the nucleus of every cell are chromosomes, which carry the information needed to construct new human beings. (Center) Chromosomes are thread-like strands of DNA that carry thousands of genes, the functional units of hereditary transmission. (Bottom) DNA is a spiraled double chain of molecules that can copy itself to reproduce.

PREVIEW QUESTIONS

- What are the basic mechanisms of hereditary transmission?
- What is the difference between one's genotype and phenotype?
- How are family studies conducted, and what can they reveal?
- How are twin studies conducted, and what have they revealed about intelligence and personality?
- How do adoption studies assess the role of genetics and environment?
- What is genetic mapping, and how will it facilitate behavioral genetics research?

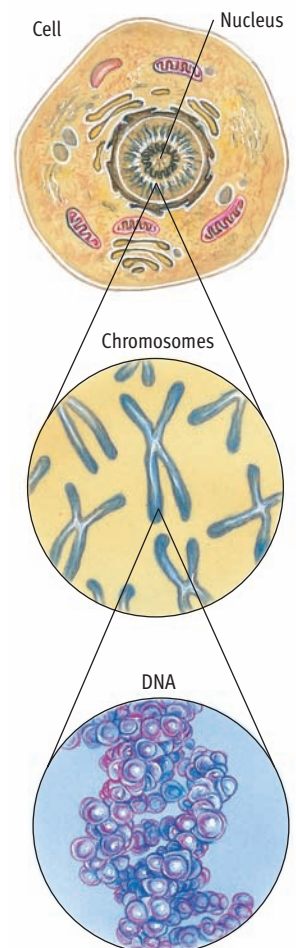
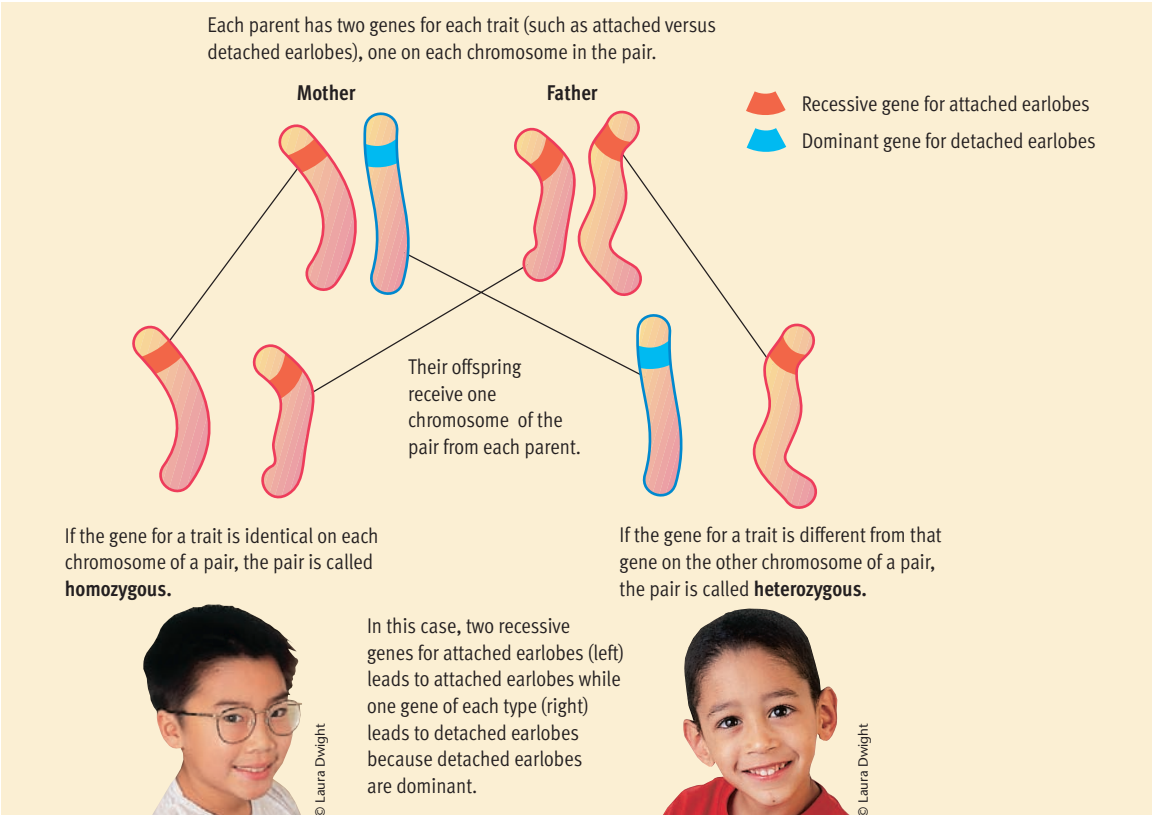


Figure 3.26
Homozygous and heterozygous genotypes.
 Like chromosomes, genes operate in pairs, with one gene in each pair coming from each parent. When paired genes are the same, they are said to be *homozygous*. When paired genes are different, they are said to be *heterozygous*. Whether people have attached or detached earlobes is determined by a single pair of genes. In the heterozygous condition, genes for detached earlobes are dominant over genes for attached earlobes.



Relationship	Degree of relatedness	Genetic overlap
Identical twins	100%	
Fraternal twins Brother or sister Parent or child	First-degree relatives	50%
Grandparent or grandchild Uncle, aunt, nephew, or niece Half-brother or half-sister	Second-degree relatives	25%
First cousin	Third-degree relatives	12.5%
Second cousin	Fourth-degree relatives	6.25%
Unrelated	0%	

Figure 3.27
Genetic relatedness. Research on the genetic bases of behavior takes advantage of the different degrees of genetic relatedness between various types of relatives. If heredity influences a trait, relatives who share more genes should be more similar with regard to that trait than are more distant relatives, who share fewer genes. Comparisons involving various degrees of biological relationships will come up frequently in later chapters.

down to 6.25% for second cousins. The numbers in **Figure 3.27** are purely theoretical, and for a variety of complicated reasons they underestimate the actual genetic overlap among people. But the key to the concept of genetic relatedness is that members of a family share more of the same genes than non-members, and closer relatives share a larger proportion of genes than more distant relatives. These realities explain why family members tend to resemble one another and why this resemblance tends to be greater among closer relatives.

Genotype Versus Phenotype

It might seem that two parents with the same manifest trait, such as detached earlobes, should always produce offspring with that trait. However, that isn't always the case. For instance, two parents with detached earlobes can produce a child with attached earlobes. This happens because there are unexpressed recessive genes in the family's gene pool—in this case, genes for attached earlobes.

This point brings us to the distinction between genotype and phenotype. **Genotype refers to a person's genetic makeup. Phenotype refers to the ways in which a person's genotype is manifested in observable characteristics.** Different genotypes (such as two genes for detached earlobes as opposed to one gene for detached and one for attached) can yield

the same phenotype (detached earlobes). Genotype is determined at conception and is fixed forever. In contrast, phenotypic characteristics (hair color, for instance) may change over time. They may also be modified by environmental factors.

Genotypes translate into phenotypic characteristics in a variety of ways. Not all gene pairs operate according to the principles of dominance. In some instances, when paired genes are different, they produce a blend, an “averaged out” phenotype. In other cases, paired genes that are different strike another type of compromise, and both characteristics show up phenotypically. In the case of type AB blood, for example, one gene is for type A and the other is for type B.

Polygenic Inheritance

Most human characteristics appear to be *polygenic traits*, or characteristics that are influenced by more than one pair of genes. For example, three to five gene pairs are thought to interactively determine skin color. Complex physical abilities, such as motor coordination, may be influenced by tangled interactions among a great many pairs of genes. Most psychological characteristics that appear to be affected by heredity seem to involve complex polygenic inheritance (Plomin et al., 2001).

Investigating Hereditary Influence: Research Methods



How do behavioral geneticists and other scientists disentangle the effects of genetics and experience to determine whether heredity affects behavioral traits? Researchers have designed special types of studies to assess the impact of heredity. Of course, with humans they are limited to correlational rather than experimental methods, as they cannot manipulate genetic variables by assigning subjects to mate with each other (this approach, called *selective breeding*, is used in animal studies). The three most important methods in human research are family studies, twin studies, and adoption studies. After examining these classic methods of research, we’ll discuss the impact of new developments in genetic mapping.



Family Studies

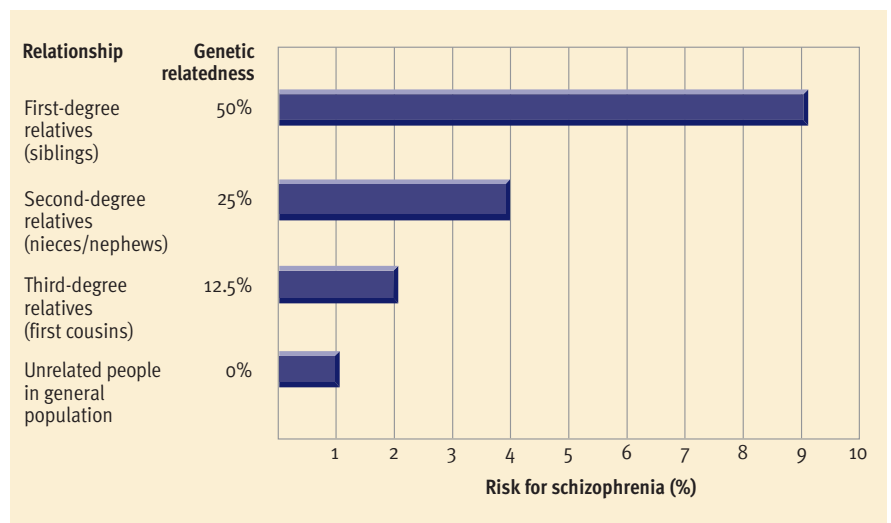
In *family studies* researchers assess hereditary influence by examining blood relatives to see how much they resemble one another on a specific trait. If heredity affects the trait under scrutiny, researchers should find phenotypic similarity among relatives. Furthermore, they should find more similarity among relatives who share more genes. For instance, siblings should exhibit more similarity than cousins.

Illustrative of this method are the numerous family studies conducted to assess the contribution of heredity to the development of schizophrenic disorders. These disorders strike approximately 1% of the population, yet as **Figure 3.28** reveals, 9% of the siblings of schizophrenic patients exhibit schizophrenia themselves (Gottesman, 1991). Thus, these first-degree relatives of schizophrenic patients show a risk for the disorder that is nine times higher than normal. This risk is greater than that observed for more distantly related, second-degree relatives, such as nieces and nephews (4%), who, in turn, are at greater risk than third-degree relatives, such as second cousins (2%). This pattern of results is consistent with the hypothesis that genetic inheritance influences the development of schizophrenic disorders (Gottesman & Moldin, 1998; Ho, Black, & Andreasen, 2003).

Family studies can indicate whether a trait runs in families. However, this correlation does not provide conclusive evidence that the trait is influenced by heredity. Why not? Because family members generally share not only genes but also similar environments. Furthermore, closer relatives are more likely to live together than more distant relatives. Thus, genetic similarity and environmental similarity *both* tend to be greater for closer relatives. Either of these confounded variables could be responsible when greater phenotypic similarity is found in closer relatives. Family studies can offer useful insights about the possible impact of heredity, but they cannot provide definitive evidence.

Figure 3.28

Family studies of risk for schizophrenic disorders. First-degree relatives of schizophrenic patients have an elevated risk of developing a schizophrenic disorder (Gottesman, 1991). For instance, the risk for siblings of schizophrenic patients is about 9% instead of the baseline 1% for unrelated people. Second- and third-degree relatives have progressively smaller elevations in risk for this disorder. Although these patterns of risk do not prove that schizophrenia is partly inherited, they are consistent with this hypothesis.



Twin Studies

Twin studies can yield better evidence about the possible role of genetic factors. In *twin studies* researchers assess hereditary influence by comparing the resemblance of identical twins and fraternal twins with respect to a trait. The logic of twin studies hinges on the genetic relatedness of identical and fraternal twins (see Figure 3.29). **Identical (monozygotic) twins** emerge from one zygote that splits for unknown reasons. Thus, they have exactly the same genotype; their genetic relatedness is 100%. **Fraternal (dizygotic) twins** result when two eggs are fertilized simultaneously by different sperm cells, forming two separate zygotes. Fraternal twins are no more alike in genetic makeup than any two siblings born to a pair of parents at different times. Their genetic relatedness is only 50%.

Fraternal twins provide a useful comparison to identical twins because in both cases the twins usually grow up in the same home, at the same time, exposed to the same configuration of relatives, neighbors, peers, teachers, events, and so forth. Thus, both kinds of twins normally develop under equally simi-

lar environmental conditions. However, identical twins share more genetic kinship than fraternal twins. Consequently, if sets of identical twins tend to exhibit more similarity on a trait than sets of fraternal twins do, it is reasonable to infer that this greater similarity is *probably* due to heredity rather than environment.

Twin studies have been conducted to assess the impact of heredity on a variety of traits. Some representative results are summarized in Figure 3.30. The

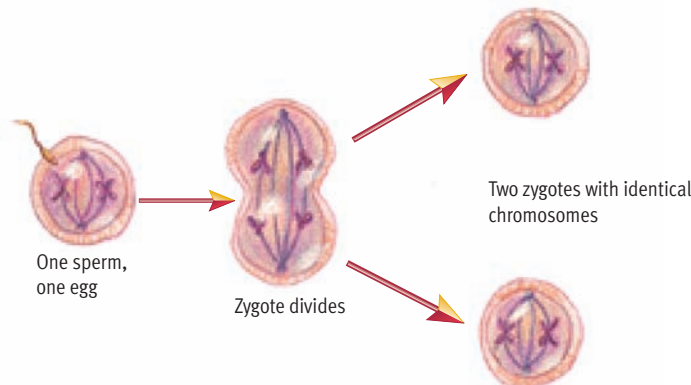
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Figure 3.29

Identical versus fraternal twins. Identical (monozygotic) twins emerge from one zygote that splits, so their genetic relatedness is 100%. Fraternal (dizygotic) twins emerge from two separate zygotes, so their genetic relatedness is only 50%.

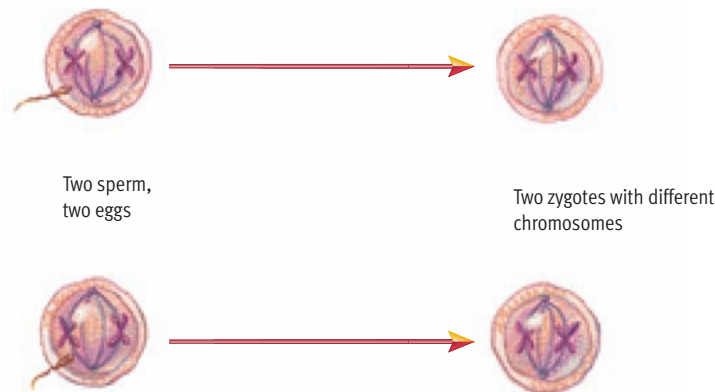
Source: Adapted from Kalat, J. (1996). *Introduction to psychology*. Belmont, CA: Wadsworth. Reprinted by permission.

Identical (monozygotic) twins



© Marina Jefferson/Taxi-Cetty Images

Fraternal (dizygotic) twins



© Mary Kate Denny/PhotoEdit

higher correlations found for identical twins indicate that they tend to be more similar to each other than fraternal twins on measures of general intelligence (Bouchard, 1998) and measures of specific personality traits, such as extraversion (Plomin & Caspi, 1999). These results support the notion that intelligence and personality are influenced to some degree by genetic makeup. However, the fact that identical twins are far from identical in intelligence and personality also shows that environment influences these characteristics.



Adoption Studies

Adoption studies assess hereditary influence by examining the resemblance between adopted children and both their biological and their adoptive parents. Generally, adoptees are used as subjects in this type of study only if they were given up for adoption in early infancy and were raised without having contact with their biological parents. The logic underlying the adoption study approach is quite simple. If adopted children resemble their biological parents on a trait, even though they were not raised by them, genetic factors probably influence that trait. In contrast, if adopted children resemble their adoptive parents, even though they inherited no genes from them, environmental factors probably influence the trait.

In recent years, adoption studies have contributed to science's understanding of how genetics and the environment influence intelligence. The research shows modest similarity between adopted children and their biological parents, as indicated by an average correlation of about .22 (Grigerenko, 2000). Interestingly, adopted children resemble their adoptive parents to roughly the same degree (an average correlation of about .20). These findings suggest that both heredity and environment have an influence on intelligence.

The Cutting Edge: Genetic Mapping

While behavioral geneticists have recently made great progress in documenting the influence of heredity on behavior, *molecular geneticists*, who study the biochemical bases of genetic inheritance, have made even more spectacular advances in their efforts to unravel the genetic code. **Genetic mapping is the process of determining the location and chemical sequence of specific genes on specific chromosomes.** New methods of manipulating DNA are now allowing scientists to create detailed physical maps of the genetic material on chromosomes in plants, animals, and humans. The Human Genome Project, a huge international enterprise, has produced a working draft of

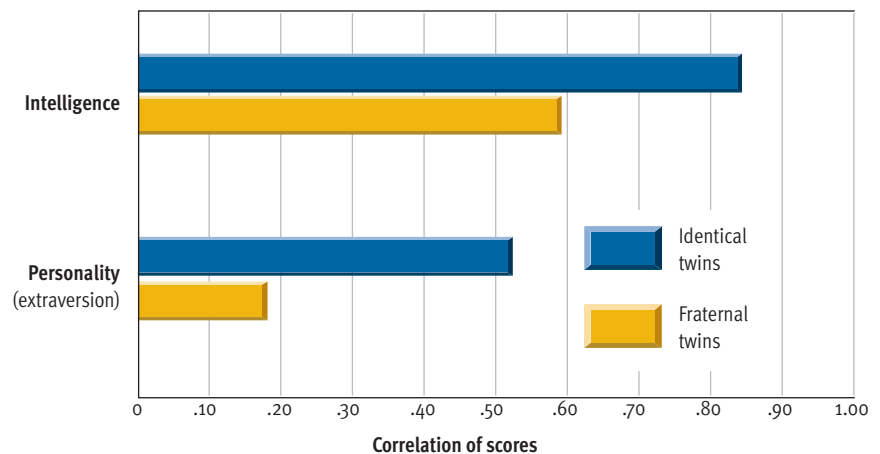


Figure 3.30

Twin studies of intelligence and personality. Identical twins tend to be more similar than fraternal twins (as reflected in higher correlations) with regard to intelligence and specific personality traits, such as extraversion. These findings suggest that intelligence and personality are influenced by heredity. (Intelligence data from McGue et al., 1993; extraversion data based on Loehlin, 1992)

the sequence of all 3 billion letters of DNA in the human genome, and the chromosomal location of almost all human genes has been identified (Kelsoe, 2004). Gene maps, by themselves, do not reveal which genes govern which traits. However, the compilation of a precise genetic atlas will fuel a quantum leap in the ability of scientists to pinpoint links between specific genes and specific traits and disorders. For example, medical researchers have already identified the genes responsible for cystic fibrosis, Huntington's chorea, and muscular dystrophy. Many medical researchers predict that genetic mapping will ultimately lead to revolutionary advances in the diagnosis and treatment of physical diseases (Collins & McKusick, 2001).

Will genetic mapping permit researchers to discover the genetic basis for intelligence, extraversion, schizophrenia, musical ability, and other *behavioral* traits? Perhaps someday, but progress is likely to be painstakingly slow (Cowan, Kopnisky, & Hyman, 2002; Plomin & McGuffin, 2003). Thus far, the major medical breakthroughs from genetic mapping have involved dichotomous traits (you either do or do not have the trait, such as muscular dystrophy) governed by a single gene pair. However, most behavioral traits do not involve a dichotomy, as everyone has varying amounts of intelligence, musical ability, and so forth. Moreover, virtually all behavioral traits appear to be *polygenic* and are shaped by many genes rather than a single pair of genes. Because of these and many other complexities, scientists are not likely to find a single gene that controls intelligence, extraversion, or musical talent (Plomin & Crabbe, 2000). The challenge will be to identify specific constellations of genes

Web Link 3.7



Human Genome Project Information
This site provides a rich array of educational resources related to the ongoing Human Genome Project, which was originally launched in 1990. Visitors can learn about the goals and history of this massive project and get updates on recent progress.



Recognizing Hereditary Influence

Check your understanding of the methods scientists use to explore hereditary influences on specific behavioral traits by filling in the blanks in the descriptive statements below. The answers can be found in the back of the book in Appendix A.

1. The findings from family studies indicate that heredity may influence a trait if _____ show more trait similarity than _____.
2. The findings from twin studies suggest that heredity influences a trait if _____ show more trait similarity than _____.
3. The findings from adoption studies suggest that heredity influences a trait if children adopted at a young age share more trait similarity with their _____ than their _____.
4. The findings from family studies, twin studies, or adoption studies suggest that heredity does not influence a trait when _____ is not related to _____.

active—genetics and experience play off each other (Gottesman & Hanson, 2005; Rutter & Silberg, 2002).

For example, consider what researchers have learned about the development of schizophrenic disorders. Although the evidence indicates that genetic factors influence the development of schizophrenia, it does *not* appear that anyone directly inherits the disorder itself. Rather, what people appear to inherit is a certain degree of *vulnerability* to the disorder (McDonald & Murphy, 2003; Paris, 1999). Whether this vulnerability is ever converted into an actual disorder depends on each person's experiences in life. As we will discuss in Chapter 14, certain types of stressful experience seem to evoke the disorder in people who are more vulnerable to it. Thus, as Danielle Dick and Richard Rose (2002) put it in a review of behavioral genetics research, "Genes confer dispositions, not destinies" (p 73).



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ROBERT PLOMIN

"The transformation of the social and behavioral sciences from environmentalism to biological determinism is happening so fast that I find I more often have to say, 'Yes, genetic influences are substantial, but environmental influences are important, too.'"

that each exert modest influence over particular aspects of behavior. What's exciting is that until recently, behavioral geneticists were largely limited to investigating *how much* heredity influences various traits. Genetic mapping will allow them to begin investigating *how* heredity influences specific aspects of behavior (Plomin, 2004).

The Interplay of Heredity and Environment

We began this section by asking, is it all in the genes? When it comes to behavioral traits, the answer clearly is no. According to Robert Plomin (1993, 2004), perhaps the leading behavioral genetics researcher in the last decade, what scientists find again and again is that heredity and experience jointly influence most aspects of behavior. Moreover, their effects are inter-

REVIEW OF KEY POINTS

- The endocrine system consists of the glands that secrete hormones, which are chemicals involved in the regulation of basic bodily processes. The control centers for the endocrine system are the hypothalamus and the pituitary gland. Hormones regulate many aspects of behavior, such as the fight-or-flight response, and many aspects of physiological development, such as sexual differentiation.
- The basic units of genetic transmission are genes housed on chromosomes. Genes operate in pairs, and when heterozygous, one may be dominant and one recessive. Genotypes are translated into phenotypes in many ways. Most behavioral qualities appear to involve polygenic inheritance.
- Researchers assess hereditary influence through a variety of methods, including family studies, twin studies, adoption studies, and genetic mapping. Family studies cannot provide conclusive evidence that a trait is influenced by heredity. Twin studies can provide much better evidence.
- Research indicates that most behavioral qualities are influenced jointly by heredity and environment, which play off of each other in complex interactions.

The Evolutionary Bases of Behavior

PREVIEW QUESTIONS

- What were Darwin's four key insights?
- Can adaptations linger in a population even if they are no longer adaptive?
- How do evolutionary theorists explain self-sacrifice?
- How can behaviors be adaptive?

To round out our look at the biological bases of behavior, we need to discuss how evolutionary forces have shaped many aspects of human and animal behavior. As you may recall from Chapter 1, *evolutionary psychology* is a major new theoretical perspective in the field that analyzes behavioral processes in terms of their adaptive significance. In this section, we will outline some basic principles of evolutionary theory and relate them to animal behavior. These ideas will create a foundation for forthcoming chapters, where we'll see how these principles can

enhance our understanding of many aspects of human behavior.

Darwin's Insights

Charles Darwin, the legendary British naturalist, was *not* the first person to describe the process of evolution. Well before Darwin's time, other biologists who had studied the earth's fossil record noted that various species appeared to have undergone gradual changes over the course of a great many generations.

What Darwin (1859) contributed in his landmark book, *The Origin of Species*, was a creative, new explanation for *how and why* evolutionary changes unfold over time. He identified *natural selection* as the mechanism that orchestrates the process of evolution.

The mystery that Darwin set out to solve was complicated. He wanted to explain how the characteristics of a species might change over generations and why these changes tended to be surprisingly adaptive. In other words, he wanted to shed light on why organisms tend to have characteristics that serve them well in the context of their environments. How did giraffes acquire their long necks that allow them to reach high into acacia trees to secure their main source of food? How did woodpeckers develop their sharp, chisel-shaped beaks that permit them to probe trees for insects so effectively? How did frogs develop their long and powerful hindlimbs that enable them to catapult through the air on land and move swiftly through water? Darwin's explanation for the seemingly purposive nature of evolution centered on four crucial insights.

First, he noted that organisms vary in endless ways, such as size, speed, strength, aspects of appearance, visual abilities, hearing capacities, digestive processes, cell structure, and so forth. Second, he noted that some of these characteristics are heritable—that is, they are passed down from one generation to the next. Although genes and chromosomes had not yet been discovered, the concept of heredity was well established. In Darwin's theory, variations in hereditary traits provide the crude materials for evolution. Third, borrowing from the work of Thomas Malthus, he noted that organisms tend to produce offspring at a pace that outstrips the local availability of food supplies, living space, and other crucial resources. As a population increases and resources dwindle, the competition for precious resources intensifies. Thus, it occurred to Darwin—and this was his grand insight—that variations in hereditary traits might affect organisms' ability to obtain the resources necessary for survival and reproduction. Fourth, building on this insight, Darwin argued that if a specific heritable trait contributes to an organism's survival or reproductive success, organisms with that trait should produce more offspring than those without the trait (or those with less of the trait), and the prevalence of that trait should gradually increase over generations—resulting in evolutionary change.

Although evolution is widely characterized as a matter of “survival of the fittest,” Darwin recognized from the beginning that survival is only important insofar as it relates to reproductive success. Indeed, in evolutionary theory, **fitness refers to the reproductive success (number of descendants) of an individual**

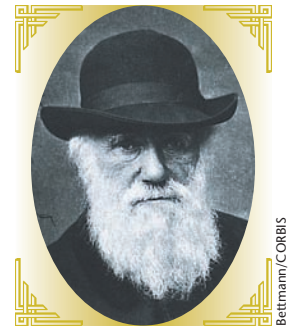
organism relative to the average reproductive success in the population. *Variations in reproductive success are what really fuels evolutionary change.* But survival is crucial because organisms typically need to mature and thrive before they can reproduce. So, Darwin theorized that there ought to be two ways in which traits might contribute to evolution: by providing either a survival advantage or a reproductive advantage. For example, a turtle's shell has great protective value that provides a survival advantage. In contrast, a firefly's emission of light is a courtship overture that provides a reproductive advantage.

To summarize, the principle of **natural selection posits that heritable characteristics that provide a survival or reproductive advantage are more likely than alternative characteristics to be passed on to subsequent generations and thus come to be “selected” over time.** Please note, the process of natural selection works on *populations* rather than *individual organisms*. Evolution occurs when the gene pool in a population changes gradually as a result of selection pressures. Although there are occasional exceptions (Gould & Eldredge, 1977), this process tends to be extremely gradual—it generally takes thousands to millions of generations for one trait to be selected over another.

Darwin's theory was highly controversial for at least two reasons: (a) It suggested that the awe-inspiring diversity of life is the result of an unplanned, natural process rather than divine creation, and (b) it implied that humans are not unique and that they share a common ancestry with other species. Nonetheless, Darwin's theory eventually gained considerable acceptance because it provided a compelling explanation for how the characteristics of various species gradually changed over many generations and for the functional, adaptive direction of these changes.

Subsequent Refinements to Evolutionary Theory

Although Darwin's evolutionary theory quickly acquired many articulate advocates, it also remained controversial for decades. One legitimate objection was that the theory did not provide an adequate explanation for the details of the inheritance process. This shortcoming was gradually rectified. Gregor Mendel's previously ignored work on patterns of inheritance started attracting attention around 1900. Research building on his insights led to major advances in the understanding of heredity over the next several decades. By 1937, these advances were sufficient to permit Theodore Dobzhansky to write a fairly comprehensive and convincing account of the



CHARLES DARWIN

“Can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and procreating their kind? . . . This preservation of favourable variations and the rejection of injurious variations, I call Natural Selection.”



Human Behavior and Evolution Society

The HBES is an interdisciplinary organization devoted to the exploration of human behavior from the perspective of evolutionary theory. This site provides a particularly rich set of links to published and online materials and organizations dealing with the evolutionary perspective on behavior.

evolutionary process in genetic terms. Dobzhansky's synthesis of Darwinian natural selection and Mendelian genetics was enormously influential, and by the 1950s the core tenets of evolutionary theory enjoyed widespread acceptance among scientists.

Contemporary models of evolution recognize that natural selection operates on the gene pool of a population. *Adaptations* are the key product of the process of evolution. **An adaptation is an inherited characteristic that increased in a population (through natural selection) because it helped solve a problem of survival or reproduction during the time it emerged.** Because of the gradual, incremental nature of evolution, adaptations sometimes linger in a population even though they no longer provide a survival or reproductive advantage. For example, humans show a taste preference for fatty substances that was adaptive in an era of hunting and gathering, when dietary fat was a scarce source of important calories. However, in our modern world, where dietary fat is typically available in abundance, this taste preference leads many people to consume too much fat, resulting in obesity, heart disease, and other health problems. Thus, the preference for fatty foods has become a liability for human survival (although its impact on reproductive success is more difficult to gauge). Organisms' environments often undergo changes so that adaptations that were once beneficial become obsolete. As you will see, evolutionary psychologists have found that many aspects of human nature reflect the adaptive demands faced by our ancient ancestors rather than contemporary demands. Of course, as natural selection continues to work, these formerly adaptive traits should gradually be eliminated, but the process is extremely slow.

In recent decades, theorists have broadened Darwin's original concept of reproductive fitness to better explain a variety of phenomena. For example, traditional evolutionary theory had difficulty explaining self-sacrifice. If organisms try to maximize their reproductive success, why does a blackbird risk death to signal the approach of a hawk to others in the flock? And why would a tribesman risk life and limb to race into a burning hut to save young children? In 1964, W. D. Hamilton proposed the theory of *inclusive fitness* to explain the paradox of self-sacrifice. According to Hamilton, an organism may contribute to passing on its genes by sacrificing itself to save others that share the same genes. Helping behavior that evolves as members of a species protect their own offspring, for example, can be extended to other, more distantly related members of the species. Thus, ***inclusive fitness is the sum of an individual's own reproductive success plus the effects the organism has on the***

reproductive success of related others. The concept of inclusive fitness suggests that the probability of self-sacrifice decreases as the degree of relatedness between a helper and potential recipients declines, a prediction that has been supported in studies of organisms as diverse as ground squirrels (Sherman, 1981) and humans (Burnstein, Crandall, & Kitayama, 1994).

Behaviors as Adaptive Traits

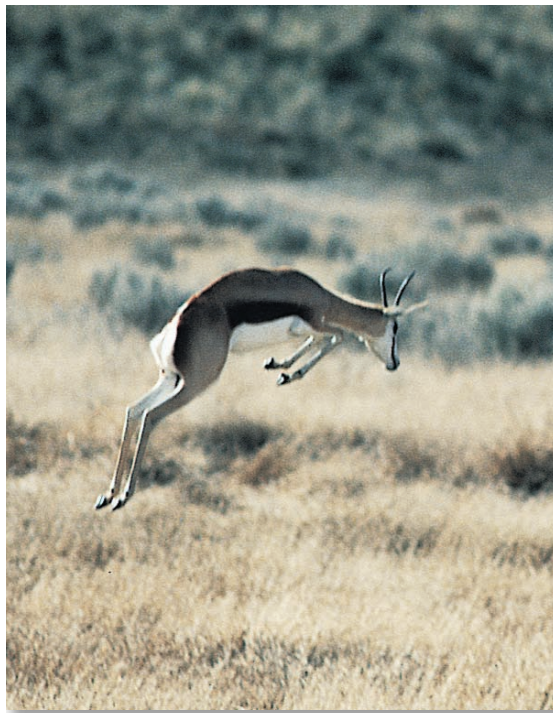
Scholarly analyses of evolution have focused primarily on the evolution of *physical characteristics* in the animal kingdom, but from the very beginning, Darwin recognized that natural selection was applicable to *behavioral traits* as well. Studying the evolution of behavior is more difficult than studying the evolution of physical traits because behavior is more transient—crucial behaviors by an organism may occur infrequently and may not last long. For example, female wood frogs are sexually receptive just one night per year. Additionally, although the fossil record *can* leave clues about past organisms' behavior (such as its prey or nesting habits), it leaves much more detailed information about organisms' physical characteristics. Nonetheless, it is clear that a species' typical patterns of behavior often reflect evolutionary solutions to adaptive problems.

Consider, for instance, the eating behavior of rats, who show remarkable caution when they encounter new foods. Rats are versatile animals that are found in an enormous range of habitats and can live off of quite a variety of foods, but this diet variety can present risks, as they need to be wary of consuming toxic substances. When rats encounter unfamiliar foods, they consume only small amounts and won't eat two new foods together. If the consumption of a new food is followed by illness, they avoid that food in the future (Logue, 1991). These precautions allow rats to learn what makes them sick while reducing the likelihood of consuming a lethal amount of something poisonous. These patterns of eating behavior are highly adaptive solutions to the food selection problems faced by rats.

Let's look at some additional examples of how evolution has shaped organisms' behavior. Avoiding predators is a nearly universal problem for organisms. Because of natural selection, many species have developed physical characteristics, such as special coloration, that allow them to blend in with their environments, making detection by predators more difficult. Many organisms also engage in elaborate *behavioral maneuvers* to hide themselves. For example, the grasshopper pictured on the next page has dug itself a small trench in which to hide and has used its midlegs



Courtesy of John Alcock



© Mitch Reardon/National Audubon Society Collection/Photo Researchers, Inc.

The behavior that helps the grasshopper on the left hide from predators is a product of evolution, just like the physical characteristics that help it blend in with its surroundings. As explained in the text, the stotting behavior exhibited by Thomson's gazelles is adaptive in that it is intended to deter the pursuit of predators. The animal shown here is a springbok, another species that exhibits stotting behavior.

to pull pebbles over its back (Alcock, 1998). This clever hiding behavior is just as much a product of evolution as the grasshopper's remarkable camouflage.

The "stotting" behavior exhibited by Thomson's gazelles when they spot a cheetah is another example of a behavioral adaptation. The cheetah is a feared predator that elicits evasive actions in Thomson's gazelles. But as the gazelles start to flee, they often slow up briefly to *stot*—that is, they jump high into the air with all four legs held straight and their white rump fully displayed. Slowing up when fleeing may not sound adaptive, but research has revealed that gazelles stot to signal to the cheetah that they have spotted the predator, they are off and running, and they will be difficult to catch. Consistent with this interpretation, stotting increases the likelihood that a cheetah will abandon its pursuit of a gazelle (Caro, 1986). Thus, stotting is a behavioral adaptation, in that it enhances the probability of survival by deterring pursuit and saves precious energy that may be needed to evade another predator.

Many behavioral adaptations are designed to improve organisms' chances of reproductive success. Consider, for instance, the wide variety of species in which females actively choose which male to mate with. In many such species, females demand material goods and services from males in return for copulation opportunities. For example, in one type of moth, males have to spend hours extracting sodium from mud puddles, which they then transfer to prospec-

tive mates, who use it to supply their larvae with an important nutritional element (Smedley & Eisner, 1996). In the black-tipped hangingfly, females insist on a nuptial gift of food before they mate. They reject suitors bringing unpalatable food, and they tie the length of subsequent copulation to the size of the nuptial gift (Thornhill, 1976).

The adaptive value of trading sex for material goods that can aid the survival of an organism and its offspring is obvious, but the evolutionary significance of other mating strategies is more perplexing. In some species characterized by female choice, the choices hinge on males' appearance and courtship behavior. Females usually prefer males sporting larger or more brightly colored ornaments, or those capable of more extreme acoustical displays. For example, female house finches are swayed by redder feathers, whereas female wild turkeys are enticed by larger beak ornaments (see **Table 3.2** on the next page for additional examples). What do females gain by selecting males with redder feathers, larger beaks, and other arbitrary characteristics? This is one of the more difficult questions in evolutionary biology, and addressing all the complexities that may be involved would take us far beyond the scope of this discussion. But, caveats aside, favored attributes generally seem to be indicators of males' relatively good genes, sound health, low parasite load, or superior ability to provide future services, such as protection or food gathering, all of which may serve to make their off-

Table 3.2 Female Mate Choices Based on Differences in Males' Morphological and Behavioral Attributes

Species	Favored attribute
Scorpionfly	More symmetrical wings
Barn swallow	More symmetrical and larger tail ornaments
Wild turkey	Larger beak ornaments
House finch	Redder feathers
Satin bowerbird	Bowers with more ornaments
Cichlid fish	Taller display "bower"
Field cricket	Longer calling bouts
Woodhouse's toad	More frequent calls

Source: Adapted from Alcock, J. (1998). *Animal behavior* (p. 463). Sunderland, MA: Sinauer Associates. Copyright © 1998 John Alcock. Reprinted by permission of Sinauer Associates and the author.

spring more viable (Alcock, 2005). For example, the quality of peacocks' plumage appears to be associated with their parasite load (Hamilton & Zuk, 1982) and

their genetic quality (as indexed by their subsequent survival) (Petrie, 1994). So, even mating preferences for seemingly nonadaptive aspects of appearance may often have adaptive significance.

➤ REVIEW OF KEY POINTS

- Darwin argued that if a heritable trait contributes to an organism's survival or reproductive success, organisms with that trait should produce more offspring than those without the trait and that the prevalence of that trait should gradually increase over generations—thanks to natural selection.
- Because of the gradual, incremental nature of evolution, adaptations sometimes linger in a population even though they no longer provide a survival or reproductive advantage. Hamilton proposed the theory of inclusive fitness to explain the paradox of self-sacrifice.
- Theorists have focused primarily on the evolution of *physical characteristics* in the animal kingdom, but from the very beginning Darwin recognized that natural selection was applicable to *behavioral traits* as well.

➤ Reflecting on the Chapter's Themes

Heredity and Environment



Multifactorial Causation



Empiricism



Three of our seven themes stood out in this chapter: (1) heredity and environment jointly influence behavior, (2) behavior is determined by multiple causes, and (3) psychology is empirical. Let's look at each of these points.

In Chapter 1, when it was first emphasized that heredity and environment jointly shape behavior, you may have been a little perplexed about how your genes could be responsible for your sarcastic wit or your interest in art. In fact, there are no genes for behavior *per se*. Experts do not expect to find genes for sarcasm or artistic interest, for example. Insofar as your hereditary endowment plays a role in your behavior, it does so *indirectly*, by molding the physiological machine that you work with. Thus, your genes influence your physiological makeup, which in turn influences your personality, temperament, intelligence, interests, and other traits. Bear in mind, however, that genetic factors do not operate in a vacuum. Genes exert their effects in an environmental context. The impact of genetic makeup depends on environment, and the impact of environment depends on genetic makeup.

It was evident throughout the chapter that behavior is determined by multiple causes, but this fact was particularly apparent in the discussions of schizophrenia. At various points in the chapter we saw that schizophrenia may be a function of (1) abnormalities in neurotransmitter activity (especially dopamine), (2) structural defects in the brain (enlarged ventri-

cles), and (3) genetic vulnerability to the illness. These findings do not contradict one another. Rather, they demonstrate that a complex array of biological factors are involved in the development of schizophrenia. In Chapter 14, we'll see that a variety of environmental factors also play a role in the multifactorial causation of schizophrenia.

The empirical nature of psychology was apparent in the numerous discussions of the specialized research methods used to study the physiological bases of behavior. As you know, the empirical approach depends on precise observation. Throughout this chapter, you've seen how investigators have come up with innovative methods to observe and measure elusive phenomena such as electrical activity in the brain, neural impulses, brain function, cerebral specialization, and the impact of heredity on behavior. The point is that empirical methods are the lifeblood of the scientific enterprise. When researchers figure out how to better observe something, their new methods usually facilitate major advances in our scientific knowledge. That is why brain-imaging techniques and genetic mapping hold such exciting promise.

The importance of empiricism will also be apparent in the upcoming Personal Application and Critical Thinking Application that follow. In both you'll see that it is important to learn to distinguish between scientific findings and conjecture based on those findings.

PERSONAL Application

Evaluating the Concept of “Two Minds in One”

Answer the following “true” or “false.”

- ___ 1 The right and left brains give people two minds in one.
- ___ 2 Each half of the brain has its own special mode of thinking.
- ___ 3 Some people are left-brained while others are right-brained.
- ___ 4 Schools should devote more effort to teaching the overlooked right side of the brain.

Do people have two minds in one that think differently? Do some people depend on one side of the brain more than the other? Is the right side of the brain neglected? These questions are too complex to resolve with a simple true or false, but in this Application we’ll take a closer look at the issues involved in these proposed applications of the findings on cerebral specialization. You’ll learn that some of these ideas are plausible, but in many cases the hype has outstripped the evidence.

Earlier, we described Roger Sperry’s Nobel prize-winning research with split-brain pa-

tients, whose right and left hemispheres were disconnected (to reduce epileptic seizures). The split-brain studies showed that the previously underrated right hemisphere has some special talents of its own. This discovery detonated an explosion of research on cerebral laterality.

Cerebral Specialization and Cognitive Processes



Using a variety of methods, scientists have compiled mountains of data on the specialized abilities of the right and left hemispheres. These findings have led to extensive theorizing about how the right and left brains might be related to cognitive processes. Some of the more intriguing ideas include the following:

1. *The two hemispheres are specialized to process different types of cognitive tasks* (Cor-



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Does artistic ability depend on being “right-brained”? The popular press has certainly suggested that this is the case, but as your text explains, there is no solid empirical evidence to support this assertion.

ballis, 1991; Ornstein, 1977). The findings of many researchers have been widely interpreted as showing that the left hemisphere handles verbal tasks, including language, speech, writing, math, and logic, while the right hemisphere handles nonverbal tasks, including spatial problems, music, art, fantasy, and creativity. These conclusions have attracted a great deal of public interest and media attention. For example, **Figure 3.31** shows a *Newsweek* artist’s depiction of how the brain divides its work.

2. *Each hemisphere has its own independent stream of consciousness* (Bogen, 1985, 2000; Pucetti, 1981). For instance, Joseph Bogen has asserted, “Pending further evidence, I believe that each of us has two minds in one person” (Hooper & Teresi, 1986, p. 221). Supposedly, this duality of consciousness goes largely unnoticed because of the considerable overlap between the experiences of each independent mind. Ultimately, though, the apparent unity of consciousness is but an illusion.

3. *The two hemispheres have different modes of thinking* (Banich & Heller, 1998; Joseph, 1992). According to this notion, the documented differences between the hemispheres in dealing with verbal and nonverbal materials are caused by more basic differences in *how* the hemispheres process information. The standard version of this theory holds that the reason the left hemisphere handles verbal material well is that it is analytic,

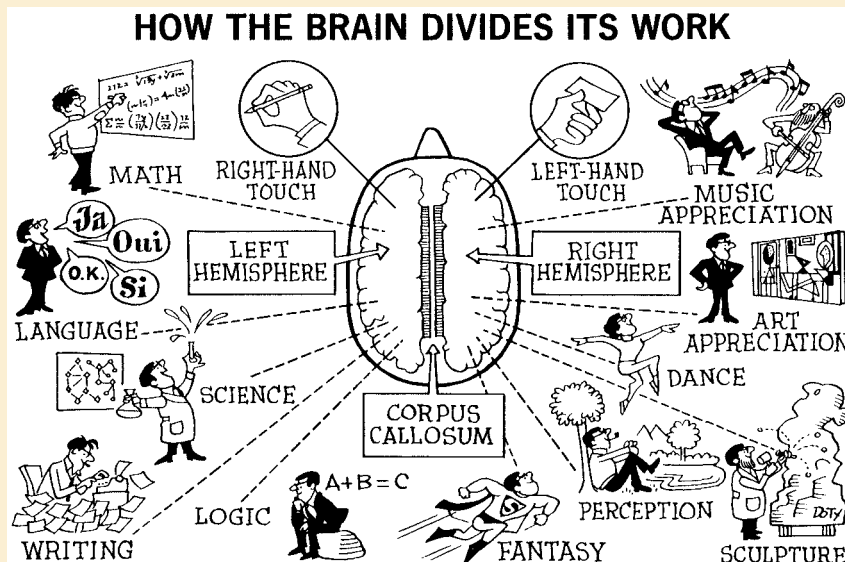


Figure 3.31

Popular conceptions of hemispheric specialization. As this *Newsweek* diagram illustrates, depictions of hemispheric specialization in the popular press have often been oversimplified.

Source: Cartoon courtesy of Roy Doty.

abstract, rational, logical, and linear. In contrast, the right hemisphere is thought to be better equipped to handle spatial and musical material because it is synthetic, concrete, nonrational, intuitive, and holistic. Robert Ornstein (1997) characterizes hemispheric differences in cognitive processing somewhat differently, asserting that the left hemisphere focuses on details while the right hemisphere responds to global patterns and the big picture.

4. *People vary in their reliance on one hemisphere as opposed to the other* (Bakan, 1971; Zenhausen, 1978). Allegedly, some people are “left-brained.” Their greater dependence on their left hemisphere supposedly makes them analytic, rational, and logical. Other people are “right-brained.” Their greater use of their right hemisphere supposedly makes them intuitive, holistic, and irrational. Being right-brained or left-brained is thought to explain many personal characteristics, such as whether an individual likes to read, is good with maps, or enjoys music. This notion of “brainedness” has even been used to explain occupational choice. Supposedly, right-brained people are more likely to become artists or musicians, while left-brained people are more likely to become writers or scientists.

5. *Schools should place more emphasis on teaching the right side of the brain* (Kitchens, 1991; Prince, 1978). “A real reform of the educational system will not occur until individual teachers learn to understand the true duality of their students’ minds,” says Thomas Blakeslee (1980, p. 59). Those sympathetic to his view assert that American schools overemphasize logical, analytical left-hemisphere thinking (required for English, math, and science) while short-changing intuitive, holistic right-hemisphere thinking (required for art and music). These educators have concluded that modern schools turn out an excess of left-brained graduates. They advocate curriculum reform to strengthen the right side of the brain in their students. This line of thinking has also spawned quite a collection of popular self-help books, such as *Whole-Brain Thinking* (Wonder, 1992), *Unleashing the Right Side of the Brain* (Williams & Stockmyer, 1987), and *Workout for a Balanced Brain* (Carter & Russell, 2001).

Complexities and Qualifications

The ideas just outlined are the source of considerable debate among psychologists and neuroscientists. These ideas are intriguing and have clearly captured the imagination of the general public. However, the research on cerebral specialization is complex, and doubts have been raised about many of these ideas (Efron, 1990; Springer & Deutsch, 1998). Let’s examine each point.

1. There is ample evidence that the right and left hemispheres are specialized to handle different types of cognitive tasks, *but only to a degree* (Brown & Kosslyn, 1993; Corballis, 2003). Doreen Kimura (1973) compared the abilities of the right and left hemispheres to quickly recognize letters, words, faces, and melodies in a series of perceptual asymmetry studies, like those described earlier in the chapter. She found that the superiority of one hemisphere over the other was usually quite modest, as you can see in **Figure 3.32**, which shows superiority ratios for four cognitive tasks.

Furthermore, in normal individuals, the hemispheres don’t work alone. As Hellige (1993a) notes, “In the intact brain, it is unlikely that either hemisphere is ever com-

pletely uninvolved in ongoing processing” (p. 23). Most tasks probably engage *both* hemispheres, albeit to different degrees (Beeman & Chiarello, 1998; Ornstein, 1997). For instance, imagine that you are asked the following question: “In what direction are you headed if you start north and make two right turns and a left turn?” In answering this question, you’re confronted with a *spatial* task that should engage the right hemisphere. However, first you have to process the wording of the question, a *language* task that should engage the left hemisphere.

Furthermore, people differ in their patterns of cerebral specialization (Springer & Deutsch, 1998). Some people display little specialization—that is, their hemispheres seem to have equal abilities on various types of tasks. Others even reverse the usual specialization, so that verbal processing might be housed in the right hemisphere. These unusual patterns are especially common among left-handed people (Josse & Tzourio-Mazoyer, 2004). For example, when Rasmussen and Milner (1977) tested subjects for the localization of speech, they found bilateral representation in 15% of the left-handers. They found a reversal of the usual specialization (speech handled by the right hemisphere) in another 15% of the left-handed subjects (see **Figure 3.33**). These variations in cere-

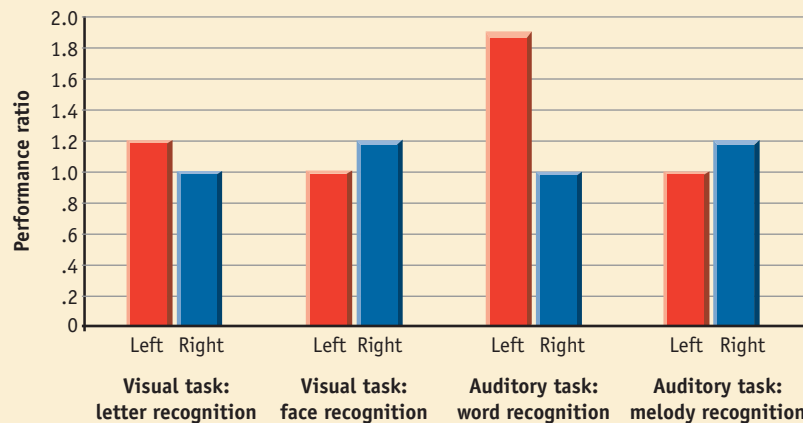


Figure 3.32

Relative superiority of one brain hemisphere over the other in studies of perceptual asymmetry. These performance ratios from a study by Doreen Kimura (1973) show the degree to which one hemisphere was “superior” to the other on each type of task in one study of normal participants. For example, the right hemisphere was 20% better than the left hemisphere in quickly recognizing melodic patterns (ratio 1.2 to 1). Most differences in the performance of the two hemispheres are quite small. (Data from Kimura, 1973)

bral specialization are not well understood. However, they clearly indicate that the functional specialization of the cerebral hemispheres is not set in concrete.

2. The evidence for the idea that people have a separate stream of consciousness in each hemisphere is weak. There *are* clear signs of such duality among *split-brain patients* (Bogen, 1990; Mark, 1996). But this duality is probably a unique by-product of the radical procedure that they have undergone—the surgical disconnection of their hemispheres (Bradshaw, 1981). In fact, many theorists have been impressed by the degree to which even split-brain patients mostly experience *unity* of consciousness. There is little empirical basis for the idea that people have two independent streams of awareness neatly housed in the right and left halves of the brain.

3. Similarly, there is little direct evidence to support the notion that each hemisphere has its own mode of thinking, or *cognitive style* (Bradshaw, 1989). This notion is plausible and there *is* some supportive evidence, but the evidence is inconsistent and more research is needed (Gordon, 1990; Reuter-Lorenz & Miller, 1998). One key problem with this idea is that aspects of cognitive style have proven difficult to define and measure (Brownell & Gardner, 1981). For instance, there is debate about the meaning of analytic versus synthetic thinking, or linear versus holistic thinking.

4. The evidence on the assertion that some people are left-brained while others are right-brained is inconclusive at best (Hellige, 1990). This notion has some plausibility—if it means only that some people consistently display more activation of one hemisphere than the other. However, researchers have yet to develop reliable measures of these possible “preferences” in cerebral activation. Hence, there are no convincing data linking brainedness to musical ability, occupational choice, or the like (Knecht et al., 2001; Springer & Deutsch, 1998).

5. The idea that schools should be reformed to better exercise the right side of the brain represents intriguing but wild speculation. In neurologically intact people it is impossible to teach just one hemisphere at

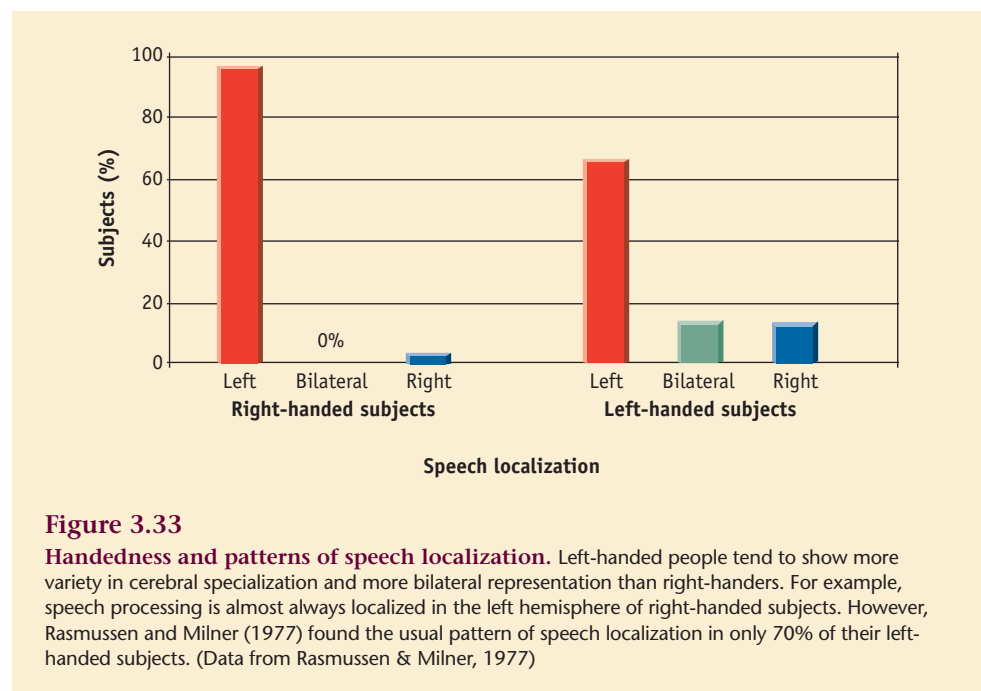


Figure 3.33

Handedness and patterns of speech localization. Left-handed people tend to show more variety in cerebral specialization and more bilateral representation than right-handers. For example, speech processing is almost always localized in the left hemisphere of right-handed subjects. However, Rasmussen and Milner (1977) found the usual pattern of speech localization in only 70% of their left-handed subjects. (Data from Rasmussen & Milner, 1977)

a time (Levy, 1985). Many sound arguments exist for reforming American schools to encourage more holistic, intuitive thinking, but these arguments have nothing to do with cerebral specialization.

In summary, the theories linking cerebral specialization to cognitive processes are highly speculative. There’s nothing wrong with theoretical speculation. Unfortunately, the tentative, conjectural nature of these ideas about cerebral specialization has gotten lost in the popular book descriptions of research on the right and left hemispheres (Coren, 1992). Popular writers continue to churn out allegedly scientific books, applying brain lateralization concepts to a host of new topics on which there often is little or no real evidence. Thus, one can find books on how to have right-brain sex (Wells, 1991), develop right-brain social skills (Snyder, 1989), and lose weight with a right-brain diet (Sommer, 1987). Commenting on this popularization, Hooper and Teresi (1986) noted, “A widespread cult of the right brain ensued, and the duplex house that Sperry built grew into the K mart of brain science. Today our hairdresser lectures us about the ‘Two Hemispheres of the Brain,’” (p. 223).

Cerebral specialization is an important and intriguing area of research. However, it is unrealistic to expect that the hemispheric divisions in the brain will provide a biological explanation for every dichotomy or polarity in modes of thinking.

➤ REVIEW OF KEY POINTS

- Split-brain research stimulated speculation about relations between cerebral specialization and cognitive processes. Some theorists believe that each hemisphere has its own stream of consciousness and mode of thinking, which are applied to specific types of cognitive tasks.
- Some theorists also believe that people vary in their reliance on the right and left halves of the brain and that schools should work more to exercise the right half of the brain.
- The cerebral hemispheres *are* specialized for handling different cognitive tasks, but only to a degree, as most tasks engage both hemispheres. Moreover, people vary in their patterns of hemispheric specialization.
- Evidence for duality in consciousness divided along hemispheric lines is weak. Evidence on whether people vary in brainedness and whether the two hemispheres vary in cognitive style is inconclusive.
- There is no way to teach only one hemisphere of the brain, so a “right-brain curriculum” is pointless. Popular ideas about the right and left brain have gone far beyond the actual research findings.

Building Better Brains: The Perils of Extrapolation

Summarizing the implications of research in neuroscience, science writer Ronald Kotulak (1996) concluded, “The first three years of a child’s life are critically important to brain development” (pp. ix–x). Echoing this sentiment, the president of a U.S. educational commission asserted that “research in brain development suggests it is time to rethink many educational policies” (Bruer, 1999, p. 16). Based on recent findings in neuroscience, many states launched expensive programs in the 1990s intended to foster better neural development in infants. For example, the Governor of Georgia at the time, Zell Miller, sought funding to distribute classical music tapes to the state’s infants, saying, “No one doubts that listening to music, especially at a very early age, affects the spatial-temporal reasoning that underlies math, engineering, and chess” (Bruer, 1999, p. 62). Well-intended educational groups and Hollywood celebrities have argued for the creation of schools for infants on the grounds that enriched educational experiences during infancy will lead to enhanced neural development.

What are these practical, new discoveries about the brain that will permit parents and educators to optimize infants’ brain development? Well, we will discuss the pertinent research momentarily, but it is not as new or as practical as suggested in many quarters. Unfortunately, as we saw in our discussion of research on hemispheric specialization, the hype in the media has greatly outstripped the realities of what scientists have learned in the laboratory (Chance, 2001).

In recent years, many child-care advocates and educational reformers have used research in neuroscience as the rationale for the policies they have sought to promote. This strategy has led to the publication of a host of books on “brain-based learning” (see Jensen, 2000a; Sousa, 2000; Sprenger, 2001). The people advocating these ideas have good intentions, but the neuroscience rationale has been stretched to the breaking point.

The result? An enlightening case study in overextrapolation.

The Key Findings on Neural Development

The education and child-care reformers who have used brain science as the basis for their campaigns have primarily cited two key findings: the discovery of critical periods in neural development and the demonstration that rats raised in “enriched environments” have more synapses than rats raised in “impoverished environments.” Let’s look at each of these findings.

A critical period is a limited time span in the development of an organism when it is optimal for certain capacities to emerge because the organism is especially responsive to certain experiences. The seminal research on critical periods in neural development was conducted by Torsten Wiesel and David Hubel (1963, 1965) in the 1960s. They showed that if an eye of a newborn kitten is sutured shut early in its development (typically the first 4 to 6 weeks), the kitten will become permanently blind in that eye, but if the eye is covered for the same amount of time at later ages (after 4 months) blindness does not result. Such studies show that certain types of visual input are necessary during a critical period of development, or neural pathways between the eye and brain will not form properly. Basically, what happens is that the inactive synapses from the closed eye are displaced by the active synapses from the open eye. Critical periods have been found for other aspects of neural development and in other species, but a great deal remains to be learned. Based on this type of research, some educational and child-care reformers have argued that the first three years of life are a critical period for human neural development.

The pioneering work on environment and brain development was begun in the

1960s by Mark Rosenzweig and his colleagues (1961, 1962). They raised some rats in an impoverished environment (housed individually in small, barren cages) and other rats in an enriched environment (housed in groups of 10 to 12 in larger cages, with a variety of objects available for exploration), as shown in **Figure 3.34**. They found that the rats raised in the enriched environment performed better on problem-solving tasks than the impoverished rats and had slightly heavier brains and a thicker cerebral cortex in some areas of the brain. Subsequent research by William Greenough demonstrated that enriched environments resulted in heavier and thicker cortical areas by virtue of producing denser dendritic branching, more synaptic contacts, and richer neural networks (Greenough, 1975; Greenough & Volkmar, 1973). Based on this type of research, some child-care reformers have argued that human infants need to be brought up in enriched environments during the critical period before age 3, to promote synapse formation and to optimize the development of their emerging neural circuits.

The findings on critical periods and the effects of enriched environments were genuine breakthroughs in neuroscience, but they certainly aren’t *new* findings, as suggested by various political action groups. Moreover, one can raise many doubts about whether this research can serve as a meaningful guide for decisions about parenting practices, day-care programs, educational policies, and welfare reform (Thompson & Nelson, 2001).

The Tendency to Overextrapolate

Extrapolation occurs when an effect is estimated by extending beyond some known values or conditions. Extrapolation is a normal process, but some extrapolations are conservative, plausible projections drawn from directly relevant data, whereas others are

Figure 3.34
Enriched environments in the study of rats' neural development. In the studies by Rosenzweig and colleagues (1961, 1962), rats raised in an impoverished environment were housed alone in small cages, whereas rats raised in enriched environments were housed in groups and were given playthings that were changed daily (as shown here). Although the enriched conditions provided more stimulating environments than what laboratory rats normally experience, they may not be any more stimulating than rats' natural habitats. Thus, the "enriched" condition may reveal more about the importance of normal stimulation than about the benefits of extra stimulation (Gopnik, Meltzoff, & Kuhl, 1999).



wild leaps of speculation based on loosely related data. The extrapolations made regarding the educational implications of critical periods and environmental effects on synapse formation are highly conjectural *overextrapolations*. The studies that highlighted the possible importance of early experience in animals have all used extreme conditions to make their comparisons, such as depriving an animal of all visual input or raising it in stark isolation. In light of the findings, it seems plausible to speculate that children probably need normal stimulation to experience normal brain development. However, great difficulty arises when these findings are extended to conclude that adding *more* stimulation to a normal environment will be beneficial to brain development (Shatz, 1992).

The ease with which people fall into the trap of overextrapolating has been particularly apparent in recent recommendations that infants listen to classical music to enhance their brain development. These recommendations have been derived from two studies that showed that college students' performance on spatial reasoning tasks was enhanced slightly for about 10–15 minutes after listening to a brief Mozart recording (Rauscher, Shaw, & Ky, 1993, 1995). This peculiar finding, dubbed the "Mozart effect," has proven difficult to replicate (McKelvie & Low, 2002; Steele, 2003), but the pertinent point here is that there was no research on how classical music affects *infants*, no research relating classical music to *brain devel-*

opment, and no research on anyone showing *lasting effects*. Nonetheless, many people (including the Governor of Georgia) were quick to extrapolate the shaky findings on the Mozart effect to infants' brain development. As discussed in Chapter 1, thinking critically about issues often involves asking questions such as: What is missing from this debate? Is there any contradictory evidence? In this case, there is some contradictory evidence that is worthy of consideration. The basis for advocating infant educational programs is the belief that the brain is malleable during the hypothesized critical period of birth to age 3 but not at later ages. However, Greenough's work on synaptic formation and other lines of research suggest that the brain remains somewhat malleable throughout life, responding to stimulation into old age (Thompson & Nelson, 2001). Thus, advocates for the aged could just as readily argue for new educational initiatives for the elderly to help them maximize their intellectual potential. Another problem is the implicit assumption that greater synap-

tic density is associated with greater intelligence. As noted in the main body of the chapter, there is evidence that infant animals and humans begin life with an overabundance of synaptic connections and that learning involves selective *pruning* of inactive synapses (Huttenlocher, 2002; Rakic, Bourgeois, & Goldman-Rakic, 1994). Thus, in the realm of synapses, more may *not* be better. In conclusion, there may be many valid reasons for increasing educational programs for infants, but research in neuroscience does not appear to provide a clear rationale for much in the way of specific infant care policies (Bruer, 2002). One problem in evaluating these proposals is that few people want to argue against high-quality child care or education. But modern societies need to allocate their limited resources to the programs that appear most likely to have beneficial effects, so even intuitively appealing ideas need to be subjected to critical scrutiny.

Table 3.3 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding the limits of extrapolation	The critical thinker appreciates that extrapolations are based on certain assumptions, vary in plausibility, and ultimately involve speculation.
Looking for contradictory evidence	In evaluating the evidence presented on an issue, the critical thinker attempts to look for contradictory evidence that may have been left out of the debate.

CHAPTER 3 *Recap*

Key Ideas

Communication in the Nervous System

- The nervous system is made up of neurons and glial cells. Neurons are the basic communication links in the nervous system. They normally transmit a neural impulse (an electric current) along an axon to a synapse with another neuron. The neural impulse is a brief change in a neuron's electrical charge that moves along an axon. It is an all-or-none event.
- Action potentials trigger the release of chemicals called neurotransmitters that diffuse across a synapse to communicate with other neurons. Transmitters bind with receptors in the postsynaptic cell membrane, causing excitatory or inhibitory PSPs. Most neurons are linked in neural pathways, circuits, and networks.
- ACh plays a key role in muscular movement. Disturbances in the activity of the monoamine transmitters have been related to the development of depression and schizophrenia. GABA is a widely distributed inhibitory transmitter. Endorphins contribute to the relief of pain.

Organization of the Nervous System

- The nervous system can be divided into the central nervous system and the peripheral nervous system. The central nervous system consists of the brain and spinal cord.
- The peripheral nervous system can be subdivided into the somatic nervous system, which connects to muscles and sensory receptors, and the autonomic nervous system, which connects to blood vessels, smooth muscles, and glands.

Looking Inside the Brain: Research Methods

- The EEG can record broad patterns of electrical activity in the brain. Lesioning involves destroying a piece of the brain. Another technique is electrical stimulation of areas in the brain in order to activate them.
- Transcranial magnetic stimulation is a new method of virtual lesioning. CT scans and MRI scans can provide excellent depictions of brain structure. PET scans and fMRI scans can show brain functioning in action.

The Brain and Behavior

- The brain has three major regions: the hindbrain, midbrain, and forebrain. Structures in the hindbrain and midbrain handle essential functions. The thalamus is primarily a relay station. The hypothalamus is involved in the regulation of basic biological drives such as hunger and sex.
- The limbic system is involved in emotion, motivation, and memory. The cortex is the cerebrum's convoluted outer layer, which is subdivided into occipital, parietal, temporal, and frontal lobes. The brain's organization is somewhat malleable.

Right Brain/Left Brain: Cerebral Laterality

- The cerebrum is divided into right and left hemispheres connected by the corpus callosum. Studies of split-brain patients and perceptual asymmetries have revealed that the right and left halves of the brain each have unique talents.

The Endocrine System: Another Way to Communicate

- The endocrine system consists of the glands that secrete hormones, which are chemicals involved in the regulation of basic bodily processes. The control centers for the endocrine system are the hypothalamus and the pituitary gland.

Heredity and Behavior: Is It All in the Genes?

- The basic units of genetic transmission are genes housed on chromosomes. Most behavioral qualities appear to involve polygenic inheritance. Researchers assess hereditary influence through a variety of methods, including family studies, twin studies, adoption studies, and genetic mapping.

The Evolutionary Bases of Behavior

- Darwin argued that if a heritable trait contributes to an organism's survival or reproductive success, organisms with that trait should produce more

offspring than those without the trait and the prevalence of that trait should gradually increase over generations—thanks to natural selection.

- Darwin recognized from the beginning that natural selection was applicable to behavioral traits, as well as physical traits. Adaptations sometimes linger in a population even though they no longer provide a survival or reproductive advantage.

PERSONAL APPLICATION • Evaluating the Concept of “Two Minds in One”

- The cerebral hemispheres are specialized for handling different cognitive tasks, but only to a degree, and people vary in their patterns of hemispheric specialization. Evidence on whether people vary in brainedness and whether the two hemispheres vary in cognitive style is inconclusive.

CRITICAL THINKING APPLICATION • Building Better Brains: The Perils of Extrapolation

- Although some education and child-care reformers have used research in neuroscience as the basis for their campaigns, research has not demonstrated that birth to three is a critical period for human neural development or that specific enrichment programs can enhance brain development. These assertions are highly conjectural overextrapolations from existing data.

Key Terms

- Absolute refractory period (p. 76)
- Action potential (p. 75)
- Adaptation (p. 108)
- Adoption studies (p. 105)
- Afferent nerve fibers (p. 82)
- Agonist (p. 79)
- Antagonist (p. 79)
- Autonomic nervous system (ANS) (p. 82)
- Axon (p. 74)
- Behavioral genetics (p. 101)
- Central nervous system (CNS) (p. 83)
- Cerebral cortex (p. 93)
- Cerebral hemispheres (p. 93)
- Cerebrospinal fluid (CSF) (p. 83)
- Chromosomes (p. 101)
- Corpus callosum (p. 93)
- Critical period (p. 114)
- Dendrites (p. 74)
- Dominant gene (p. 101)
- Efferent nerve fibers (p. 82)
- Electrical stimulation of the brain (ESB) (p. 85)
- Electroencephalograph (EEG) (p. 84)
- Endocrine system (p. 99)
- Endorphins (p. 80)
- Excitatory PSP (p. 77)
- Family studies (p. 103)
- Fitness (p. 107)
- Forebrain (p. 90)
- Fraternal (dizygotic) twins (p. 104)
- Genes (p. 101)
- Genetic mapping (p. 105)
- Genotype (p. 102)
- Glia (p. 74)
- Heterozygous condition (p. 101)
- Hindbrain (p. 89)
- Homozygous condition (p. 101)
- Hormones (p. 99)
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- Identical (monozygotic) twins (p. 104)
- Inclusive fitness (p. 108)
- Inhibitory PSP (p. 77)
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- Parasympathetic division (p. 83)
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- Phenotype (p. 102)
- Pituitary gland (p. 100)
- Polygenic traits (p. 103)
- Postsynaptic potential (PSP) (p. 77)
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- Resting potential (p. 75)
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- Split-brain surgery (p. 97)
- Sympathetic division (p. 83)
- Synapse (p. 74)
- Synaptic cleft (p. 76)
- Terminal buttons (p. 74)
- Thalamus (p. 90)
- Transcranial magnetic stimulation (TMS) (p. 86)
- Twin studies (p. 104)
- Zygote (p. 101)

Key People

- Charles Darwin (pp. 106–107)
- Alan Hodgkin and Andrew Huxley (p. 75)
- James Olds and Peter Milner (p. 92)
- Candace Pert and Solomon Snyder (p. 80)
- Robert Plomin (p. 106)
- Roger Sperry and Michael Gazzaniga (pp. 97–98)

CHAPTER 3 Practice Test

- A neural impulse is initiated when a neuron's charge momentarily becomes less negative, or even positive. This event is called:
 - an action potential.
 - a resting potential.
 - impulse facilitation.
 - inhibitory.
- Neurons convey information about the strength of stimuli by varying:
 - the size of their action potentials.
 - the velocity of their action potentials.
 - the rate at which they fire action potentials.
 - all of the above.
- Alterations in activity at dopamine synapses have been implicated in the development of:
 - anxiety.
 - schizophrenia.
 - Alzheimer's disease.
 - nicotine addiction.
- Jim just barely avoided a head-on collision on a narrow road. With heart pounding, hands shaking, and body perspiring, Jim recognizes that these are signs of the body's fight-or-flight response, which is controlled by the:
 - empathetic division of the peripheral nervous system.
 - parasympathetic division of the autonomic nervous system.
 - somatic division of the peripheral nervous system.
 - sympathetic division of the autonomic nervous system.
- The hindbrain consists of the:
 - endocrine system and the limbic system.
 - reticular formation.
 - thalamus, hypothalamus, and cerebrum.
 - cerebellum, medulla, and pons.
- Juan is watching a basketball game. The neural impulses from his eyes will ultimately travel to his primary visual cortex, but first they must pass through the:
 - amygdala.
 - hypothalamus.
 - thalamus.
 - pons.
- The _____ lobe is to hearing as the occipital lobe is to vision.
 - frontal
 - temporal
 - parietal
 - cerebellar
- Paul has profound difficulty producing spoken language. If his problem is attributable to brain damage, the damage would probably be found in:
 - the cerebellum.
 - Sperry's area.
 - Broca's area.
 - Wernicke's area.
- Sounds presented to the right ear are registered:
 - only in the right hemisphere.
 - only in the left hemisphere.
 - more quickly in the right hemisphere.
 - more quickly in the left hemisphere.
- In people whose corpus callosum has not been severed, verbal stimuli are identified more quickly and more accurately:
 - when sent to the right hemisphere first.
 - when sent to the left hemisphere first.
 - when presented to the left visual field.
 - when presented auditorially rather than visually.
- Hormones are to the endocrine system as _____ are to the nervous system.
 - nerves
 - synapses
 - neurotransmitters
 - action potentials
- Jenny has brown hair and blue eyes and is 5'8" tall. What is being described is Jenny's:
 - genotype.
 - phenotype.
 - somatotype.
 - physiognomy.
- Adopted children's similarity to their biological parents is generally attributed to _____; adopted children's similarity to their adoptive parents is generally attributed to _____.
 - heredity; the environment
 - the environment; heredity
 - the environment; the environment
 - heredity; heredity
- In evolutionary theory, _____ refers to the reproductive success of an individual organism relative to the average reproductive success in the population.
 - natural selection
 - gene flow
 - adaptation
 - fitness
- For which of the following assertions is the empirical evidence strongest?
 - The two cerebral hemispheres are specialized to handle different types of cognitive tasks.
 - People have a separate stream of consciousness in each hemisphere.
 - Each hemisphere has its own cognitive style.
 - Some people are right-brained, while others are left-brained.

1 A p. 75
 2 C p. 76
 3 B p. 80
 4 D p. 82-83
 5 D p. 82, 88
 6 C p. 90
 7 B p. 93-94
 8 C p. 96-97
 9 D p. 97-98
 10 B p. 98-99
 11 C p. 99
 12 B p. 102-103
 13 A p. 105
 14 D p. 107
 15 A p. 112-113

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



<http://www.thomsonedu.com>

Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/

Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



CHAPTER

4

Sensation and Perception



Psychophysics: Basic Concepts and Issues

Thresholds: Looking for Limits
Weighing the Differences: The JND
Signal-Detection Theory
Perception Without Awareness
Sensory Adaptation

Our Sense of Sight: The Visual System

The Stimulus: Light
The Eye: A Living Optical Instrument
The Retina: The Brain's Envoy in the Eye
Vision and the Brain
Viewing the World in Color
Perceiving Forms, Patterns, and Objects
Perceiving Depth or Distance
Perceiving Geographical Slant

FEATURED STUDY • Why Hills Look Steeper Than They Are

Perceptual Constancies in Vision
The Power of Misleading Cues: Visual Illusions

Our Sense of Hearing: The Auditory System

The Stimulus: Sound
Human Hearing Capacities
Sensory Processing in the Ear
Auditory Perception: Theories of Hearing
Auditory Localization: Perceiving Sources of Sound

Our Chemical Senses: Taste and Smell

Taste: The Gustatory System
Smell: The Olfactory System

Our Sense of Touch: Sensory Systems in the Skin

Feeling Pressure
Feeling Pain

Our Other Senses

The Kinesthetic System
The Vestibular System

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Appreciating Art and Illusion

CRITICAL THINKING APPLICATION • Recognizing Contrast Effects: It's All Relative

Recap

Practice Test

© Michael Freeman/Digital Vision/Getty Images

Take a look at the adjacent photo. What do you see? You probably answered, “a rose” or “a flower.” But is that what you really see? No, this isn’t a trick question. Let’s examine the odd case of “Dr. P.” It shows that there’s more to seeing than meets the eye.

Dr. P was an intelligent and distinguished music professor who began to exhibit some worrisome behaviors that seemed to be related to his vision. Sometimes he failed to recognize familiar students by sight, although he knew them instantly by the sound of their voices. Sometimes he acted as if he saw faces in inanimate objects, cordially greeting fire hydrants and parking meters as if they were children. On one occasion, reaching for what he thought was his hat, he took hold of his wife’s head and tried to put it on! Except for these kinds of visual mistakes, Dr. P was a normal, talented man.

Ultimately Dr. P was referred to Oliver Sacks, a neurologist, for an examination. During one visit, Sacks handed Dr. P a fresh red rose to see whether he would recognize it. Dr. P took the rose as if he were being given a model of a geometric solid rather than a flower. “About six inches in length,” Dr. P observed, “a convoluted red form with a linear green attachment.”

“Yes,” Sacks persisted, “and what do you think it is, Dr. P?”

“Not easy to say,” the patient replied. “It lacks the simple symmetry of the Platonic solids . . .”

“Smell it,” the neurologist suggested. Dr. P looked perplexed, as if being asked to smell symmetry, but he complied and brought the flower to his nose. Suddenly, his confusion cleared up. “Beautiful. An early rose. What a heavenly smell” (Sacks, 1987, pp. 13–14).

What accounted for Dr. P’s strange inability to recognize faces and familiar objects by sight? There was nothing wrong with his eyes. He could readily spot a pin on the floor. If you’re thinking that he must have had something wrong with his vision, look again at the photo of the rose. What you see is “a convoluted red form with a linear green attachment.” It doesn’t occur to you to describe it that way only because, without thinking about it, you instantly perceive that combination of form and color as a flower. This is precisely what Dr. P was unable to do. He could see perfectly well, but he was losing the ability to assemble what he saw into a meaningful picture of the world. Technically, he suffered from a condition called *visual agnosia*, an inability to recognize objects through sight. As Sacks (1987) put it, “Visually, he was lost in a world of lifeless abstractions” (p. 15).

As Dr. P’s case illustrates, without effective processing of sensory input, our familiar world can become a chaos of bewildering sensations. To acknowledge the need to both take in and process sensory information, psychologists distinguish between sensation and perception. **Sensation is the stimulation of sense organs. Perception is the selection, organization, and interpretation of sensory input.** Sensation involves the absorption of energy, such as light or sound waves, by sensory organs, such as the eyes and ears. Perception involves organizing and translating sensory input into something meaningful (see **Figure 4.1**). For example, when you look at the photo of the rose, your eyes are *sensing* the light reflected from the page, including areas of low reflectance where ink has been deposited in an irregular shape. What you *perceive*, however, is a picture of a rose.

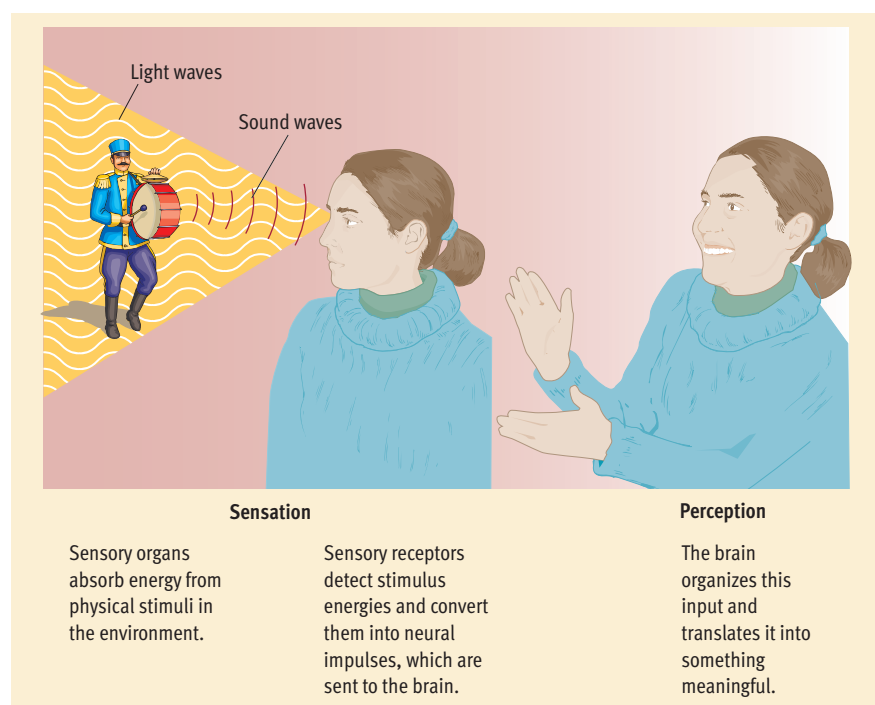
The distinction between sensation and perception stands out in Dr. P’s case of visual agnosia. His eyes were doing their job of registering sensory input and transmitting signals to the brain. However, damage in his brain interfered with his ability to put these signals together into organized wholes. Thus, Dr. P’s process of visual *sensation* was intact, but his process of visual *perception* was severely impaired.



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Figure 4.1

The distinction between sensation and perception. Sensation involves the stimulation of sensory organs, whereas perception involves the interpretation of sensory input. The two processes merge at the point where sensory receptors convert physical energy into neural impulses.



Dr. P's case is unusual, of course. Normally, the processes of sensation and perception are difficult to separate because people automatically start organizing incoming sensory stimulation the moment it arrives. Although the distinction between sensation and perception has been useful in organizing theory and research, in operation the two processes merge.

We'll begin our discussion of sensation and perception by examining some general concepts that

are relevant to all the senses. Next, we'll examine individual senses, in each case beginning with the sensory aspects and working our way through to the perceptual aspects. The chapter's Personal Application explores how principles of visual perception come into play in art and illusion. The Critical Thinking Application discusses how perceptual contrasts can be used in efforts to persuade us.

> Psychophysics: Basic Concepts and Issues

PREVIEW QUESTIONS

- What are absolute thresholds?
- What is a JND, and where does it fit in with Weber's law?
- What is the central idea of signal-detection theory?
- What is the practical significance of subliminal perception?
- What is sensory adaptation?

As you may recall from Chapter 1, the first experimental psychologists were interested mainly in sensation and perception. They called their area of interest **psychophysics—the study of how physical stimuli are translated into psychological experience**. A particularly important contributor to psychophysics was Gustav Fechner, who published a seminal work on the subject in 1860. Fechner was a German scientist working at the University of Leipzig, where Wilhelm Wundt later founded the first formal laboratory and journal devoted to psychological research. Unlike Wundt, Fechner was not a “campaigner” interested in establishing psychology as an independent discipline. However, his groundbreaking research laid the foundation that Wundt built upon.

Thresholds: Looking for Limits

Sensation begins with a *stimulus*, any detectable input from the environment. What counts as detectable, though, depends on who or what is doing the detecting. For instance, you might not be able to detect a weak odor that is readily apparent to your dog. Thus, Fechner wanted to know: For any given sense, what is the weakest detectable stimulus? For example, what is the minimum amount of light needed for a person to see that there is light?

Implicit in Fechner's question is a concept central to psychophysics: the threshold. A *threshold* is a dividing point between energy levels that do and do not have a detectable effect. For example, hardware stores sell a gadget with a photocell that automatically turns a lamp on when a room gets dark. The level of light intensity at which the gadget clicks on is its threshold.

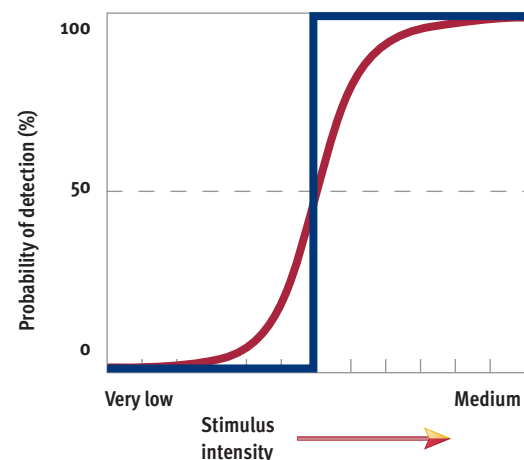
An absolute threshold for a specific type of sensory input is the minimum stimulus intensity that an organism can detect. Absolute thresholds define the boundaries of an organism's sensory capabilities.

Fechner and his contemporaries used a variety of methods to determine humans' absolute threshold for detecting light. They discovered that absolute thresholds are anything but absolute. When lights of varying intensity are flashed at a subject, there is no single stimulus intensity at which the subject jumps from no detection to completely accurate detection. Instead, as stimulus intensity increases, subjects' probability of responding to stimuli *gradually* increases, as shown in red in **Figure 4.2**. Thus, researchers had to arbitrarily define the absolute threshold as the stimulus intensity *detected 50% of the time*.

Using this definition, investigators found that under ideal conditions, human abilities to detect weak stimuli are greater than appreciated. Some concrete examples of the absolute thresholds for various senses can be seen in **Table 4.1**. For example, on a clear, dark night, in the absence of other distract-

Figure 4.2

The absolute threshold. If absolute thresholds were truly absolute, then at threshold intensity the probability of detecting a stimulus would jump from 0 to 100%, as graphed here in blue. In reality, the chances of detecting a stimulus increase gradually with stimulus intensity, as shown in red. Accordingly, an “absolute” threshold is defined as the intensity level at which the probability of detection is 50%.



GUSTAV FECHNER

“The method of just noticeable differences consists in determining how much the weights have to differ so that they can just be discriminated.”

Table 4.1 Examples of Absolute Thresholds

Sense	Absolute Threshold
Vision	A candle flame seen at 30 miles on a dark clear night
Hearing	The tick of a watch under quiet conditions at 20 feet
Taste	One teaspoon of sugar in two gallons of water
Smell	One drop of perfume diffused into entire volume of a six-room apartment
Touch	The wing of a fly falling on your cheek from a distance of 1 centimeter

Source: Galanter, E. (1962). Contemporary psychophysics. In R. Brown (Ed.), *New directions in psychology*. New York: Holt, Rinehart & Winston. © 1962 Eugene Galanter. Reprinted by permission.

ing lights, you could see the light of a candle burning 30 miles in the distance! Of course, we’re talking about ideal conditions—you would have to go out to the middle of nowhere to find the darkness required to put this assertion to a suitable test.

Weighing the Differences: The JND

Fechner was also interested in people’s sensitivity to differences between stimuli. **A just noticeable difference (JND) is the smallest difference in stimulus intensity that a specific sense can detect.** JNDs are close cousins of absolute thresholds. In fact, an absolute threshold is simply the just noticeable difference from nothing (no stimulus input) to something. You might think that the JND would always have the same value for any given sense. For instance, what do you suppose is the smallest difference in weight that you can detect by lifting different objects? An ounce? Two ounces? Six ounces? As it turns out, the answer varies. The JND is greater for heavy objects than for light ones. However, the smallest detectable difference is a fairly stable *proportion* of the weight of the original object.

This principle was first demonstrated by Fechner’s brother-in-law, Ernst Weber, and came to be known as Weber’s law. **Weber’s law states that the size of a just noticeable difference is a constant proportion of the size of the initial stimulus.** This constant proportion is called the *Weber fraction*. Weber’s law applies not only to weight perception but to all the senses. However, different fractions apply to different types of sensory input. For example, the Weber fraction for lifting weights is approximately 1/30. That means that you should be just able to detect the difference between a 30-ounce weight and a 31-ounce weight (the JND for 30 ounces is 1 ounce). If you started with a 90-ounce weight, however, you would

not be able to tell the difference between it and a 91-ounce weight. Why? Because the JND for 90 ounces is 3 ounces (1/30 of 90). In general, then, as stimuli increase in magnitude, the JND becomes larger.

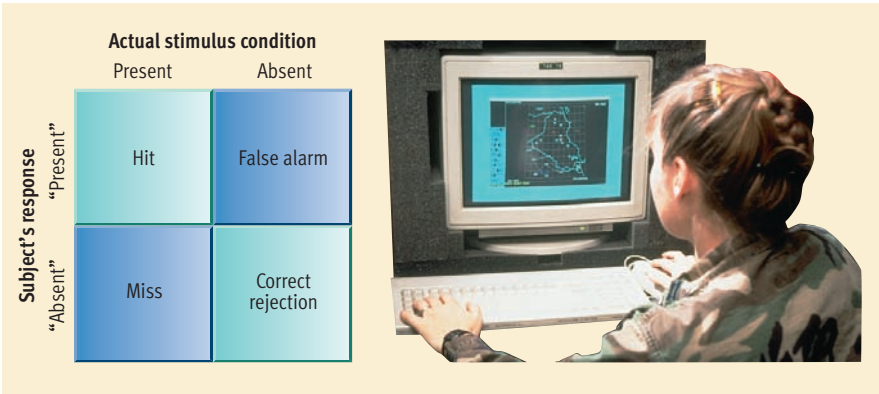
Signal-Detection Theory

Modern psychophysics has a more complicated view of how stimuli are detected. **Signal-detection theory proposes that the detection of stimuli involves decision processes as well as sensory processes, which are both influenced by a variety of factors besides stimulus intensity** (Egan, 1975; Swets, Tanner, & Birdsall, 1961).

Imagine that you are monitoring a radar screen, looking for signs of possible enemy aircraft. Your mission is to detect signals that represent approaching airplanes as quickly and as accurately as possible. In this situation, there are four possible outcomes, which are outlined in **Figure 4.3: hits** (detecting signals when they are present), *misses* (failing to detect signals when they are present), *false alarms* (detecting signals when they are not present), and *correct rejections* (not detecting signals when they are absent). Given these possibilities, signal-detection theory attempts to account for the influence of decision-making processes on stimulus detection. In detecting weak signals on the radar screen, you will often have to decide whether a faint signal represents an airplane or whether you’re just imagining that it does. Your responses will depend in part on the *criterion* you set for how sure you must feel before you react. Setting this criterion involves higher mental processes rather than raw sensation and depends on your expectations and on the consequences of missing a signal or of reporting a false alarm.

Another major innovation of signal-detection theory was its assertion that one’s performance will also depend on the level of “noise” in the system (Kubovy, Epstein, & Gepshtein, 2003). Noise comes from all the irrelevant stimuli in the environment and the

Figure 4.3 Signal-detection theory. Signal-detection theory emerged from pragmatic efforts to improve the monitoring of modern equipment, such as the radar screen shown in photo below. This diagram shows the four outcomes that are possible in attempting to detect the presence of weak signals. The criterion you set for how confident you want to feel before reporting a signal will affect your responding. For example, if you require high confidence before reporting a signal, you will minimize false alarms, but you’ll be more likely to miss some signals.



neural activity they elicit. Noise is analogous to the background static on a radio station. The more noise in the system, the harder it will be for you to pick up a weak signal. Variations in noise provide another reason that sensory thresholds depend on more than just the intensity of stimuli.

Signal-detection theory grew out of practical efforts to understand and improve the monitoring of complex, modern equipment, such as radar. However, the theory applies equally well to a broad range of everyday experiences involving the registration of sensory inputs. Suppose, for instance, you are eagerly awaiting the delivery of a pizza at a loud, raucous party. In this situation, you want to detect a signal (the doorbell) in the midst of background noise (music, people talking), and your criteria for “hearing” the doorbell will change as the expected time of delivery approaches.

The key point is that signal-detection theory replaces Fechner’s sharp threshold with the concept of “detectability.” Detectability is measured in terms of probability and depends on decision-making processes as well as sensory processes. In comparison to classical models of psychophysics, signal-detection theory is better equipped to explain some of the complexities of perceived experience in the real world.

Perception Without Awareness

The concepts of thresholds and detectability lie at the core of an interesting debate: Can sensory stimuli that fall beneath the threshold of awareness still influence behavior? This issue centers on the concept of **subliminal perception—the registration of sensory input without conscious awareness** (*limen* is another term for threshold, so *subliminal* means below threshold). This question might be just another technical issue in the normally staid world of psychophysics, except that subliminal perception has become tied up in highly charged controversies relating to money, sex, religion, and rock music.

The controversy began in 1957 when an executive named James Vicary placed hidden messages such as “Eat popcorn” in a film showing at a theater in New Jersey. The messages were superimposed on only a few frames of the film, so that they flashed by quickly and imperceptibly. Nonetheless, Vicary claimed in the press that popcorn sales increased by 58%, and a public outcry ensued (McConnell, Cutler, & McNeil, 1958). Since then, Wilson Brian Key, a former advertising executive, has written several books claiming that sexual words and drawings are embedded subliminally in magazine advertisements to elicit favorable unconscious reactions from consumers (Key, 1973,

1976, 1980). One such advertisement discussed by Key is shown in **Figure 4.4**. If you look closely, you’ll find the word SEX embedded in the ice cubes. Taking the sexual manipulation theme a step further, entrepreneurs are now marketing music audiotapes containing subliminal messages that are supposed to help people seduce unsuspecting listeners. Furthermore, subliminal self-help tapes intended to facilitate weight loss, sleep, memory, self-esteem, and the like have become a \$50 million industry. Religious overtones were added to this controversy in the 1980s when subliminal messages encouraging devil worship were allegedly found in rock music played *backward* (Vokey & Read, 1985).

Can listening to Led Zeppelin’s “Stairway to Heaven” promote Satanic rituals? Can your sexual urges be manipulated by messages hidden under music? Can advertisers influence your product preferences with subliminal stimuli? Those who are concerned about subliminal messages assert that such messages are likely to be persuasive because people supposedly are defenseless against appeals operating

Figure 4.4

Subliminal advertising: Is it all in the eye of the beholder? If you look closely at the ice cubes in this ad, you will see the word SEX spelled out. Former advertising executive Wilson Bryan Key (1973) claims advertisers routinely place subliminal stimuli in their ads. Marketing companies maintain that people are merely reading things into their ads, much like you might see familiar forms in clouds. Although subliminal perception appears to be a genuine phenomenon, Thomas Creed (1987) has pinpointed a host of fallacies in Key’s analysis, which he characterizes as pseudoscience.

Image Not Available

Image Not Available

below their threshold of awareness. How justified are these fears? Research on subliminal perception was sporadic in the 1960s and 1970s because scientists initially dismissed the entire idea as preposterous. However, empirical studies have begun to accumulate since the 1980s.

For example, Jon Krosnick and his colleagues (1992) set out to determine whether subjects' attitudes toward a target person could be shaped without their awareness. Participants were asked to attentively view a series of slides showing a target person going about her daily activities. These slides were preceded by very brief (13/1000 of a second) subliminal presentations of photos expected to arouse positive emotions (a bridal couple, a pair of kittens, and so on) or negative emotions (a skull, a werewolf, and so on). After the slide presentations, subjects rated the target person on various dimensions. The researchers found statistically significant differences in participants' attitudes toward the target person that reflected the type of subliminal photos they had seen. Thus, subliminal inputs produced measurable, although small, effects in subjects who subsequently reported that they did not consciously register the stimuli.

A number of other studies have also found support for the existence of subliminal perception (De Houwer, 2001; Greenwald, 1992; Snodgrass, Bernat, & Shevrin, 2004). Using diverse methodological and conceptual approaches, researchers examining a variety of phenomena, such as unconscious semantic priming (Abrams, Klinger, & Greenwald, 2002), subliminal affective conditioning (Dijksterhuis, 2004), subliminal mere exposure effects (Monahan, Murphy, & Zajonc, 2000), nonconscious learning (Lewicki, Hill, & Czyzewska, 1992), subliminal visual priming (Haneda et al., 2003), and subliminal psychodynamic activation (Sohlberg & Birgegard, 2003), have found evidence that perception without awareness *can* take place. Hence, the dominant view today is that subliminal perception is a genuine phenomenon that is worthy of experimental investigation (Cooper & Cooper, 2002; Merikle & Daneman, 1998).

So, should we be worried about the threat of subliminal persuasion? The research to date suggests that there is little reason for concern. The effects of subliminal stimuli turn out to be nearly as subliminal as the stimuli themselves. Subliminal stimulation generally produces weak effects (De Houwer, Hendrickx, & Baeyens, 1997; Kihlstrom, Barnhardt, & Tataryn, 1992). These effects can be detected only by very precise measurement, under carefully controlled laboratory conditions, in which subjects are asked to focus their undivided attention on visual or auditory materials that contain the subliminal stimuli. Although these effects are theoretically interesting, they appear unlikely to have much practical importance. More research on the manipulative potential of subliminal persuasion is needed, but so far there is no cause for alarm.

Sensory Adaptation

The process of sensory adaptation is yet another factor that influences registration of sensory input. **Sensory adaptation is a gradual decline in sensitivity to prolonged stimulation.** For example, suppose the garbage in your kitchen has started to smell. If you stay in the kitchen without removing the garbage, the stench will soon start to fade. In reality, the stimulus intensity of the odor is stable, but with continued exposure, your *sensitivity* to it decreases. Meanwhile, someone new walking into the room is likely to remark on the foul odor. Sensory adaptation is a pervasive aspect of everyday life. When you put on your clothes in the morning, you feel them initially, but the sensation quickly fades. Similarly, if you jump reluctantly into a pool of cold water, you'll probably find that the water temperature feels fine in a few moments after you *adapt* to it.

Sensory adaptation is an automatic, built-in process that keeps people tuned in to the *changes* rather than the *constants* in their sensory input. It allows people to ignore the obvious. After all, you don't need constant confirmation that your clothes are still on.

Because of sensory adaptation, people who live near foul-smelling industrial plants tend to grow accustomed to the stench in the air, whereas visitors may initially be overwhelmed by the same odors.



© Danny Lehman/Corbis

But, like most organisms, people are interested in changes in their environment that may signal threats to safety. Thus, as its name suggests, sensory adaptation probably is a behavioral adaptation that has been sculpted by natural selection. Sensory adaptation also shows once again that there is no one-to-one correspondence between sensory input and sensory experience.

The general points we've reviewed so far begin to suggest the complexity of the relationships between the world outside and people's perceived experience of it. As we review each of the principal sensory sys-

tems in detail, we'll see repeatedly that people's experience of the world depends on both the physical stimuli they encounter and their active processing of stimulus inputs. We begin our exploration of the senses with vision—the sense that most people think of as nearly synonymous with a direct perception of reality. The case is actually quite different, as you'll see.

➤ REVIEW OF KEY POINTS

- Psychophysicists use a variety of methods to relate sensory inputs to subjective perception. They have found that absolute thresholds are not really absolute. Weber's law states that the size of a just noticeable difference is a constant proportion of the size of the initial stimulus.
- According to signal-detection theory, the detection of sensory inputs is influenced by noise in the system and by decision-making strategies. Signal-detection theory replaces Fechner's sharp threshold with the concept of detectability and emphasizes that factors besides stimulus intensity influence detectability.
- In recent years, a host of researchers, using very different conceptual approaches, have demonstrated that perception can occur without awareness. However, research indicates that the effects of subliminal perception are relatively weak and of little or no practical concern.
- Prolonged stimulation may lead to sensory adaptation, which involves a reduction in sensitivity to constant stimulation.

➤ Our Sense of Sight: The Visual System

PREVIEW QUESTIONS

- What are the three properties of light?
- What do the lens and pupil contribute to visual functioning?
- What are the functions of rods and cones?
- How do visual receptive fields typically function?
- How are visual signals routed from the eye to the primary visual cortex?
- What are feature detectors?

"Seeing is believing." Good ideas are "bright," and a good explanation is "illuminating." This section is an "overview." Do you see the point? As these common expressions show, humans are visual animals. People rely heavily on their sense of sight, and they virtually equate it with what is trustworthy (seeing is believing). Although it is taken for granted, you'll see (there it is again) that the human visual system is amazingly complex. Furthermore, as in all sensory domains, what people "sense" and what they "perceive" may be quite different.

The Stimulus: Light



For people to see, there must be light. *Light* is a form of electromagnetic radiation that travels as a wave, moving, naturally enough, at the speed of light. As **Figure 4.5(a)** shows, light waves vary in *amplitude* (height) and in *wavelength* (the distance between peaks). Amplitude affects mainly the perception of brightness, while wavelength affects mainly the perception of color. The lights humans normally see are

mixtures of several wavelengths. Thus, light can also vary in its *purity* (how varied the mix is). Purity influences perception of the saturation, or richness, of colors. *Saturation* refers to the relative amount of whiteness in a color. The less whiteness seen in a color, the more saturated it is (see **Figure 4.6**). Of course, most objects do not emit light, they reflect it (the sun, lamps, and fireflies being some exceptions).

What most people call light includes only the wavelengths that humans can see. But as **Figure 4.5(c)** shows, the visible spectrum is only a slim portion of the total range of wavelengths. Vision is a filter that permits people to sense but a fraction of the real world. Other animals have different capabilities and so live in a quite different visual world. For example, many insects can see shorter wavelengths than humans, in the *ultraviolet* spectrum, whereas many fish and reptiles can see longer wavelengths, in the *infrared* spectrum. Although the sense of sight depends on light waves, for people to *see*, incoming visual input must be converted into neural impulses that are sent to the brain. Let's investigate how this transformation is accomplished.

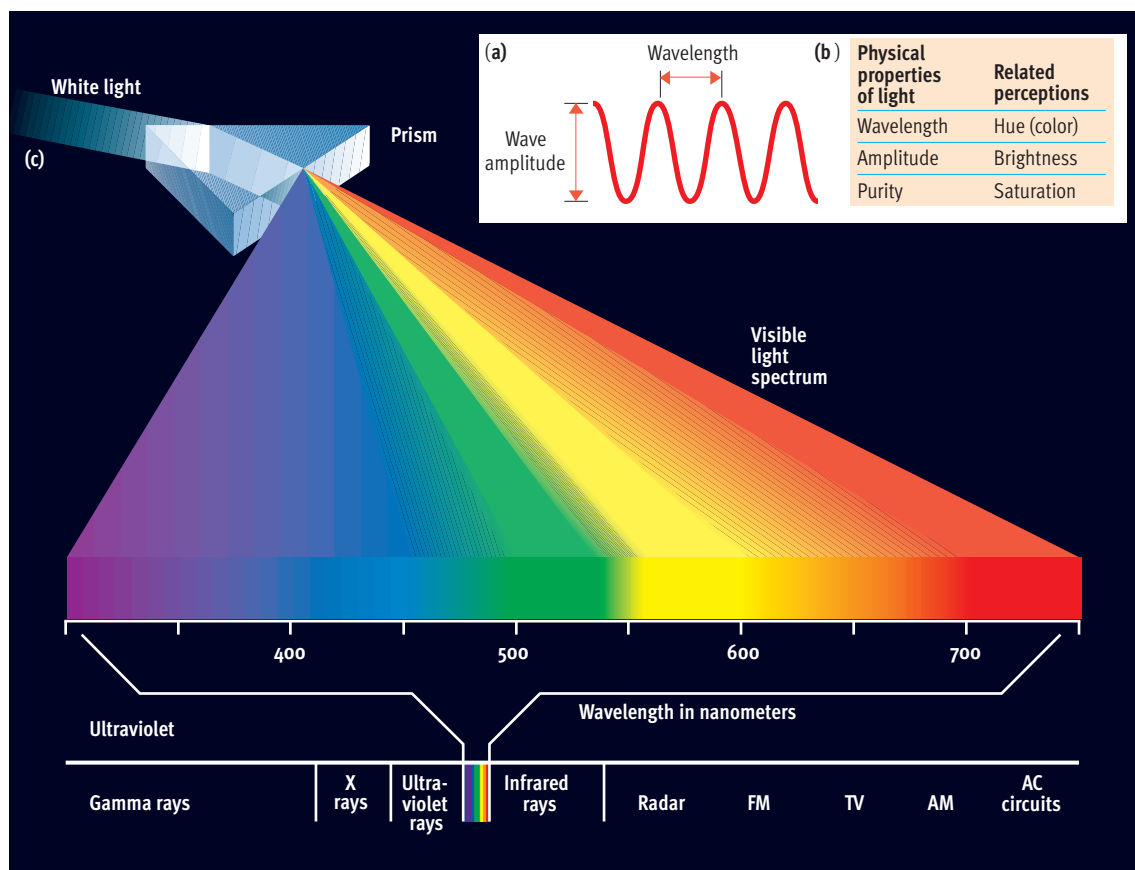


Figure 4.5

Light, the physical stimulus for vision.

(a) Light waves vary in amplitude and wavelength. (b) Within the spectrum of visible light, amplitude (corresponding to physical intensity) affects mainly the experience of brightness. Wavelength affects mainly the experience of color, and purity is the key determinant of saturation. (c) If white light (such as sunlight) passes through a prism, the prism separates the light into its component wavelengths, creating a rainbow of colors. However, visible light is only the narrow band of wavelengths to which human eyes happen to be sensitive.

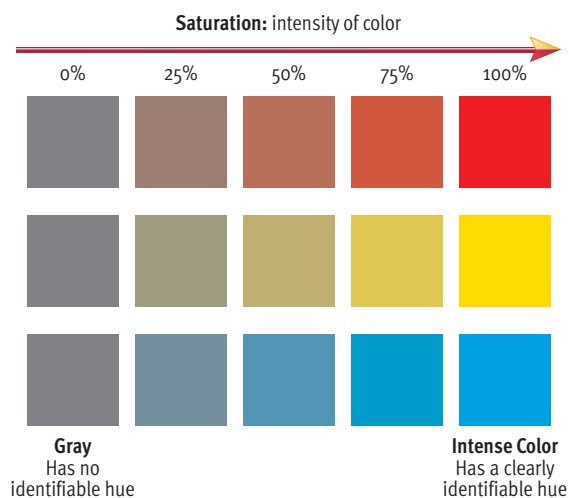


Figure 4.6

Saturation. Saturation refers to the amount of whiteness in a color. As you can see in these two examples, as the amount of whiteness declines (moving to the right), the saturation or richness of a color increases.

The Eye: A Living Optical Instrument



The eyes serve two main purposes: They channel light to the neural tissue that receives it, called the *retina*,

and they house that tissue. The structure of the eye is shown in **Figure 4.7** on the next page. Each eye is a living optical instrument that creates an image of the visual world on the light-sensitive retina lining its inside back surface.

Light enters the eye through a transparent “window” at the front, the *cornea*. The cornea and the crystalline *lens*, located behind it, form an upside-down image of objects on the retina. It might seem disturbing that the image is upside down, but the brain knows the rule for relating positions on the retina to the corresponding positions in the world.

The lens is the transparent eye structure that focuses the light rays falling on the retina. The lens is made up of relatively soft tissue, capable of adjustments that facilitate a process called accommodation. Accommodation occurs when the curvature of the lens adjusts to alter visual focus. When you focus on a close object, the lens of your eye gets fatter (rounder) to give you a clear image. When you focus on distant objects, the lens flattens out to give you a better image of them.

Some common visual deficiencies are attributable to light not being focused clearly on the retina (Guyton, 1991). For example, **in nearsightedness, close objects are seen clearly but distant objects appear blurry** because the focus of light from distant objects

Web Link 4.1



Vision Science: An Internet Resource for Research in Human and Animal Vision
Numerous online sites are devoted to the sense of sight and visual processes. Vision Science provides a convenient guide to the best of these sites, especially for online demonstrations and tutorials.

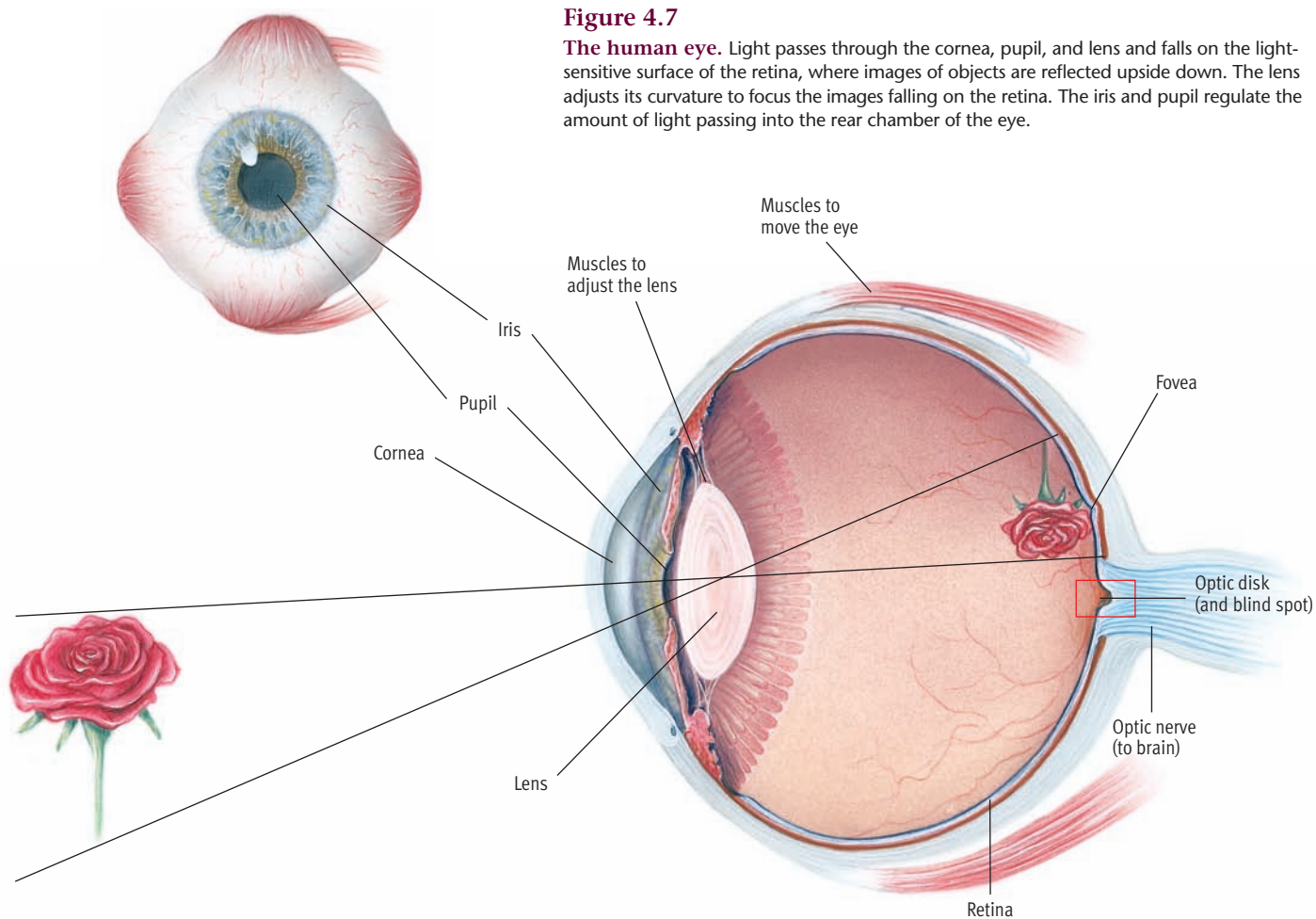
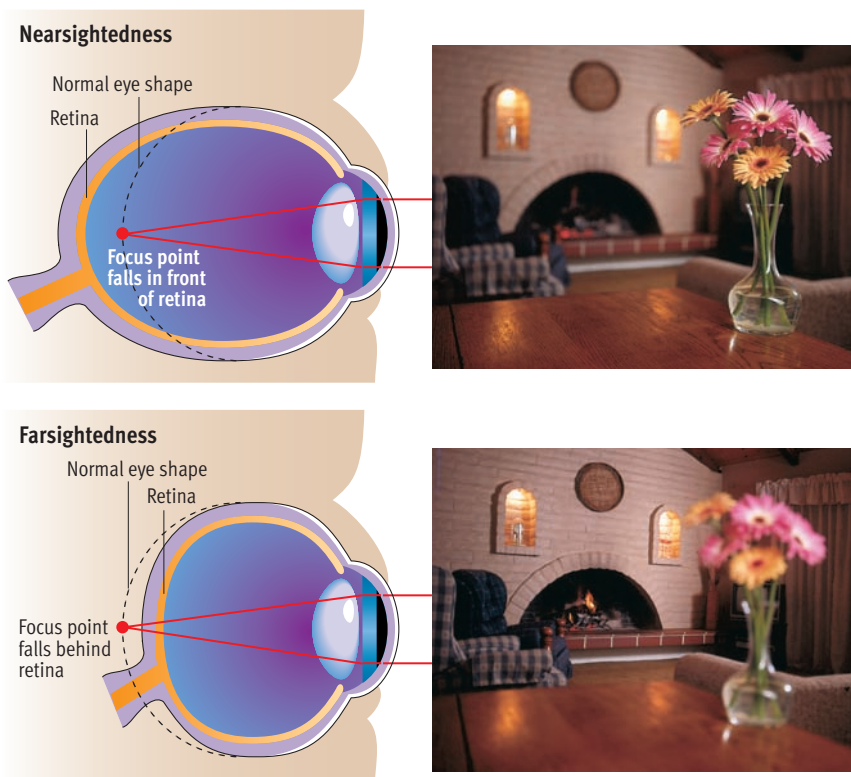


Figure 4.7

The human eye. Light passes through the cornea, pupil, and lens and falls on the light-sensitive surface of the retina, where images of objects are reflected upside down. The lens adjusts its curvature to focus the images falling on the retina. The iris and pupil regulate the amount of light passing into the rear chamber of the eye.

Figure 4.8

Nearsightedness and farsightedness. The pictures shown here simulate how a scene might look to nearsighted and farsighted people. Nearsightedness occurs because light from distant objects focuses in front of the retina. Farsightedness is due to the opposite situation—light from close objects focuses behind the retina.



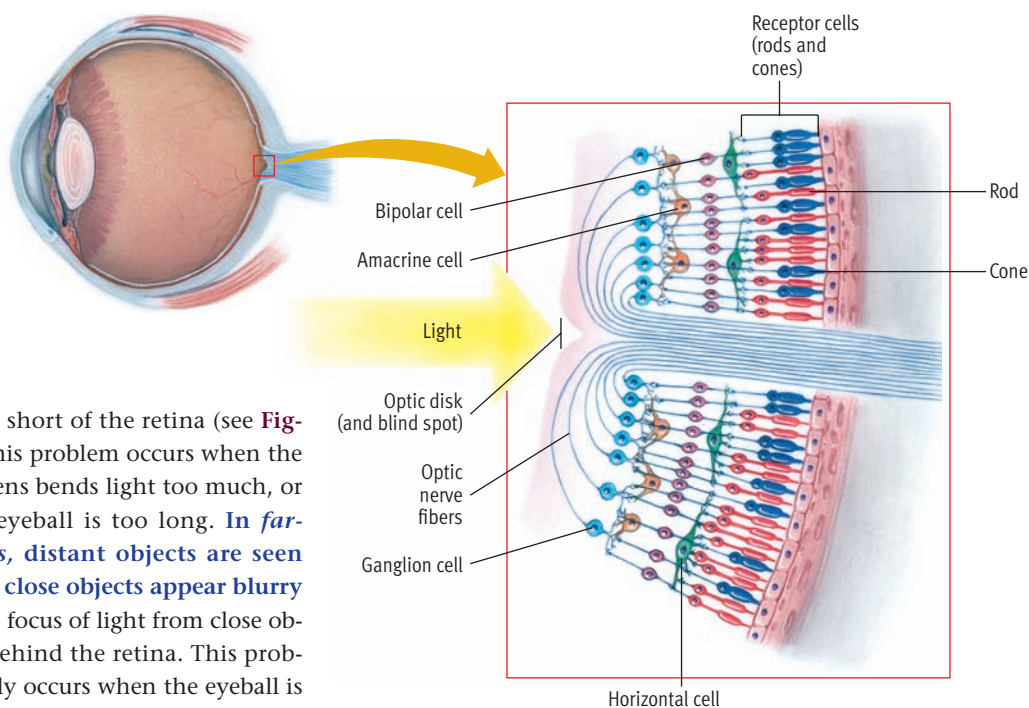


Figure 4.9

The retina. The closeup shows the several layers of cells in the retina. The cells closest to the back of the eye (the rods and cones) are the receptor cells that actually detect light. The intervening layers of cells receive signals from the rods and cones and form circuits that begin the process of analyzing incoming information. The visual signals eventually converge into *ganglion cells*, whose axons form the optic fibers that make up the optic nerve. These optic fibers all head toward the “hole” in the retina where the optic nerve leaves the eye—the point known as the optic disk (which corresponds to the blind spot).

falls a little short of the retina (see **Figure 4.8**). This problem occurs when the cornea or lens bends light too much, or when the eyeball is too long. In **far-sightedness**, distant objects are seen clearly but close objects appear blurry because the focus of light from close objects falls behind the retina. This problem typically occurs when the eyeball is too short.

The eye can make adjustments to alter the amount of light reaching the retina. The *iris* is the colored ring of muscle surrounding the *pupil*, or black center of the eye. The iris regulates the amount of light entering the eye because it controls the size of the pupil. **The pupil is the opening in the center of the iris that permits light to pass into the rear chamber of the eye.** When the pupils are constricted, they let less light into the eye, but they sharpen the image falling on the retina. When the pupils are dilated (opened more), they let more light in, but the image is less sharp. In bright light, the pupils constrict to take advantage of the sharpened image. But in dim light, the pupils dilate; image sharpness is sacrificed to allow more light to fall on the retina so that more remains visible.

The Retina: The Brain's Envoy in the Eye



The retina is the neural tissue lining the inside back surface of the eye; it absorbs light, processes images, and sends visual information to the brain. You may be surprised to learn that the retina *processes* images. But it's a piece of the central nervous system that happens to be located in the eyeball. Much as the spinal cord is a complicated extension of the brain, the retina is the brain's envoy in the eye. Although the retina is only a paper-thin sheet of neural tissue, it contains a complex network of specialized cells arranged in layers, as shown in **Figure 4.9**.

The axons that run from the retina to the brain converge at the **optic disk**, a hole in the retina where

the optic nerve fibers exit the eye. Because the optic disk is a *hole* in the retina, you cannot see the part of an image that falls on it. It is therefore known as the *blind spot*. You may not be aware that you have a blind spot in each eye, as each normally compensates for the blind spot of the other.

Visual Receptors: Rods and Cones



The retina contains millions of receptor cells that are sensitive to light. Surprisingly, these receptors are located in the innermost layer of the retina. Hence, light must pass through several layers of cells before it gets to the receptors that actually detect it. Interestingly, only about 10% of the light arriving at the cornea reaches these receptors (Leibovic, 1990). The retina contains two types of receptors, *rods* and *cones*. Their names are based on their shapes, as rods are elongated and cones are stubbier. Rods outnumber cones by a huge margin, as humans have 100–125 million rods, but only 5–6.4 million cones (Frishman, 2001).

Cones are specialized visual receptors that play a key role in daylight vision and color vision. The cones handle most of our daytime vision, because bright lights dazzle the rods. The special sensitivities of cones also allow them to play a major role in the perception of color. However, cones do not respond well to dim light, which is why you don't see color very well in low illumination. Nonetheless, cones provide better *visual acuity*—that is, sharpness and precise detail—than rods. Cones are concentrated most heavily in the center of the retina and quickly fall off

Web Link 4.2



The Joy of Visual

Perception: A Web Book

This site shows the Net at its best. Peter Kaiser of York University has crafted a comprehensive guide to human color vision, supplying plenty of graphics and demonstrations to help visitors understand what laboratory research in psychology has learned about visual perception.

in density toward its periphery. **The fovea is a tiny spot in the center of the retina that contains only cones; visual acuity is greatest at this spot.** When you want to see something sharply, you usually move your eyes to center the object in the fovea.

Rods are specialized visual receptors that play a key role in night vision and peripheral vision. Rods handle night vision because they are more sensitive than cones to dim light. They handle the lion's share of peripheral vision because they greatly outnumber cones in the periphery of the retina. The density of the rods is greatest just outside the fovea and gradually decreases toward the periphery of the retina. Because of the distribution of rods, when you want to see a faintly illuminated object in the dark, it's best to look slightly above or below the place it should be. Averting your gaze this way moves the image from the cone-filled fovea, which requires more light, to the rod-dominated area just outside the fovea, which requires less light. This trick of averted vision is well known to astronomers, who use it to study dim objects viewed through the eyepiece of a telescope.

Dark and Light Adaptation



You've probably noticed that when you enter a dark theater on a bright day, you stumble around almost blindly. But within minutes you can make your way about in the dim light. This adjustment is called **dark adaptation—the process in which the eyes become more sensitive to light in low illumination.** **Figure 4.10** maps out the course of this process. The declining absolute thresholds over time indicate that you require less and less light to see. Dark adaptation is virtually complete in about 30 minutes, with considerable progress occurring in the first 10 minutes. The curve (in **Figure 4.10**) that charts this progress consists of two segments because cones adapt more rapidly than rods (Walraven et al., 1990).

When you emerge from a dark theater on a sunny day, you need to squint to ward off the overwhelming brightness, and the reverse of dark adaptation occurs. **Light adaptation is the process whereby the eyes become less sensitive to light in high illumination.** As with dark adaptation, light adaptation improves your visual acuity under the prevailing circumstances. Both types of adaptation are due in large part to chemical changes in the rods and cones, but neural changes in the receptors and elsewhere in the retina also contribute (Frumkes, 1990).

Information Processing in the Retina



In processing visual input, the retina transforms a pattern of light falling onto it into a very different

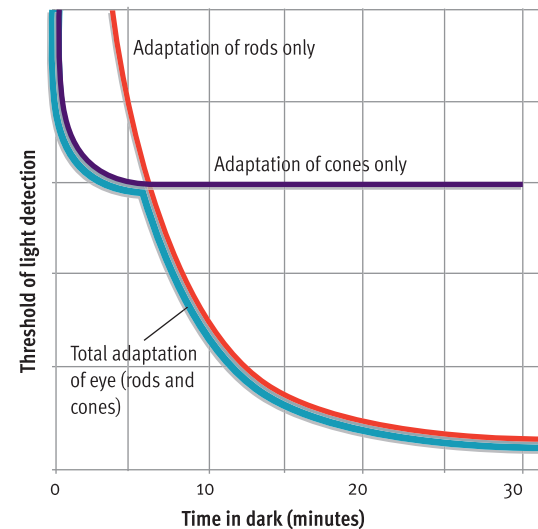


Figure 4.10

The process of dark adaptation. The declining thresholds over time indicate that your visual sensitivity is improving, as less and less light is required to see. Visual sensitivity improves markedly during the first 5 to 10 minutes after entering a dark room, as the eye's bright-light receptors (the cones) rapidly adapt to low light levels. However, the cones' adaptation, which is plotted in purple, soon reaches its limit, and further improvement comes from the rods' adaptation, which is plotted in red. The rods adapt more slowly than the cones, but they are capable of far greater visual sensitivity in low levels of light.

representation of the visual scene. Light striking the retina's receptors (rods and cones) triggers neural signals that pass into the intricate network of cells in the retina, which in turn send impulses along the *optic nerve*—a collection of axons from *ganglion cells* that connect the eye with the brain (see **Figure 4.9**). These axons, which depart from the eye through the optic disk, carry visual information, encoded as a stream of neural impulses, to the brain.

A great deal of complex information processing goes on in the retina itself before visual signals are sent to the brain. Ultimately, the information from over 100 million rods and cones converges to travel along "only" 1 million axons in the optic nerve (Slaughter, 1990). The collection of rod and cone receptors that funnel signals to a particular visual cell in the retina (or ultimately in the brain) make up that cell's *receptive field*. Thus, **the receptive field of a visual cell is the retinal area that, when stimulated, affects the firing of that cell.**

Receptive fields in the retina come in a variety of shapes and sizes. Particularly common are circular fields with a center-surround arrangement (Tessier-Lavigne, 2000). In these receptive fields, light falling in the center has the opposite effect of light falling in the surrounding area (see **Figure 4.11**). For example, the rate of firing of a visual cell might be *increased* by light in the *center* of its receptive field and *decreased*

Understanding Sensory Processes in the Retina

Check your understanding of sensory receptors in the retina by completing the following exercises. The receptors for vision are rods and cones in the retina. These two types of receptors have many important differences, which are compared systematically in the chart below. Fill in the missing information to finish the chart. Consult Appendix A for the answers.

Dimension	Rods	Cones
1. Physical shape	<u>Elongated</u>	
2. Number in the retina		<u>5-6.4 million</u>
3. Area of the retina in which they are dominant receptor	<u>Periphery</u>	
4. Critical to color vision		
5. Critical to peripheral vision		<u>No</u>
6. Sensitivity to dim light	<u>Strong</u>	
7. Speed of dark adaptation		<u>Rapid</u>

by light in the *surrounding area*, as **Figure 4.11** shows. Other visual cells may work in just the opposite way. Either way, when receptive fields are stimulated, retinal cells send signals both toward the brain and *laterally* (sideways) toward nearby visual cells. These lateral signals allow visual cells in the retina to have interactive effects on each other.

Lateral antagonism (also known as lateral inhibition) is the most basic of these interactive effects. *Lateral antagonism occurs when neural activity in a*

cell opposes activity in surrounding cells. Lateral antagonism is responsible for the opposite effects that occur when light falls on the inner versus outer portions of center-surround receptive fields. Lateral antagonism allows the retina to compare the light falling in a specific area against general lighting. This means that the visual system can compute the *relative* amount of light at a point instead of reacting to *absolute* levels of light. This attention to *contrast* is exactly what is needed, because most of the crucial

Figure 4.11

Receptive fields in the retina. Visual cells' receptive fields—made up of rods and cones in the retina—are often circular with a center-surround arrangement (**a**), so that light striking the center of the field produces the opposite result of light striking the surround. In the receptive field depicted here, light in the center produces excitatory effects (symbolized by green at the synapse) and increased firing in the visual cell (**b**), whereas light in the surround produces inhibitory effects (symbolized by red at the synapse) and decreased firing (**c**). Interestingly, no light in the receptive field and light in both center and surround produce similar baseline rates of firing. This arrangement makes the visual cell particularly sensitive to *contrast*, which facilitates the extremely important task of recognizing the *edges* of objects.

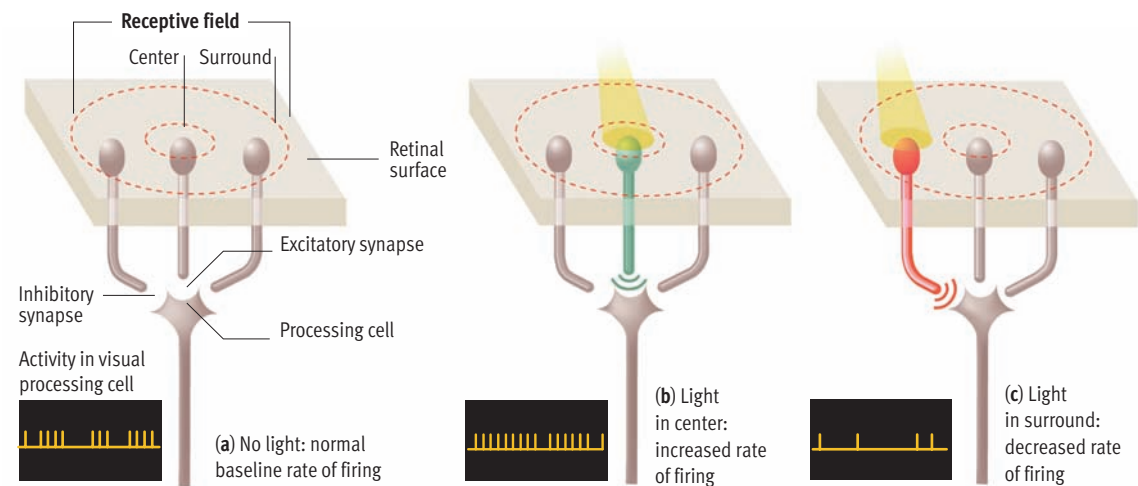
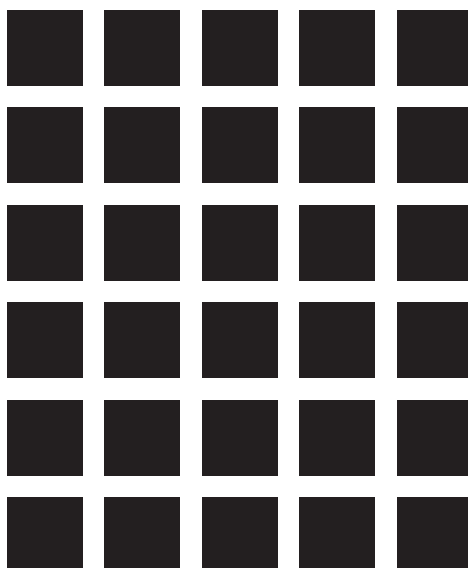


Figure 4.12

The Hermann grid. If you look at this grid, you will see dark spots at the intersections of the white bars, except in the intersection you're staring at directly. This illusion is due to lateral antagonism (see the text).



information required to recognize objects in a visual scene is contained in the pattern of contrasts, which reveal the *edges* of the objects (Tessier-Lavigne, 2000). If you look at **Figure 4.12**, you will experience a perplexing illusion attributable to lateral antagonism in the ganglion cells of the retina.

Vision and the Brain



Light falls on the eye, but you see with your brain. Although the retina does an unusual amount of information processing for a sensory organ, visual input is meaningless until it is processed in the brain.

Visual Pathways to the Brain



How does visual information get to the brain? Axons from ganglion cells leaving the back of each eye form the optic nerves, which travel to the *optic chiasm*—**the point at which the optic nerves from the inside half of each eye cross over and then project to the opposite half of the brain.** This arrangement ensures that signals from both eyes go to both hemispheres of the brain. Thus, as **Figure 4.13** shows, axons from the left half of each retina carry signals to the left side of the brain, and axons from the right half of each retina carry information to the right side of the brain.

After reaching the optic chiasm, the optic nerve fibers diverge along two pathways. The main pathway projects into the thalamus, the brain's major relay station. Here, about 90% of the axons from the retinas synapse in the *lateral geniculate nucleus* (LGN). Visual signals are processed in the LGN and then distributed to areas in the occipital lobe that make up the *primary visual cortex* (see **Figure 4.13**). The second visual pathway leaving the optic chiasm branches off

to an area in the midbrain called the *superior colliculus* before traveling through the thalamus and on to the occipital lobe. The principal function of the second pathway appears to be the perception of motion and the coordination of visual input with other sensory input (Casanova et al., 2001; Stein & Meredith, 1993).

The main visual pathway is subdivided into two more specialized pathways called the *magnocellular* and *parvocellular* channels (based on the layers of the LGN they synapse in). These channels engage in **parallel processing, which involves simultaneously extracting different kinds of information from the same input.** For example, the parvocellular channel handles the perception of color, while the magnocellular channel processes information regarding brightness (Wurtz & Kandel, 2000). Of course, this brief description hardly does justice to the immense complexity of visual processing in the brain.

Researchers have found rather sizable differences among people in the amount of neural resources devoted to vision. A study of 15 normal brains obtained at autopsy found twofold to threefold variations in the size of their optic nerve, their LGN, and their primary visual cortex (Andrews, Halpern, & Purves, 1997). These are huge disparities in comparison to the 30% variation usually seen in overall brain size. These differences in the architecture of individuals' visual systems could be the neural basis for variations among people in visual ability (Halpern, Andrews, & Purves, 1999). According to this line of thinking, someone like baseball star Alex Rodriguez, who can see 95-mile-per-hour pitches exceptionally well, probably has an overdeveloped visual system (a larger than average optic nerve, LGN and visual cortex).

Information Processing in the Visual Cortex



Most visual input eventually arrives in the primary visual cortex, located in the occipital lobe. Explaining how the cortical cells in this area respond to light once posed a perplexing problem. Researchers investigating the question placed microelectrodes in the primary visual cortex of animals to record action potentials from individual cells. They would flash spots of light in the retinal receptive fields that the cells were thought to monitor, but there was rarely any response.

According to David Hubel and Torsten Wiesel (1962, 1963), they discovered the solution to this mystery quite by accident. One of the projector slides they used to present a spot to a cat had a crack in it. The spot elicited no response, but when they removed the slide, the crack moved through the cell's receptive field, and the cell fired like crazy in response to the moving dark line. It turns out that individual cells in

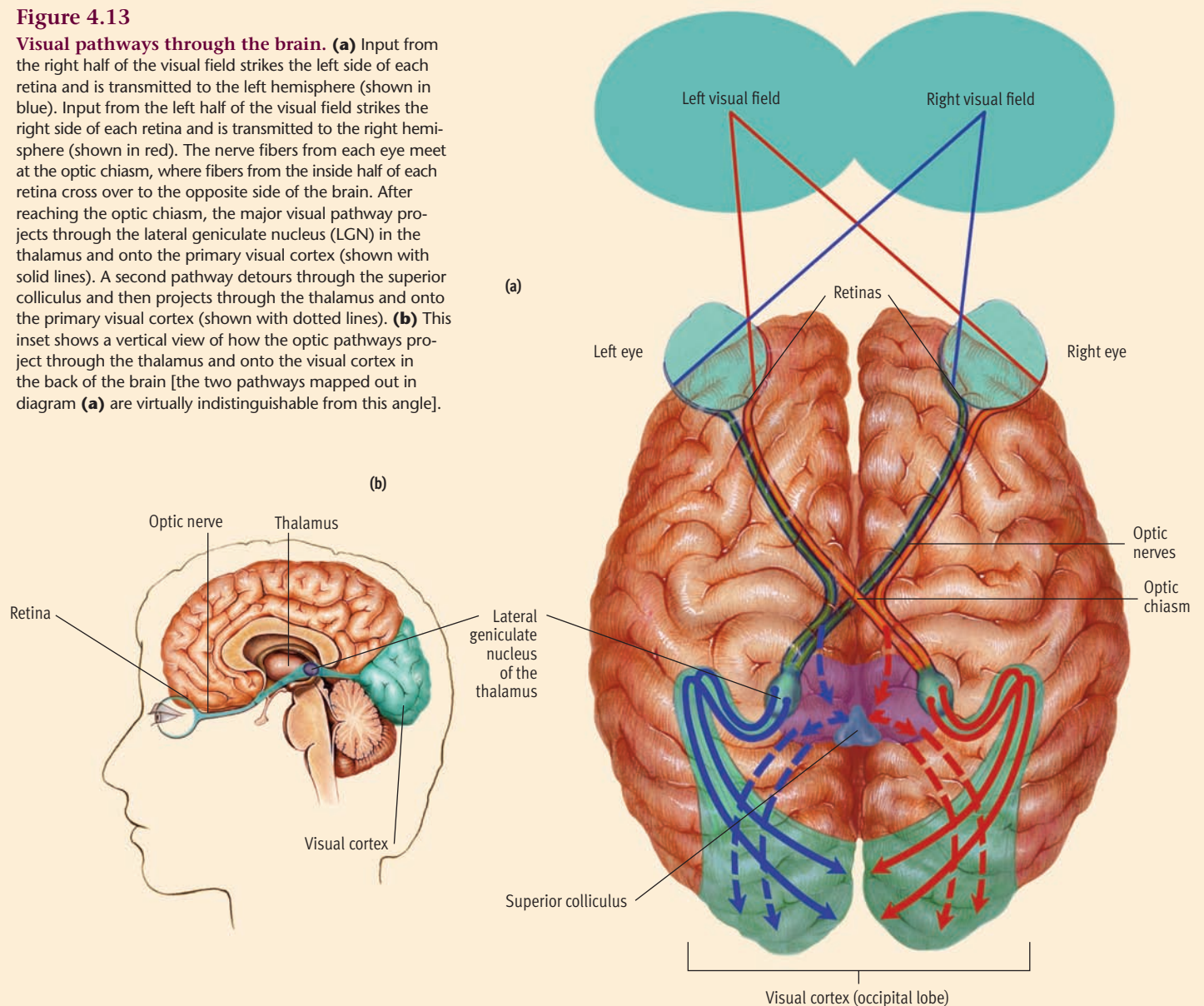


DAVID HUBEL

"One can now begin to grasp the significance of the great number of cells in the visual cortex. Each cell seems to have its own specific duties."

Figure 4.13

Visual pathways through the brain. (a) Input from the right half of the visual field strikes the left side of each retina and is transmitted to the left hemisphere (shown in blue). Input from the left half of the visual field strikes the right side of each retina and is transmitted to the right hemisphere (shown in red). The nerve fibers from each eye meet at the optic chiasm, where fibers from the inside half of each retina cross over to the opposite side of the brain. After reaching the optic chiasm, the major visual pathway projects through the lateral geniculate nucleus (LGN) in the thalamus and onto the primary visual cortex (shown with solid lines). A second pathway detours through the superior colliculus and then projects through the thalamus and onto the primary visual cortex (shown with dotted lines). **(b)** This inset shows a vertical view of how the optic pathways project through the thalamus and onto the visual cortex in the back of the brain [the two pathways mapped out in diagram **(a)** are virtually indistinguishable from this angle].



the primary visual cortex don't really respond much to little spots—they are much more sensitive to lines, edges, and other more complicated stimuli. Armed with new slides, Hubel and Wiesel embarked on years of painstaking study of the visual cortex (see **Figure 4.14** on the next page). Their work eventually earned them a Nobel prize in 1981.

Hubel and Wiesel (1979, 1998) identified various types of specialized cells in the primary visual cortex that respond to different stimuli. For example, *simple cells* respond best to a line of the correct width, oriented at the correct angle, and located in the correct position in its receptive field. *Complex cells* also care about width and orientation, but they respond to any position in their receptive fields. Some com-

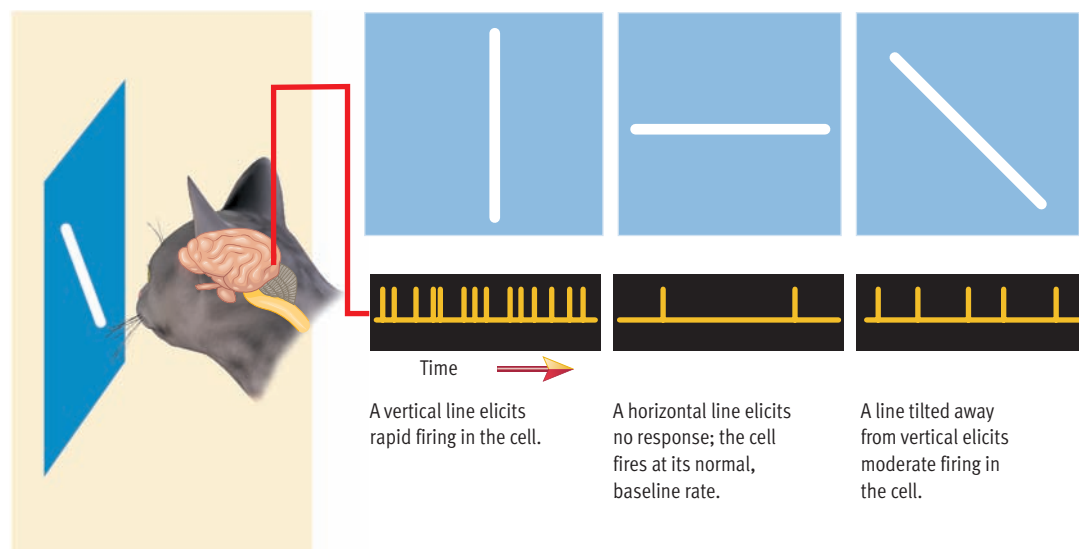
plex cells are most responsive if a line sweeps across their receptive field—but only if it's moving in the "right" direction. The key point of all this is that the cells in the visual cortex seem to be highly specialized. They have been characterized as *feature detectors, neurons that respond selectively to very specific features of more complex stimuli*. According to some theorists, most visual stimuli could ultimately be represented by combinations of lines such as those registered by these feature detectors (Maguire, Weisstein, & Klymenko, 1990).

After visual input is processed in the primary visual cortex, it is often routed to other cortical areas for additional processing. These signals travel through two streams that have sometimes been characterized

Figure 4.14

Hubel and Wiesel's procedure for studying the activity of neurons in the visual cortex.

As the cat is shown various stimuli, a microelectrode records the firing of a neuron in the cat's visual cortex. The figure shows the electrical responses of a visual cell apparently "programmed" to respond to lines oriented vertically.



as the *what* and *where* pathways (see **Figure 4.15**). The *ventral stream* processes the details of *what* objects are out there (the perception of form and color), while the *dorsal stream* processes *where* the objects are (the perception of motion and depth) (Kandel & Wurtz, 2000; Ungerleider & Haxby, 1994).

As signals move further along in the visual processing system, neurons become even more specialized or fussy about what turns them on, and the stimuli that activate them become more and more complex. For example, researchers have identified cells in the temporal lobe (along the *what* pathway) of monkeys and humans that seem especially sensitive to pictures of faces (Levine, 2001; Rolls & Tovee, 1995). This incredible specificity has led researchers to joke that they may eventually find a cell that only recognizes one's grandmother (Cowey, 1994). The discovery of neurons that are particularly responsive

to facial stimuli raises an obvious question: Why does the cortex have face detectors? Theorists are far from sure, but one line of thinking is that the ability to quickly recognize faces—such as those of friends or foes—probably has had adaptive significance over the course of evolution (Desimone, 1991). Thus, natural selection may have wired the brains of some species to quickly respond to faces.

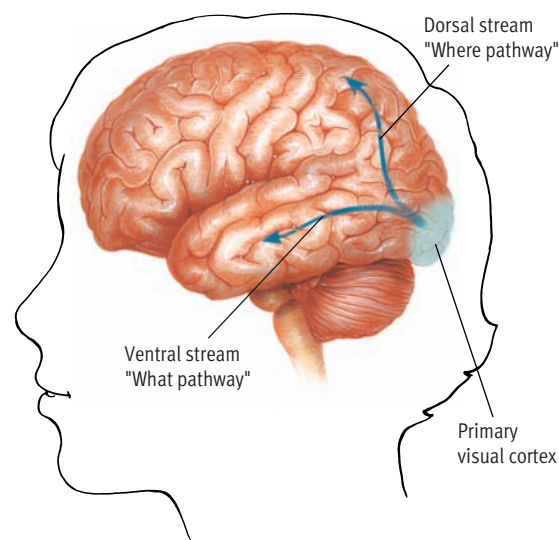
➤ REVIEW OF KEY POINTS

- Light varies in terms of wavelength, amplitude, and purity. Light enters the eye through the cornea and pupil and is focused upside down on the retina by the lens. Distant objects appear blurry to nearsighted people and close objects appear blurry to farsighted people.
- The retina is the neural tissue in the eye that absorbs light, processes images, and sends visual signals to the brain. Cones, which are concentrated in the fovea, play a key role in daylight vision and color perception. Rods, which have their greatest density just outside the fovea, are critical to night vision and peripheral vision. Dark adaptation and light adaptation both involve changes in the retina's sensitivity to light, allowing the eye to adapt to changes in illumination.
- The retina transforms light into neural impulses that are sent to the brain via the optic nerve. Receptive fields are areas in the retina that affect the firing of visual cells. They vary in shape and size, but center-surround arrangements are common. The optic nerves from the inside half of each eye cross at the optic chiasm and then project to the opposite half of the brain.
- Two visual pathways engage in parallel processing and send signals to different areas of the primary visual cortex. The main pathway is routed through the LGN in the thalamus. After processing in the primary visual cortex, visual information is shuttled along the *what* and *where* pathways to other cortical areas.
- Nobel prize-winning research by Hubel and Wiesel suggests that the visual cortex contains cells that function as feature detectors. The *what* pathway has neurons inside it that are especially sensitive to faces, which may have evolutionary significance.

Figure 4.15

The *what* and *where* pathways from the primary visual cortex.

Cortical processing of visual input is begun in the primary visual cortex. From there, signals are shuttled onward to a variety of other areas in the cortex along a number of pathways. Two prominent pathways are highlighted here. The *dorsal stream*, or *where* pathway, which processes information about motion and depth, moves on to areas of the parietal lobe. The *ventral stream*, or *what* pathway, which processes information about color and form, moves on to areas of the temporal lobe.



Viewing the World in Color



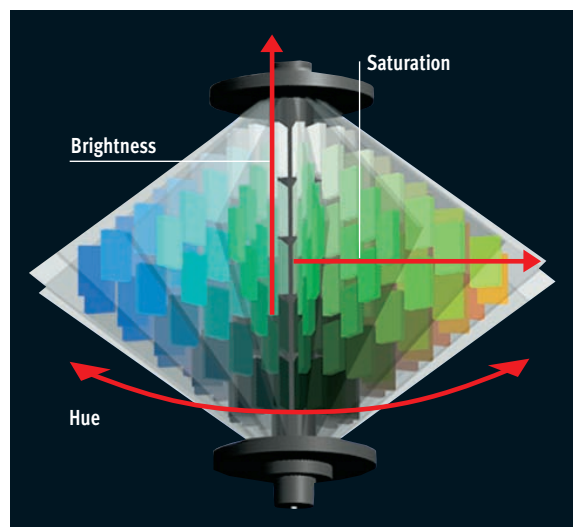
So far, we've considered only how the visual system deals with light and dark. Let's journey now into the world of color. On the one hand, you can see perfectly well without seeing in color. Many animals get by with little or no color vision, and no one seemed to suffer back when all photographs, movies, or TV shows were in black and white. On the other hand, color clearly adds rich information to our perception of the world. The ability to identify objects against a complex background is enhanced by the addition of color. Quickly identifying objects probably has had adaptive value in terms of finding food and detecting predators. Indeed, some theorists have suggested that color vision evolved in humans and monkeys because it improved their ability to find fruit in the forest (Mollon, 1989). Although the purpose of color vision remains elusive, scientists have learned a great deal about the mechanisms underlying the perception of color.

The Stimulus for Color



As noted earlier, the lights people see are mixtures of various wavelengths. Perceived color is primarily a function of the dominant wavelength in these mixtures. In the visible spectrum, lights with the longest wavelengths appear red, whereas those with the shortest appear violet. Notice the word *appear*. Color is a psychological interpretation. It's not a physical property of light itself.

Although wavelength wields the greatest influence, perception of color depends on complex blends of all three properties of light. *Wavelength* is most closely related to hue, *amplitude* to brightness, and *purity* to saturation. These three dimensions of color are illustrated in the *color solid* shown in Figure 4.16.



As a color solid demonstrates systematically, people can perceive many different colors. Indeed, experts estimate that humans can discriminate among roughly a million colors (Boynton, 1990). Most of these diverse variations are the result of mixing a few basic colors. There are two kinds of color mixture: subtractive and additive. **Subtractive color mixing works by removing some wavelengths of light, leaving less light than was originally there.** You probably became familiar with subtractive mixing as a child when you mixed yellow and blue paints to make green. Paints yield subtractive mixing because pigments *absorb* most wavelengths, selectively reflecting specific wavelengths that give rise to particular colors. Subtractive color mixing can also be demonstrated by stacking color filters. If you look through a sandwich of yellow and blue cellophane filters, they will block out certain wavelengths. The middle wavelengths that are left will look green.

Additive color mixing works by superimposing lights, putting more light in the mixture than exists in any one light by itself. If you shine red, green, and blue spotlights on a white surface, you'll have an additive mixture. As Figure 4.17 (on the next page) shows, additive and subtractive mixtures of the same colors produce different results. Human processes of color perception parallel additive color mixing much more closely than subtractive mixing, as you'll see in the following discussion of theories of color vision.

Trichromatic Theory of Color Vision



The *trichromatic theory* of color vision (*tri* for "three," *chroma* for "color") was first stated by Thomas Young and modified later by Hermann von Helmholtz (1852). The **trichromatic theory of color vision holds that the human eye has three types of receptors**

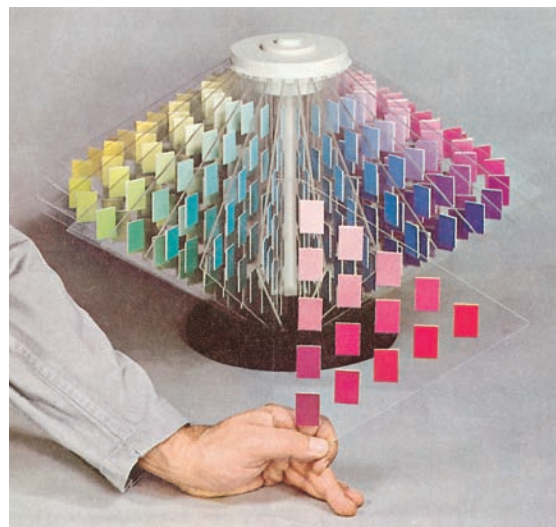


Figure 4.16

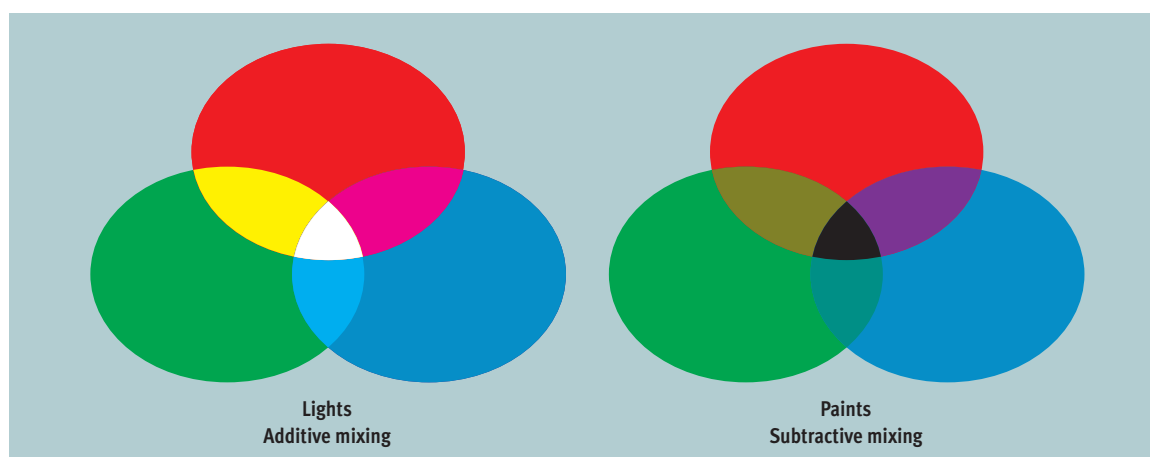
The color solid. The color solid shows how color varies along three perceptual dimensions: brightness (increasing from the bottom to the top of the solid), hue (changing around the solid's perimeter), and saturation (increasing toward the periphery of the solid).

PREVIEW QUESTIONS

- How are additive and subtractive color mixing different?
- How have the trichromatic and opponent process theories been reconciled to explain color vision?
- What is feature analysis, and what is the difference between top-down and bottom-up processing?
- What was the basic premise of Gestalt psychology?
- What are the Gestalt principles of form perception?
- How do perceptual hypotheses contribute to form perception?

Figure 4.17

Additive versus subtractive color mixing. Lights mix additively because all the wavelengths contained in each light reach the eye. If red, blue, and green lights are projected onto a white screen, they produce the colors shown on the left, with white at the intersection of all three lights. If paints of the same three colors were combined in the same way, the subtractive mixture would produce the colors shown on the right, with black at the intersection of all three colors. As you can see, additive and subtractive color mixing produce different results.



with differing sensitivities to different light wavelengths. Helmholtz theorized that the eye contains specialized receptors sensitive to the specific wavelengths associated with red, green, and blue. According to this model, people can see all the colors of the rainbow because the eye does its own “color mixing” by varying the ratio of neural activity among these three types of receptors.

The impetus for the trichromatic theory was the demonstration that a light of any color can be matched by the additive mixture of three *primary colors*. Any three colors that are appropriately spaced out in the visible spectrum can serve as primary colors, although red, green, and blue are usually used. Does it sound implausible that three colors should be adequate for creating all other colors? If so, consider that this is exactly what happens on your color TV screen. Additive mixtures of red, green, and blue fool you into seeing all the colors of a natural scene.

Most of the known facts about color blindness also meshed well with trichromatic theory. **Color blindness encompasses a variety of deficiencies in the ability to distinguish among colors.** Color blindness occurs much more frequently in males than in females. Actually, the term *color blindness* is somewhat misleading, since complete blindness to differences in colors is rare. Most people who are color blind are *dichromats*; that is, they make do with only two types of color receptors. There are three types of dichromats, and each type is insensitive to a different color (red, green, or blue, although the latter is rare) (Gouras, 1991). The three deficiencies seen among dichromats support the notion that there are three sets of color receptors, as proposed by trichromatic theory.

Opponent Process Theory of Color Vision

Although trichromatic theory explained some facets of color vision well, it ran aground in other areas.



Consider complementary afterimages, for instance. **Complementary colors are pairs of colors that produce gray tones when mixed together.** The various pairs of complementary colors can be arranged in a *color circle*, such as the one in Figure 4.18. If you stare at a strong color and then look at a white background, you’ll see an *afterimage*—a visual image that persists after a stimulus is removed. The color of the afterimage will be the *complement* of the color you originally stared at. Trichromatic theory cannot account for the appearance of complementary afterimages.

Here’s another peculiarity to consider. If you ask people to describe colors but restrict them to using three names, they run into difficulty. For example, using only red, green, and blue, they simply don’t feel comfortable describing yellow as “reddish green.”

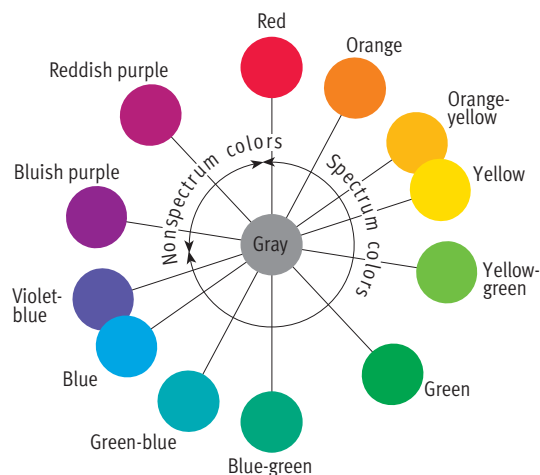


Figure 4.18

The color circle and complementary colors. Colors opposite each other on this color circle are complements, or “opposites.” Additively mixing complementary colors produces gray. Opponent process principles help explain this effect as well as the other peculiarities of complementary colors noted in the text.

However, if you let them have just one more name, they usually choose yellow; they can then describe any color quite well (Gordon & Abramov, 2001). If colors can be reduced to three primaries, why are four color names required to describe the full range of possible colors?

In an effort to answer questions such as these, Ewald Hering proposed the *opponent process theory* in 1878. **The opponent process theory of color vision holds that color perception depends on receptors that make antagonistic responses to three pairs of colors.** The three pairs of opponent colors posited by Hering were red versus green, yellow versus blue, and black versus white. The antagonistic processes in this theory provide plausible explanations for complementary afterimages and the need for four names (red, green, blue, and yellow) to describe colors. Opponent process theory also explains some aspects of color blindness. For instance, it can explain why dichromats typically find it hard to distinguish either green from red or yellow from blue.

Reconciling Theories of Color Vision



Advocates of trichromatic theory and opponent process theory argued about the relative merits of their models for almost a century. Most researchers assumed that one theory must be wrong and the other must be right. In recent decades, however, it has become clear that *it takes both theories to explain color vision*. Eventually a physiological basis for both theories was found. Research that earned George Wald a Nobel prize demonstrated that *the eye has three types of cones*, with each type being most sensitive to a different band of wavelengths, as shown in **Figure 4.19** (Lennie, 2000; Wald, 1964). The three types of cones represent the three different color receptors predicted by trichromatic theory.

Researchers also discovered a biological basis for opponent processes. They found cells in the retina, LGN, and visual cortex *that respond in opposite ways to red versus green and blue versus yellow* (DeValois & Jacobs, 1984; Zrenner et al., 1990). For example, specific ganglion cells in the retina are excited by green and inhibited by red. Other retinal ganglion cells work in just the opposite way, as predicted in opponent process theory.

In summary, the perception of color appears to involve sequential stages of information processing (Hurvich, 1981). The receptors that do the first stage of processing (the cones) seem to follow the principles outlined in trichromatic theory. In later stages of processing, at least some cells in the retina, the LGN, and the visual cortex seem to follow the principles outlined in opponent process theory. As you

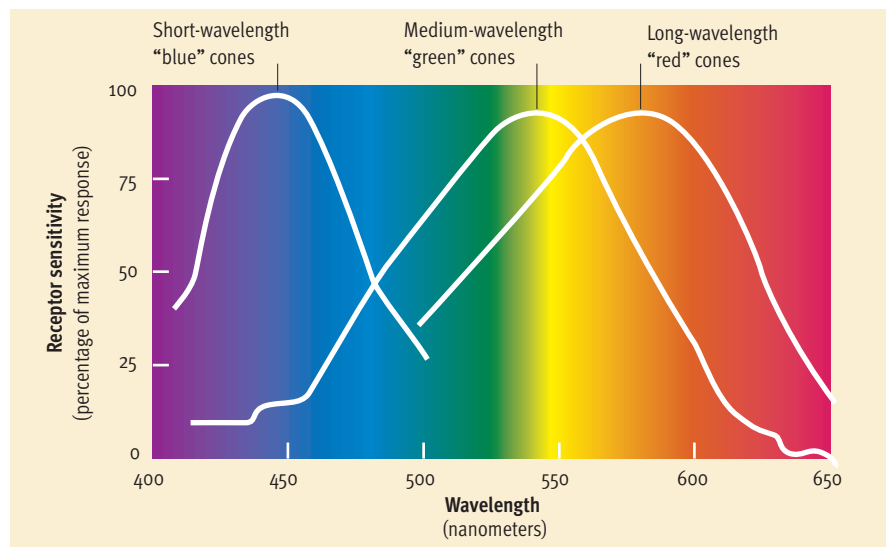


Figure 4.19
Three types of cones.

Research has identified three types of cones that show varied sensitivity to different wavelengths of light. As the graph shows, these three types of cones correspond only roughly to the red, green, and blue receptors predicted by trichromatic theory, so it is more accurate to refer to them as cones sensitive to short, medium, and long wavelengths.

Source: Wald, G., & Brown, P. K. (1965). Human color vision and color blindness. *Symposium Cold Spring Harbor Laboratory of Quantitative Biology*, 30, 345–359 (p. 351). Copyright © 1965. Reprinted by permission of the author.

can see, vigorous theoretical debate about color vision produced a solution that went beyond the contributions of either theory alone.

Recently, theorists have floated an interesting, new explanation for why the human brain evolved to organize color experience into four basic categories. The inspiration for this explanation centers on the fact that mapmakers have long known that a minimum of four colors are needed to create maps in which no two adjacent countries are the same color. Purves, Lotto, and Polger (2000) argue that the human visual system evolved to solve a similar problem—ensuring that no two areas separated by a common boundary will look the same if they are really different. According to Purves et al. (2000), four color categories are required to facilitate the human visual system achieving its chief purpose—reliably distinguishing one object from another.

Perceiving Forms, Patterns, and Objects



The drawing in **Figure 4.20** on the next page is a poster for a circus act involving a trained seal. Take a good look at it. What do you see?

No doubt you see a seal balancing a ball on its nose and a trainer holding a fish and a whip. But suppose you had been told that the drawing is actually a poster for a costume ball. Would you have perceived it differently?

If you focus on the idea of a costume ball (stay with it a minute if you still see the seal and trainer), you will probably see a costumed man and woman in **Figure 4.20**. She's handing him a hat, and he has a sword in his right hand. This tricky little sketch was made ambiguous quite intentionally. It's a **reversible**



Figure 4.20

A poster for a trained seal act. Or is it? The picture is an ambiguous figure, which can be interpreted as either of two scenes, as explained in the text.

the failure to see visible objects or events because one's attention is focused elsewhere. In one such study (Simons & Chabris, 1999), participants watched a video of a group of people in white shirts passing a basketball that was laid over another video of people in black shirts passing a basketball (the two videos were partially transparent). The observers were instructed to focus on one of the two teams and press a key whenever that team passed the ball. Thirty seconds into the task, a woman carrying an umbrella clearly walked through the scene for four seconds. You might guess that this bizarre development would be noticed by virtually all the observers, but 44% of the participants failed to see the woman. Moreover, when someone in a gorilla suit strolled through the same scene, even more subjects (73%) missed the unexpected event!

Additional studies using other types of stimulus materials have demonstrated that people routinely overlook obvious forms that are unexpected (Mack & Rock, 1998). Inattention blindness has been attributed to subjects having a perceptual set that leads them to focus most of their attention on a specific feature in a scene (such as the basketball passes) while neglecting other facets of the scene (Most et al., 2001). Inattention blindness may account for many automobile accidents, as accident reports frequently include the statement "I looked right there, but never saw them" (Shermer, 2004). The idea that we see much less of the world than we think we do surprises many people, but an auditory parallel exists that people take for granted (Mack, 2003). Think of how often you have had someone clearly say something to you, but you did not hear a word of what was said because you were "not listening." Inattention blindness is essentially the same thing in the visual domain.

An understanding of how people perceive forms and objects also requires knowledge of how people *organize* their visual inputs. Several influential approaches to this issue emphasize *feature analysis*.

Feature Analysis: Assembling Forms



The information received by your eyes would do you little good if you couldn't recognize objects and forms—ranging from words on a page to mice in your cellar and friends in the distance. According to some theories, perceptions of form and pattern entail *feature analysis* (Lindsay & Norman, 1977; Maguire et al., 1990). **Feature analysis is the process of detecting specific elements in visual input and assembling them into a more complex form.** In other words, you start with the components of a form, such as lines, edges, and corners, and build them into perceptions



Figure 4.21

Another ambiguous figure. What animal do you see here?

As the text explains, two very different perceptions are possible. This ambiguous figure was devised around 1900 by Joseph Jastrow, a prominent psychologist at the turn of the 20th century (Block & Yaker, 1992).

figure, a drawing that is compatible with two interpretations that can shift back and forth. Another classic reversible figure is shown in **Figure 4.21**. What do you see? A rabbit or a duck? It all depends on how you look at the drawing.

The key point is simply this: *The same visual input can result in radically different perceptions.* No one-to-one correspondence exists between sensory input and what you perceive. *This is a principal reason that people's experience of the world is subjective.* Perception involves much more than passively receiving signals from the outside world. It involves the *interpretation* of sensory input. To some extent, this interpretive process can be influenced by manipulating people's *expectations*. For example, information given to you about the drawing of the "circus act involving a trained seal" created a **perceptual set—a readiness to perceive a stimulus in a particular way.** A perceptual set creates a certain slant in how someone interprets sensory input.

Form perception also depends on the *selection* of sensory input—that is, what people focus their attention on (Chun & Wolfe, 2001). A visual scene may include many objects and forms. Some of them may capture viewers' attention, while others may not. This fact has been demonstrated in dramatic fashion in studies of **inattention blindness, which involves**

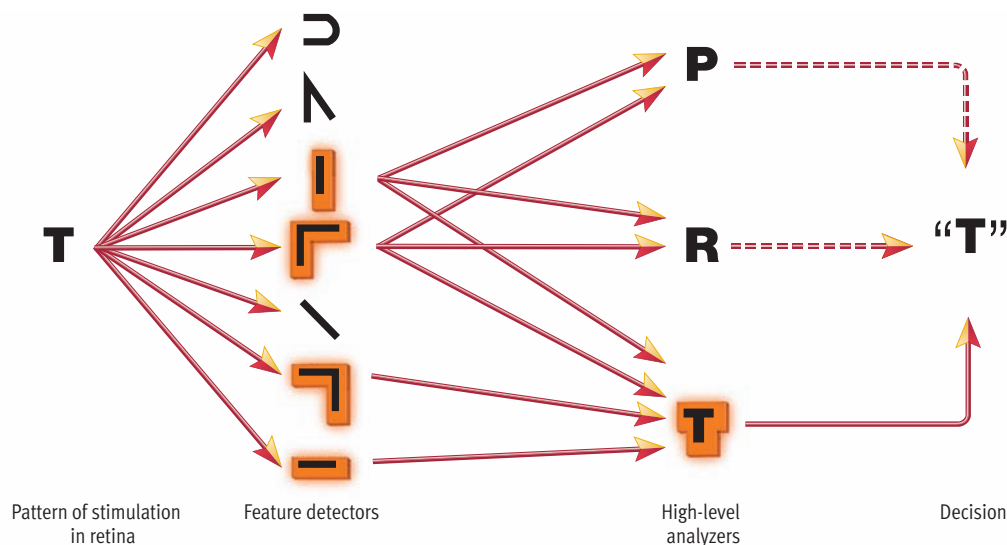


Figure 4.22
Feature analysis in form perception. One vigorously debated theory of form perception is that the brain has cells that respond to specific aspects or features of stimuli, such as lines and angles. Neurons functioning as higher-level analyzers then respond to input from these “feature detectors.” The more input each analyzer receives, the more active it becomes. Finally, other neurons weigh signals from these analyzers and make a “decision” about the stimulus. In this way perception of a form is arrived at by assembling elements from the bottom up.

of squares, triangles, stop signs, bicycles, ice cream cones, and telephones. An application of this model of form perception is diagrammed in **Figure 4.22**.

Feature analysis assumes that form perception involves **bottom-up processing**, a progression from individual elements to the whole (see **Figure 4.23**). The plausibility of this model was bolstered greatly when Hubel and Wiesel showed that cells in the visual cortex operate as highly specialized feature detectors. Indeed, their findings strongly suggested that at least some aspects of form perception involve feature analysis.

Can feature analysis provide a complete account of how people perceive forms? Clearly not. A crucial problem for the theory is that form perception often does not involve bottom-up processing. In fact, there is ample evidence that perceptions of form frequently involve **top-down processing**, a progression from the whole to the elements (see **Figure 4.23**). For example, there is evidence that people can perceive a word before its individual letters, a phenomenon that has to reflect top-down processing (Johnston & McClelland, 1974). If readers depended exclusively on bottom-up processing, they would have to analyze the features of letters in words to recognize them and then assemble the letters into words. This task would be terribly time-consuming and would slow down reading speed to a snail’s pace.

Subjective contours are another phenomenon traditionally attributed to top-down processing, although that view is changing. The phenomenon of **subjective contours** is the perception of contours where none actually exist. Consider, for instance, the triangle shown in **Figure 4.24**. We see the contours of the triangle easily, even though no physical edges or lines are present. It is hard to envision how feature

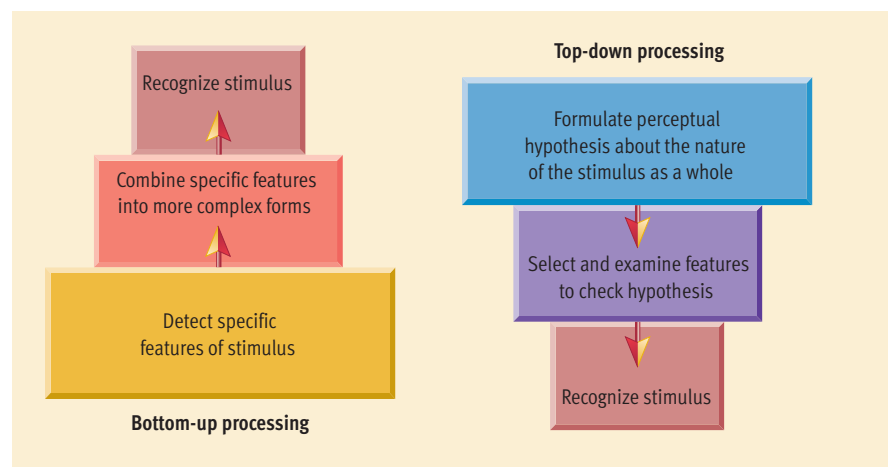
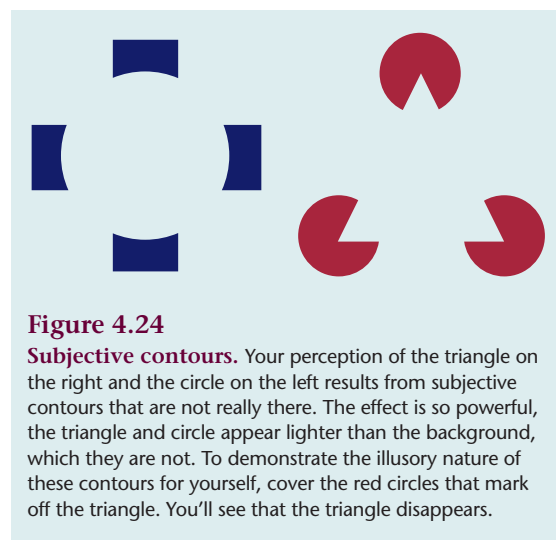


Figure 4.23

Bottom-up versus top-down processing. As explained in these diagrams, bottom-up processing progresses from individual elements to whole elements, whereas top-down processing progresses from the whole to the individual elements.



detectors could detect edges that are not really there, so most theorists have argued that bottom-up models of form perception are unlikely to account for subjective contours. Until recently, the prevailing view was that subjective contours depend on viewing stimulus configurations as wholes and then filling in the blanks (Rock, 1986). However, researchers have demonstrated that feature detectors *do* respond to the edges in subjective contours (Peterhans & von der Heydt, 1991). At present, neural theories of subjective contours that emphasize bottom-up processing or both types of processing are under investigation, with promising results (Gunn et al., 2000; Lesher, 1995). In sum, it appears that both top-down and bottom-up processing have their niches in form perception.

Looking at the Whole Picture: Gestalt Principles



Top-down processing is clearly at work in the principles of form perception described by the Gestalt psychologists. *Gestalt psychology* was an influential school of thought that emerged out of Germany during the first half of the 20th century. (*Gestalt* is a German word for “form” or “shape.”) Gestalt psychologists repeatedly demonstrated that *the whole can be greater than the sum of its parts*.

A simple example of this principle is the *phi phenomenon*, first described by Max Wertheimer in 1912. **The *phi phenomenon* is the illusion of movement created by presenting visual stimuli in rapid succession.** You encounter examples of the phi phenomenon nearly every day. For example, movies and TV consist of separate still pictures projected rapidly one after the other. You see smooth motion, but in reality the “moving” objects merely take slightly different positions in successive frames. Viewed as a whole, a movie has a property (motion) that isn’t evident in any of its parts (the individual frames). The Gestalt psychologists formulated a series of principles that describe how the visual system organizes a scene into discrete forms. Let’s examine some of these principles.

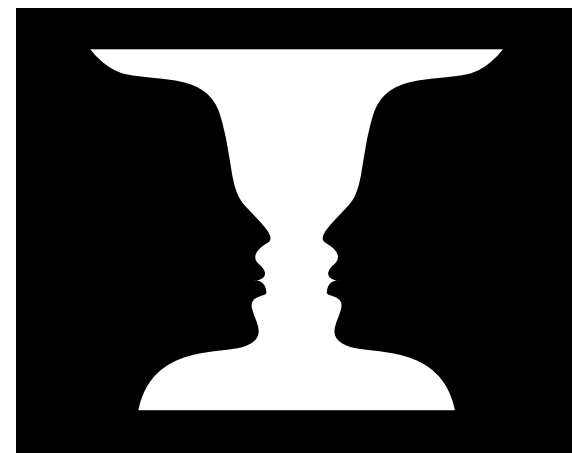


Figure 4.25

The principle of figure and ground. Whether you see two faces or a vase depends on which part of this drawing you see as figure and which as background. Although this reversible drawing allows you to switch back and forth between two ways of organizing your perception, you can’t perceive the drawing both ways at once.

Figure and Ground. Take a look at **Figure 4.25**. Do you see the figure as two silhouetted faces against a white background, or as a white vase against a black background? This reversible figure illustrates the Gestalt principle of *figure and ground*. Dividing visual displays into figure and ground is a fundamental way in which people organize visual perceptions (Baylis & Driver, 1995). The *figure* is the thing being looked at, and the *ground* is the background against which it stands. Figures seem to have more substance and shape, appear closer to the viewer, and seem to stand out in front of the ground. Other things being equal, an object is more likely to be viewed as a figure when it is smaller in size, higher in contrast, or greater in symmetry (Palmer, 2003), and especially when it is lower in one’s frame of view (Vecera, Vogel, & Woodman, 2002). More often than not, your visual field may contain many figures sharing a background. The following Gestalt principles relate to how these elements are grouped into higher-order figures (Palmer, 2003).

Proximity. Things that are near one another seem to belong together. The black dots in the upper left panel of **Figure 4.26(a)** could be grouped into vertical columns or horizontal rows. However, people tend to perceive rows because of the effect of proximity (the dots are closer together horizontally).

Closure. People often group elements to create a sense of *closure*, or completeness. Thus, you may “complete” figures that actually have gaps in them. This principle is demonstrated in the upper right panel of **Figure 4.26(b)**.



MAX WERTHEIMER

“The fundamental ‘formula’ of Gestalt theory might be expressed in this way: There are wholes, the behaviour of which is not determined by that of their individual elements.”

The illusion of movement in a highway construction sign is an instance of the phi phenomenon, which is also at work in motion pictures and television. The phenomenon illustrates the Gestalt principle that the whole can have properties that are not found in any of its parts.



© Tony Freeman/PhotoEdit

Similarity. People also tend to group stimuli that are similar. This principle is apparent in **Figure 4.26(c)**, where viewers group elements of similar lightness into the number two.

Simplicity. The Gestaltists' most general principle was the law of *Pragnanz*, which translates from German as "good form." The idea is that people tend to group elements that combine to form a good figure. This principle is somewhat vague in that it's often difficult to spell out what makes a figure "good" (Biederman, Hilton, & Hummel, 1991). Some theorists maintain that goodness is largely a matter of simplicity, asserting that people tend to organize forms in the simplest way possible (see **Figure 4.26d**).

Continuity. The principle of continuity reflects people's tendency to follow in whatever direction they've been led. Thus, people tend to connect points that

result in straight or gently curved lines that create "smooth" paths, as shown in the bottom panel of **Figure 4.26(e)**.

Although Gestalt psychology is no longer an active theoretical orientation in modern psychology, its influence is still felt in the study of perception (Banks & Krajiček, 1991). The Gestalt psychologists raised many important questions that still occupy researchers, and they left a legacy of many useful insights about form perception that have stood the test of time (Sharps & Wertheimer, 2000).

Formulating Perceptual Hypotheses

The Gestalt principles provide some indications of how people organize visual input. However, scientists are still one step away from understanding how these organized perceptions result in a representation of the real world. Understanding the problem

Web Link 4.3



Sensation and Perception Tutorials
John Krantz of Hanover College has assembled a collection of quality tutorials on sensation and perception. Topics covered include receptive fields, depth perception, Gestalt laws, and the use of perceptual principles in art.

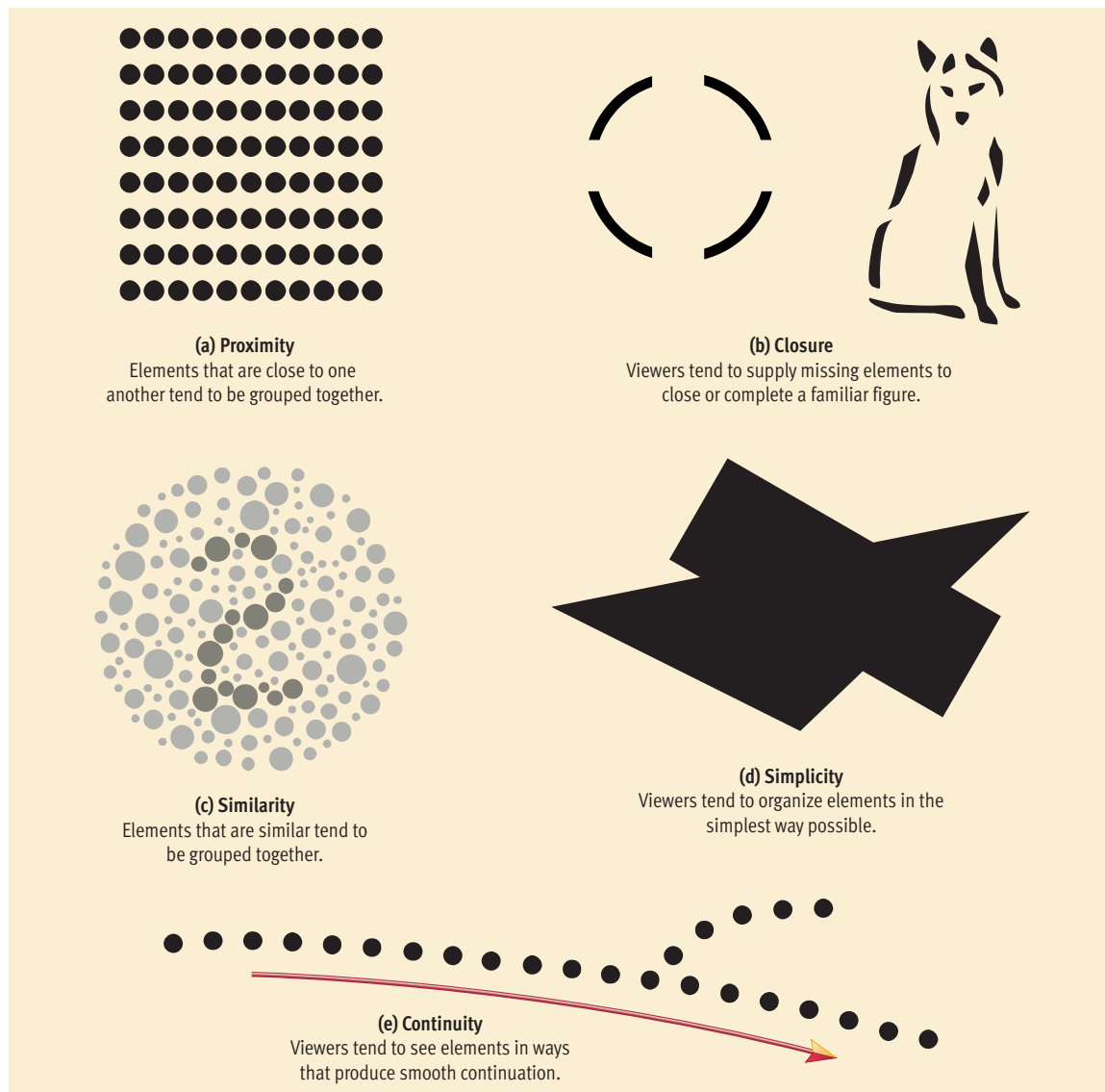


Figure 4.26
Gestalt principles of perceptual organization.

Gestalt principles help explain some of the factors that influence form perception.

(a) Proximity: These dots might well be organized in vertical columns rather than horizontal rows, but because of proximity (the dots are closer together horizontally), they tend to be perceived in rows. **(b) Closure:** Even though the figures are incomplete, you fill in the blanks and see a circle and a dog. **(c) Similarity:** Because of similarity of color, you see dots organized into the number 2 instead of a random array. If you did not group similar elements, you wouldn't see the number 2 here. **(d) Simplicity:** You could view this as a complicated 11-sided figure, but given the preference for simplicity, you are more likely to see it as an overlapping rectangle and triangle.

(e) Continuity: You tend to group these dots in a way that produces a smooth path rather than an abrupt shift in direction.

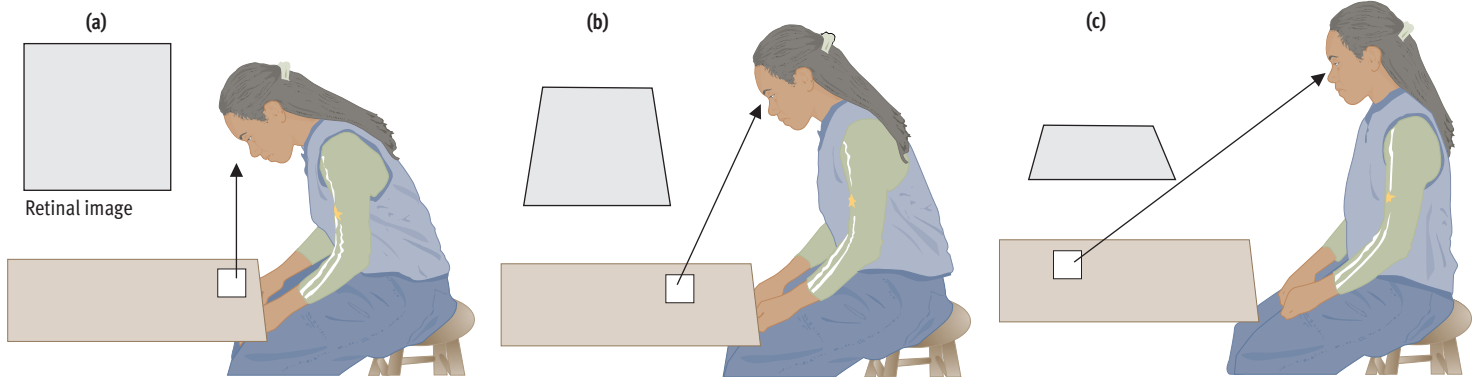


Figure 4.27

Distal and proximal stimuli.

Proximal stimuli are often distorted, shifting representations of distal stimuli in the real world. If you look directly down at a small, square piece of paper on a desk (a), the distal stimulus (the paper) and the proximal stimulus (the image projected on your retina) will both be square. But as you move the paper away on the desktop, as shown in (b) and (c), the square distal stimulus projects an increasingly trapezoidal image on your retina, making the proximal stimulus more and more distorted. Nevertheless, you continue to perceive a square.

requires distinguishing between two kinds of stimuli: distal and proximal (Hochberg, 1988). **Distal stimuli are stimuli that lie in the distance (that is, in the world outside the body).** In vision, these are the objects that you're looking at. They are "distant" in that your eyes don't touch them. What your eyes do "touch" are the images formed by patterns of light falling on your retinas. These images are the **proximal stimuli, the stimulus energies that impinge directly on sensory receptors.** The distinction is important, because there are great differences between the objects you perceive and the stimulus energies that represent them.

In visual perception, the proximal stimuli are distorted, two-dimensional versions of their actual, three-dimensional counterparts. For example, consider the distal stimulus of a square such as the one in Figure 4.27. If the square is lying on a desk in front of you, it is actually projecting a trapezoid (the proximal stimulus) onto your retinas, because the top of the square is farther from your eyes than the bottom. Obviously, the trapezoid is a distorted representation of the square. If what people have to work with is so

distorted a picture, how do they get an accurate view of the world out there?

One explanation is that people bridge the gap between distal and proximal stimuli by constantly making and testing *hypotheses* about what's out there in the real world (Gregory, 1973). Thus, **a perceptual hypothesis is an inference about which distal stimuli could be responsible for the proximal stimuli sensed.** In effect, people make educated guesses about what form could be responsible for a pattern of sensory stimulation. The square in Figure 4.27 may project a trapezoidal image on your retinas, but your perceptual system "guesses" correctly that it's a square—and that's what you see.

Let's look at another ambiguous drawing to further demonstrate the process of making a perceptual hypothesis. Figure 4.28 is a famous reversible figure, first published as a cartoon in a humor magazine. Perhaps you see a drawing of a young woman looking back over her right shoulder. Alternatively, you might see an old woman with her chin down on her chest. The ambiguity exists because there isn't enough information to force your perceptual system to accept only one of these hypotheses. Incidentally, studies show that people who are led to *expect* the young woman or the old woman generally see the one they expect (Leeper, 1935). This is another example of how perceptual sets influence what people see.

Psychologists have used a variety of reversible figures to study how people formulate perceptual hypotheses. Another example can be seen in Figure 4.29, which shows the *Necker cube*. The shaded surface can

Figure 4.28

A famous reversible figure.

What do you see? Consult the text to learn what the two possible interpretations of this figure are.

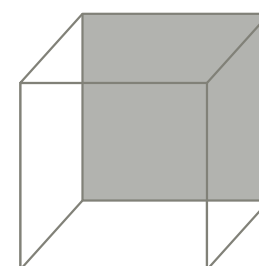


Figure 4.29

The Necker cube. The tinted surface of this reversible figure can become either the front or the back of the cube.

appear as either the front or the rear of the transparent cube. If you look at the cube for a while, your perception will alternate between these possibilities.

The *context* in which something appears often guides people's perceptual hypotheses. To illustrate, take a look at **Figure 4.30**. What do you see? You probably saw the words "THE CAT." But look again; the middle characters in both words are identical. You identified an "H" in the first word and an "A" in the second because of the surrounding letters, which created an expectation—another example of top-down processing in visual perception. The power of expectations explains why typographical errors like those in this sentence often pass unobserved (Lachman, 1996).

Our perceptual hypotheses clearly are guided by our experience-based expectations. For example, subjects recognize everyday objects more quickly when they are presented from familiar viewpoints as opposed to unfamiliar viewpoints (Enns, 2004; see **Figure 4.31**). We also realize that certain objects and settings generally go together. We expect to see a sofa sitting in a living room, but not on a beach. When subjects are given brief glimpses of objects in typical versus unusual settings, the objects that appear in typical settings are identified more accurately (Davenport & Potter, 2004; see **Figure 4.32**). This finding illustrates the importance of both context and experience.

➤ REVIEW OF KEY POINTS

- Perceptions of color (hue) are primarily a function of light wavelength, while amplitude affects brightness and purity affects saturation. There are two types of color mixing: additive and subtractive. Human color perception depends on processes that resemble additive color mixing.
- The trichromatic theory holds that people have three types of receptors that are sensitive to wavelengths associated with red, green, and blue. The opponent process theory holds that color perception depends on receptors that make antagonistic responses to red versus green, blue versus yellow, and black versus white. The evidence now suggests that both theories are necessary to account for color vision.
- Reversible figures and perceptual sets demonstrate that the same visual input can result in very different perceptions. Form perception depends on both the selection and interpretation of sensory inputs. According to feature analysis theories, people detect specific elements in stimuli and build them into recognizable forms through bottom-up processing. However, form perception also involves top-down processing, which progresses from the whole to the elements.
- Gestalt psychology emphasized that the whole may be greater than the sum of its parts (features), as illustrated by the Gestalt principles of form perception, including figure-ground, proximity, similarity, continuity, closure, and simplicity. Other approaches to form perception emphasize that people develop perceptual hypotheses about the distal stimuli that could be responsible for the proximal stimuli that are sensed. These perceptual hypotheses are guided by experience-based expectations.



Figure 4.30

Context effects. You probably read these letters as "THE CAT" even though the middle letter of each word is the same. This simple demonstration shows that the context in which a stimulus is seen can affect your perceptual hypotheses.

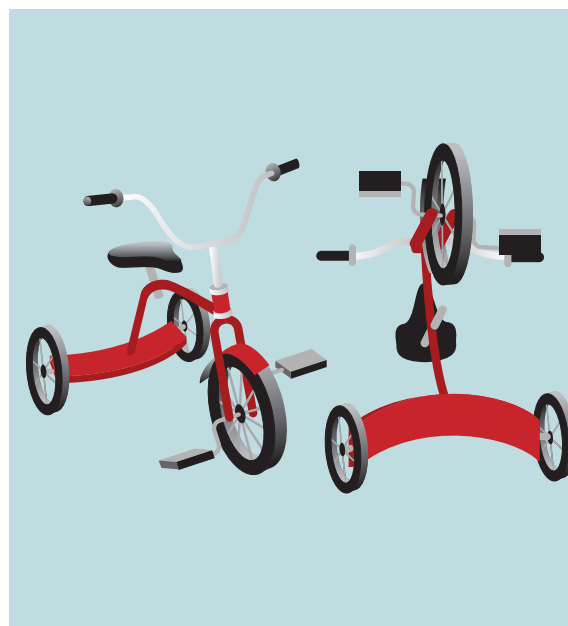


Figure 4.31

Effect of viewpoint on form perception. Research on object recognition shows that the time needed to recognize an object depends on the perspective from which it is viewed (Enns, 2004). Subjects recognize familiar, prototypical views of everyday objects (such as the tricycle on the left) more quickly than atypical views of the same objects (such as the tricycle on the right) (Palmer, Rosch, & Chase, 1981). This finding shows that our perceptual hypotheses are guided by our experience.

Source: Enns, J. T. (2004). *The thinking eye, the seeing brain: Explorations in visual cognition*. Copyright © 2004 by W. W. Norton & Company. Used by permission.



Figure 4.32

Effect of object and background consistency on object recognition. In a study by Davenport and Potter (2004), participants were given brief glimpses of objects that were presented in a typical setting consistent with expectations, such as a football player on a football field or a priest in a church (top), or in an unusual, unexpected setting, as seen in the bottom photos, where the priest is on a football field and the football player is in a church. The findings showed that when objects are consistent with their background, they are recognized more accurately. Thus, context and experience affect form perception.

Source: Davenport, J. L., & Potter, M. C. (2004). Scene consistency in object and background perception. *Psychological Science*, 15, 559-564. Reprinted by permission of Blackwell Publishers and the author.

PREVIEW QUESTIONS

- What are some binocular and monocular depth cues?
- Are there cultural differences in depth perception?
- Why do hills look steeper than they are?
- What are perceptual constancies?
- What do optical illusions reveal about perceptual processes?

Perceiving Depth or Distance



More often than not, forms and figures are objects in space. Spatial considerations add a third dimension to visual perception. **Depth perception involves interpretation of visual cues that indicate how near or far away objects are.** To make judgments of distance, people rely on a variety of cues, which can be classified into two types: binocular and monocular (Hochberg, 1988; Proffitt & Caudek, 2003).

Binocular Cues



Because the eyes are set apart, each eye has a slightly different view of the world. **Binocular depth cues are clues about distance based on the differing views of the two eyes.** “Stereo” viewers like the Viewmaster toy you may have had as a child make use of this principle by presenting slightly different flat images of the same scene to each eye. The brain then supplies the “depth,” and you perceive a three-dimensional scene.

The principal binocular depth cue is **retinal disparity, which refers to the fact that objects within 25 feet project images to slightly different locations on the right and left retinas, so each eye sees a slightly different view of the object.** The closer an object gets, the greater the disparity between the images seen by each eye. Thus, retinal disparity increases as objects come closer, providing information about distance. Another binocular cue is **convergence, which involves sensing the eyes converging toward each other as they focus on closer objects.**

Image Not Available

Monocular Cues



Monocular depth cues are clues about distance based on the image in either eye alone. There are two kinds of monocular cues to depth. One kind is the result of active use of the eye in viewing the world. For example, as an object comes closer, you may sense the accommodation (the change in the curvature of the lens) that must occur for the eye to adjust its focus. Furthermore, if you cover one eye and move your head from side to side, closer objects appear to move more than distant objects. In a similar vein, you may notice when driving along a highway that nearby objects (such as fenceposts along the road) appear to move by more rapidly than objects that are farther away (such as trees in the distance). Thus, you get cues about depth from **motion parallax, which involves images of objects at different distances moving across the retina at different rates.**

The other kind of monocular cues are **pictorial depth cues—clues about distance that can be given in a flat picture.** There are many pictorial cues to depth, which is why some paintings and photographs seem so realistic that you feel you can climb right into them. Six prominent pictorial depth cues are described and illustrated in **Figure 4.33.** **Linear perspective** is a depth cue reflecting the fact that lines converge in the distance. Because details are too small to see when they are far away, **texture gradients** can provide information about depth. If an object comes between you and another object, it must be closer to you, a cue called **interposition.** **Relative size** is a cue because closer objects appear larger. **Height in plane** reflects the fact that distant objects appear higher in a picture. Finally, the familiar effects of shadowing make **light and shadow** useful in judging distance.

There appear to be some cultural differences in the ability to take advantage of pictorial depth cues in two-dimensional drawings. These differences were first investigated by Hudson (1960, 1967), who presented pictures like that shown in **Figure 4.34** to various cultural groups in South Africa. Hudson’s approach was based on the assumption that subjects who indicate that the hunter is trying to spear the elephant instead of the antelope don’t understand the depth cues (interposition, relative size, height in plane) in the picture, which place the elephant in the distance. Hudson found that subjects from a rural South African tribe (the Bantu), who had little exposure at that time to pictures and photos, frequently misinterpreted the depth cues in his pictures. Similar difficulties with depth cues in pictures have been documented for other cultural groups who have lit-



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Linear perspective Parallel lines that run away from the viewer seem to get closer together.



© Jean-Marc Truchet/Getty Images

Texture gradient As distance increases, a texture gradually becomes denser and less distinct.



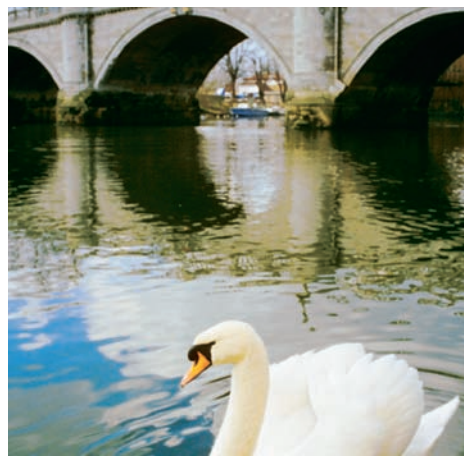
© Ron Fehling/Masterfile

Interposition The shapes of near objects overlap or mask those of more distant ones.



© Jose Fuste Raga/zefa/Corbis

Relative size If separate objects are expected to be of the same size, the larger ones are seen as closer.



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Height in plane Near objects are low in the visual field; more distant ones are higher up.



U. S. Department of Energy

Light and shadow Patterns of light and dark suggest shadows that can create an impression of three-dimensional forms.

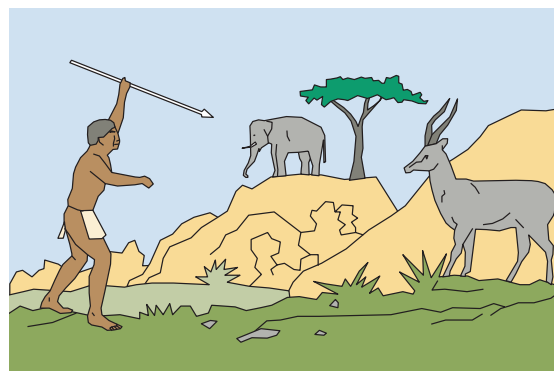
Figure 4.33

Pictorial cues to depth. Six pictorial depth cues are explained and illustrated here. Although one cue stands out in each photo, in most visual scenes several pictorial cues are present. Try looking at the light-and-shadow picture upside down. The change in shadowing reverses what you see.

the experience with two-dimensional representations of three-dimensional space (Berry et al., 1992). Thus, the application of pictorial depth cues to pictures varies to some degree across cultures.

Perceiving Geographical Slant

The perception of *geographical slant* involves making judgments about how steep hills and other inclines are in relation to the norm of a flat, horizontal surface. As with depth perception, the perception of geographical slant involves juggling spatial considerations. However, unlike with depth perception, which has a rich tradition of empirical inquiry, the perception of geographical slant has largely been neglected



by researchers. Nevertheless, a clever series of studies has turned up some thought-provoking findings and raised some interesting questions. We will look at this work in our Featured Study for Chapter 4.

Figure 4.34

Testing understanding of pictorial depth cues. In his cross-cultural research, Hudson (1960) asked subjects to indicate whether the hunter is trying to spear the antelope or the elephant. He found cultural disparities in subjects' ability to make effective use of the pictorial depth cues, which place the elephant in the distance and make it an unlikely target.

Source: Adapted by permission from an illustration by Ilil Arbel, in Derogowski, J. B. (1972, November). Pictorial perception and culture. *Scientific American*, 227 (5), p. 83. Copyright © 1972 by Scientific American, Inc. All rights reserved.



Recognizing Pictorial Depth Cues

Painters routinely attempt to create the perception of depth on a flat canvas by using pictorial depth cues. Figure 4.33 (on previous page) describes and illustrates six pictorial depth cues, most of which are apparent in van Gogh's colorful piece *Corridor in the Asylum* (1889). Check your understanding of depth perception by trying to spot the depth cues in the painting.

In the list below, check off the depth cues used by van Gogh. The answers can be found in the back of the book in Appendix A. You can learn more about how artists use the principles of visual perception in the Personal Application at the end of this chapter.

Image Not Available

- | | |
|---------------------------|-----------------------------|
| _____ 1. Interposition | _____ 4. Relative size |
| _____ 2. Height in plane | _____ 5. Light and shadow |
| _____ 3. Texture gradient | _____ 6. Linear perspective |

FEATURED Study

Source: Proffitt, D. R., Bhalla, M., Gossweiler, R., & Midgett, J. (1995). Perceiving geographical slant. *Psychonomic Bulletin and Review*, 2, 409-428.

Why Hills Look Steeper Than They Are

Accurate perceptions of geographical slant have obvious practical significance for people walking up hills, skiing down mountain slopes, working on pitched roofs, and so forth. Yet anecdotal accounts suggest that people tend to overestimate geographical slant. Thus, Proffitt and his colleagues set out to collect the first systematic data on everyday geographical pitch perception. They ended up conducting a series of five studies. We'll examine the first study in detail and then briefly discuss the followup studies.

Method

Participants. Three hundred students at the University of Virginia agreed to participate in the study when asked by an experimenter stationed near the bottom of various hills around campus. Each participant made estimates for only one hill.

Stimuli. Nine hills on the University of Virginia campus were used as stimuli. The experimenters chose hills with lots of foot traffic, unobstructed views, and wide variation in geographical slant. The inclinations of the nine hills were 2, 4, 5, 6, 10, 21, 31, 33, and 34 degrees. To put these figures in perspective, the authors note that 9 degrees is the steepest incline allowed for roads in Virginia and that a 30-degree hill is about the limit of what most people can walk up (the very steep hills on campus had stairs nearby).

Measures and apparatus. The participants were asked to estimate geographical slant in three ways. They provided a *verbal measure* by estimating the slope of the hill they were viewing in degrees. They provided a *vi-*

sual measure by adjusting the incline on the disk shown in **Figure 4.35(a)** to match the slope of the hill they were viewing. Finally, they provided a *haptic measure* (one based on touch) by adjusting the tilt board shown in **Figure 4.35(b)** to match the slope of the stimulus hill. To keep the latter measure exclusively haptic and not visual, participants were not allowed to look at their hand while they adjusted the tilt board.

Results

The mean slant estimates for all three measures and all nine hills are summarized graphically in **Figure 4.36**. As you can see, the participants' verbal and visual judgments resulted in large overestimates of all nine hills' geographic slant. For example, participants' verbal estimates for the 5-degree hill in the study averaged 20 degrees. Similarly, their visual estimates for the 10-degree hill averaged 25 degrees. In contrast, the subjects' haptic judgments were much more accurate.

Discussion

Why do hills appear substantially steeper than they are? Why are haptic judgments relatively immune to this peculiar perceptual bias? The authors argue that the data for all three measures make sense from an adaptive point of view. Subjects' verbal and visual estimates reflect their conscious awareness of how challenging hills will be to climb. Overestimates of slant are functional in that they should prevent people from undertaking climbs they are not equipped to handle, and they lead people to pace themselves and conserve energy on the steep hills

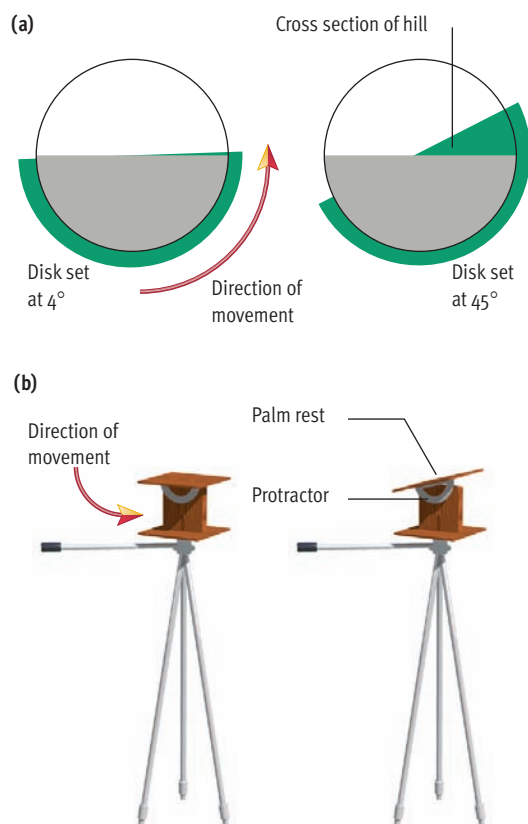


Figure 4.35

Apparatus used to measure visual and haptic estimates of geographical slant. (a) Visual estimates of pitch were made by adjusting the incline on a disk to match the incline of the hill. (b) Haptic estimates of pitch were made by adjusting a tilt board by hand without looking at it.

Source: Adapted from Proffitt, D. R., Bhalla, M., Gossweiler, R., & Midgett, J. (1995). Perceiving geographical slant. *Psychonomic Bulletin & Review*, 214, 409–428. Copyright © 1995 by Psychonomic Society Publications. Reprinted by permission.

they do attempt to traverse. Although overestimates of slant may be functional when people make conscious decisions about climbing hills, they would be dysfunctional if they distorted people's locomotion on hills. If people walking up a 5-degree hill raised their feet to accommodate a 20-degree slope, they would stumble. Accurate tactile perceptions are thus crucial to people's motor responses when they walk up a hill, so it is functional for haptic perceptions to be largely unaffected by the misperception of slant. Thus, learning, or evolution, or some combination has equipped people with perceptual responses that are adaptive.

In their followup studies, Proffitt and his colleagues (1995) replicated and extended their original findings. In their second study, for instance, they found that verbal and visual overestimates of pitch are even more pronounced when hills are viewed from the top rather than the bottom. They argue

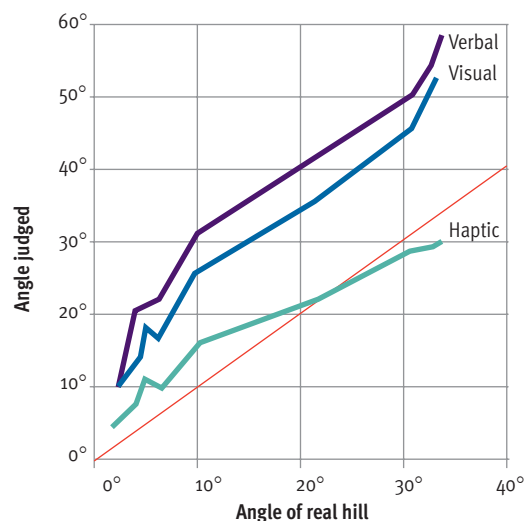


Figure 4.36

Mean slant estimates. The average pitch estimates for all three types of measures are plotted here. The red line shows where accurate estimates would fall. As you can see, verbal and visual measures yielded substantial overestimates, but haptic measures were reasonably accurate.

Source: Adapted from Proffitt, D. R., Bhalla, M., Gossweiler, R., & Midgett, J. (1995). Perceiving geographical slant. *Psychonomic Bulletin & Review*, 214, 409–428. Copyright © 1995 by Psychonomic Society Publications. Reprinted by permission.

Comment

The study of sensation and perception is one of the oldest areas of scientific research in psychology. Yet this study shows that there are still fascinating areas of inquiry that remain unexplored. It just takes some creativity and insight to recognize them. This research also illustrates the importance of using more than a single measure of the phenomenon that one is interested in. The investigators chose to assess the dependent variable of slant perception in several ways, leading to a much richer understanding of slant perception than if only one of the three measures had been used. Finally, the highly exaggerated estimates of slant show once again that human perceptions are not simple reflections of reality, although most people tend to assume that they are. The authors note that many of their subjects were “incredulous” during their postexperimental briefings: “To look at a 10-degree hill—typically judged to be about 30 degrees by verbal reports and visual matching—and to be told that it is actually 10 degrees is an astonishing experience for anyone unfamiliar with the facts of geographical slant overestimation” (p. 425).

that this bias makes functional sense because steep hills are much harder to descend than ascend. In another study, subjects' fatigue was manipulated by having the participants make slant estimates before or after an exhausting run. *Consistent with their adaptive perspective, the investigators found that hills look*

even steeper when people are tired. Their findings on the influence of fatigue demonstrate once again that perception is a highly subjective process.

Perceptual Constancies in Vision

When a person approaches you from a distance, his or her image on your retinas gradually changes in size. Do you perceive that the person is growing right before your eyes? Of course not. Your perceptual system constantly makes allowances for this variation in visual input. The task of the perceptual system is to provide an accurate rendition of distal stimuli based on distorted, ever-changing proximal stimuli. In doing so, it relies in part on perceptual constancies. **A perceptual constancy is a tendency to experience a stable perception in the face of continually changing sensory input.** Among other things, people tend to view objects as having a stable size, shape, brightness, hue, and location in space.

The Power of Misleading Cues: Visual Illusions



In general, perceptual constancies, depth cues, and principles of visual organization (such as the Gestalt laws) help people perceive the world accurately. Sometimes, however, perceptions are based on inappropriate assumptions, and *visual illusions* can result. **A visual illusion involves an apparently inexplicable discrepancy between the appearance of a visual stimulus and its physical reality.**

One famous visual illusion is the *Müller-Lyer illusion*, shown in **Figure 4.37**. The two vertical lines in this figure are equally long, but they certainly don't look that way. Why not? Several mechanisms probably play a role (Day, 1965; Gregory, 1978). The figure on the left looks like the outside of a building, thrust toward the viewer, while the one on the right looks like an inside corner, thrust away (see **Figure 4.38**). The vertical line in the left figure therefore seems closer. If two lines cast equally long retinal images but one seems closer, the closer one is assumed to be shorter. Thus, the *Müller-Lyer illusion* may result from a combination of size constancy processes and misperception of depth.

The geometric illusions shown in **Figure 4.39** also demonstrate that visual stimuli can be highly deceptive. The *Ponzo illusion*, which is shown at the top of **Figure 4.39**, appears to result from the same factors at work in the *Müller-Lyer illusion* (Coren & Girgus, 1978). The upper and lower horizontal lines are the same length, but the upper one appears longer. This

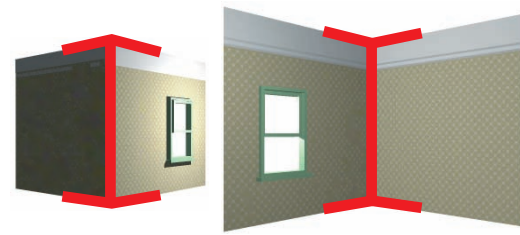


Figure 4.38

Explaining the Müller-Lyer illusion. The figure on the left seems to be closer, since it looks like an outside corner thrust toward you, whereas the figure on the right looks like an inside corner thrust away from you. Given retinal images of the same length, you assume that the “closer” line is shorter.

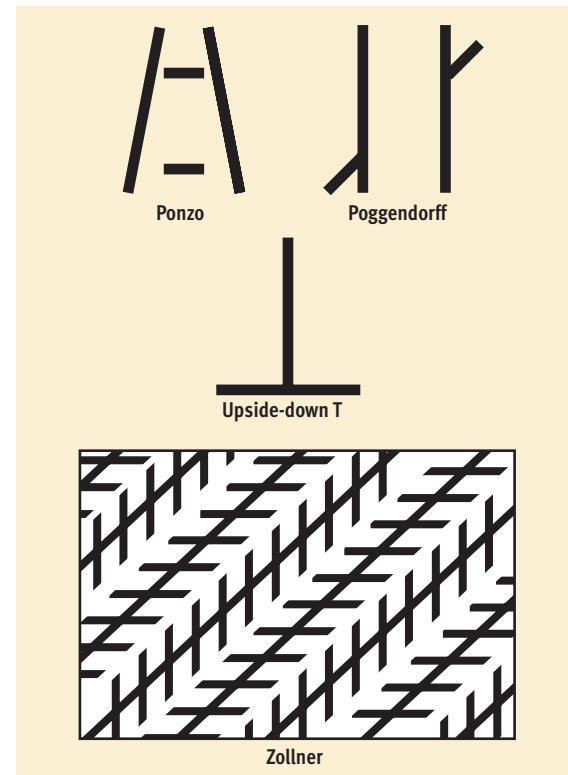


Figure 4.39

Four geometric illusions. **Ponzo:** The horizontal lines are the same length. **Poggendorff:** The two diagonal segments lie on the same straight line. **Upside-down T:** The vertical and horizontal lines are the same length. **Zollner:** The long diagonals are all parallel (try covering up some of the short diagonal lines if you don't believe it).

illusion probably occurs because the converging lines convey linear perspective, a key depth cue suggesting that the upper line lies farther away. **Figure 4.40** shows a drawing by Stanford University psychologist Roger Shepard (1990) that creates a similar illusion. The second monster appears much larger than the first, even though they are really identical in size.

Adelbert Ames designed a striking illusion that makes use of misperception of distance. It's called,

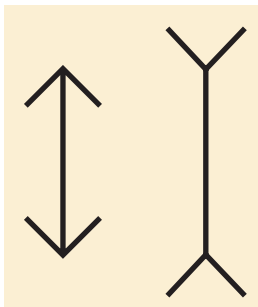


Figure 4.37

The Müller-Lyer illusion. The vertical lines in this classic illusion are very deceptive. Although they do not appear to be the same length, they are. Go ahead, measure them.



Figure 4.40

A monster of an illusion. The principles underlying the Ponzo illusion also explain the striking illusion seen here, in which two identical monsters appear to be quite different in size, although they really are equal in size.

Source: Shepard, R. N. (1990). *Mind Sights*. New York: Henry Holt & Co. Copyright 1990 by Roger N. Shepard. Used by permission of Henry Holt & Co., LLC.

appropriately enough, the *Ames room*. It's a specially contrived room built with a trapezoidal rear wall and a sloping floor and ceiling. When viewed from the correct point, as in the picture, it looks like an ordinary rectangular room (see **Figure 4.41**). But in reality, the

left corner is much taller and much farther from the viewer than the right corner. Hence, bizarre illusions unfold in the Ames room. People standing in the right corner appear to be giants, while those standing in the left corner appear to be midgets. Even more disconcerting, a person who walks across the room from right to left appears to shrink before your eyes! The Ames room creates these misperceptions by toying with the perfectly reasonable assumption that the room is vertically and horizontally rectangular.

Impossible figures create another form of illusion. **Impossible figures** are objects that can be represented in two-dimensional pictures but cannot exist in three-dimensional space. These figures may look fine at first glance, but a closer look reveals that they are geometrically inconsistent or impossible. Three widely studied impossible figures are shown in **Figure 4.42** on the next page, and a more recent impossible figure created by Roger Shepard (1990) can be seen in **Figure 4.43**. Notice that specific portions of these figures are reasonable, but they don't add up to a sensible whole. The parts don't interface properly. The initial illusion that the figures make sense is probably a result of bottom-up processing. You perceive specific features of the figure as acceptable but are baffled as they are built into a whole.

Obviously, illusions such as impossible figures and their real-life relative, the Ames room, involve a conspiracy of cues intended to deceive the viewer. Many visual illusions, however, occur quite naturally. A well-known example is the *moon illusion*. The full moon appears to be much smaller when overhead than when looming on the horizon (see the photo on the next page). As with many of the other illusions we have discussed, the moon illusion appears

Web Link 4.4



IllusionWorks

IllusionWorks bills itself as "the most comprehensive collection of optical and sensory illusions on the World Wide Web." At both "introductory" and "advanced" levels of explanation, this is an excellent resource for experiencing some of the strangest and most thought-provoking illusions ever created.



Wayne Weiten

Figure 4.41

The Ames room. The diagram on the right shows the room as it is actually constructed. However, the viewer assumes that the room is rectangular, and the image cast on the retina is consistent with this hypothesis. Because of this reasonable perceptual hypothesis, the normal perceptual adjustments made to preserve size constancy lead to the illusions described in the text. For example, naive viewers "conclude" that the boy on the right is much larger than the other, when in fact he is merely closer.

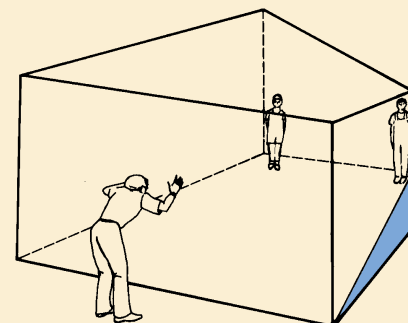


Figure 4.42

Three classic impossible figures. These figures are impossible, yet they clearly exist—on the page. What makes them impossible is that they appear to be three-dimensional representations yet are drawn in a way that frustrates mental attempts to “assemble” their features into possible objects. It’s difficult to see the drawings simply as lines lying in a plane—even though this perceptual hypothesis is the only one that resolves the contradiction.

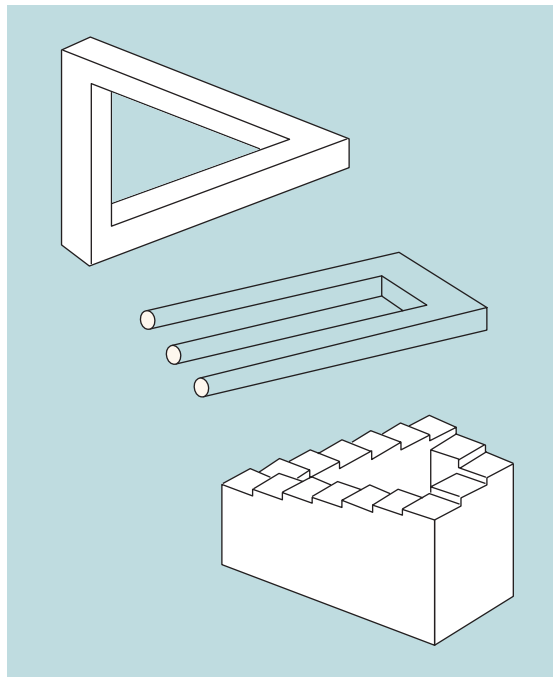


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Figure 4.43

Another impossible figure. This impossible figure, drawn by Stanford University psychologist Roger Shepard (1990), seems even more perplexing than the classic impossible figure that it is based on (the one seen in the middle of Figure 4.42).

Source: Shepard, R. N. (1990). *Mind Sights*. New York: Henry Holt & Co. Copyright 1990 by Roger N. Shepard. Used by permission of Henry Holt & Co., LLC.

Web Link 4.5



The Moon Illusion Explained

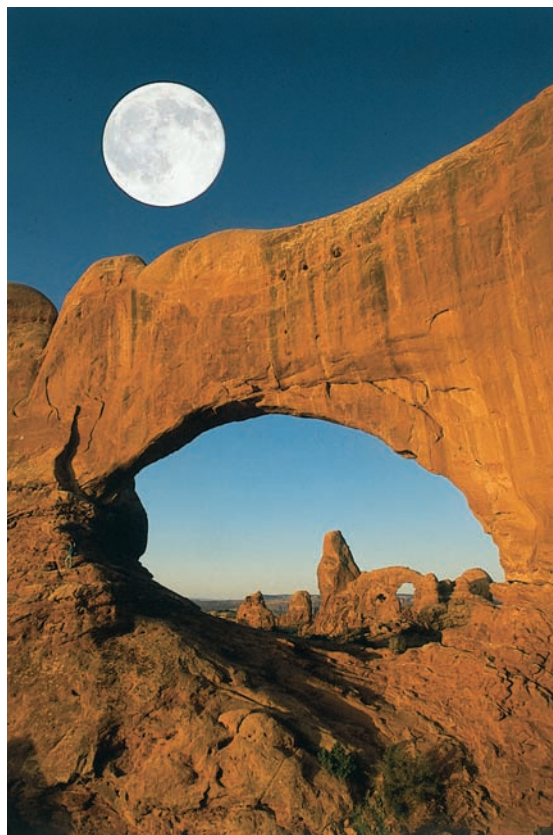
Don McCready, professor emeritus at the University of Wisconsin (Whitewater), addresses the age-old puzzle of why the moon appears much larger at the horizon than overhead. He uses a helpful collection of illustrations in a comprehensive review of alternative theories.

to be due mainly to size constancy effects coupled with the misperception of distance (Coren & Aks, 1990; Kaufman & Rock, 1962). The moon illusion shows that optical illusions are part of everyday life. Indeed, many people are virtually addicted to an optical illusion called television (an illusion of move-

ment created by a series of still images presented in quick succession).

Cross-cultural studies have uncovered some interesting differences among cultural groups in their propensity to see certain illusions. For example, Segall, Campbell, and Herskovits (1966) found that people from a variety of non-Western cultures are less susceptible to the Müller-Lyer illusion than Western samples. What could account for this difference? The most plausible explanation is that in the West, we live in a “carpentered world” dominated by straight lines, right angles, and rectangular rooms, buildings, and furniture. Thus, our experience prepares us to readily view the Müller-Lyer figures as inside and outside corners of buildings—inferences that help foster the illusion (Segall et al., 1990). In contrast, people in many non-Western cultures, such as the Zulu (see the photo on the next page) who were tested by Segall and associates (1966), live in a less carpentered world, making them less prone to see the Müller-Lyer figures as building corners.

What do illusions reveal about visual perception? They drive home the point that people go through life formulating perceptual hypotheses about what lies out there in the real world. The fact that these are only hypotheses becomes especially striking when the hypotheses are wrong, as they are with illusions. Finally, like ambiguous figures, illusions clearly demonstrate that human perceptions are not simple reflections of objective reality. Once again, we see



A puzzling perceptual illusion common in everyday life is the moon illusion: the moon looks larger when at the horizon than when overhead.

© N. R. Rowan/The Image Works

that perception of the world is subjective. These insights do not apply to visual perception only. We will encounter these lessons again as we examine other sensory systems, such as hearing, which we turn to next.

> REVIEW OF KEY POINTS

- Binocular cues such as retinal disparity and convergence can contribute to depth perception. Depth perception depends primarily on monocular cues, including pictorial cues such as texture gradient, linear perspective, light and shadow, interposition, relative size, and height in plane.
- People from pictureless societies have some difficulty in applying pictorial depth cues to two-dimensional pictures. Conscious perceptions of geographical slant, as reflected by visual and verbal estimates of pitch angles, tend to be greatly exaggerated, but haptic (tactile) judgments seem largely immune to this perceptual bias. Perceptual constancies in vision help viewers deal with the ever-shifting nature of proximal stimuli.
- Visual illusions demonstrate that perceptual hypotheses can be inaccurate and that perceptions are not simple reflections of objective reality. Researchers have found some interesting cultural differences in susceptibility to the Müller-Lyer and Ponzo illusions.

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Unlike people in Western nations, the Zulus live in a culture where straight lines and right angles are scarce. Thus, they are not affected by such phenomena as the Müller-Lyer illusion nearly as much as people raised in environments that abound with rectangular structures.

> Our Sense of Hearing: The Auditory System

Stop reading for a moment, close your eyes, and listen carefully. What do you hear?

Chances are, you'll discover that you're immersed in sounds: street noises, a high-pitched laugh from the next room, the hum of a fluorescent lamp, perhaps some background music you put on a while ago but forgot about. As this demonstration shows, physical stimuli producing sound are present almost constantly, but you're not necessarily aware of these sounds.

Like vision, the auditory (hearing) system provides input about the world "out there," but not until incoming information is processed by the brain. A distal stimulus—a screech of tires, someone laughing, the hum of the refrigerator—produces a proximal stimulus in the form of sound waves reaching the ears. The perceptual system must somehow transform this stimulation into the psychological experience of hearing. We'll begin our discussion of hearing by looking at the stimulus for auditory experience: sound.

The Stimulus: Sound



Sound waves are vibrations of molecules, which means that they must travel through some physical

medium, such as air. They move at a fraction of the speed of light. Sound waves are usually generated by vibrating objects, such as a guitar string, a loudspeaker cone, or your vocal cords. However, sound waves can also be generated by forcing air past a chamber (as in a pipe organ), or by suddenly releasing a burst of air (as when you clap).

Like light waves, sound waves are characterized by their *amplitude*, their *wavelength*, and their *purity* (see **Figure 4.44** on the next page). The physical properties of amplitude, wavelength, and purity affect mainly the perceived (psychological) qualities of *loudness*, *pitch*, and *timbre*, respectively. However, the physical properties of sound interact in complex ways to produce perceptions of these sound qualities (Hirsh & Watson, 1996).

Human Hearing Capacities



Wavelengths of sound are described in terms of their *frequency*, which is measured in cycles per second, or *hertz (Hz)*. For the most part, higher frequencies are perceived as having higher pitch. That is, if you strike the key for high C on a piano, it will produce higher-frequency sound waves than the key for low C.

PREVIEW QUESTIONS

- What are the three key properties of sound?
- How are these properties related to auditory perceptions?
- What are the key structures in the ear involved in the processing of sound?
- What were the central ideas of place theory and frequency theory?
- How were the two theories reconciled?
- What cues do people use to locate sounds in space?

Although the perception of pitch depends mainly on frequency, the amplitude of the sound waves also influences it.

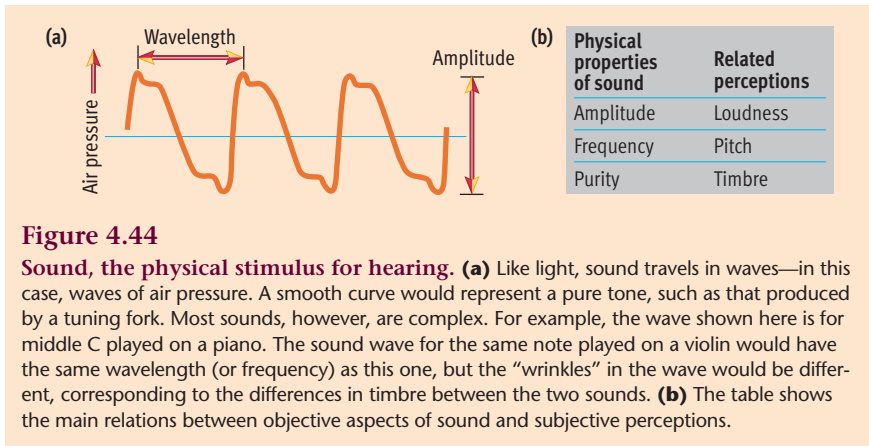


Figure 4.44

Sound, the physical stimulus for hearing. (a) Like light, sound travels in waves—in this case, waves of air pressure. A smooth curve would represent a pure tone, such as that produced by a tuning fork. Most sounds, however, are complex. For example, the wave shown here is for middle C played on a piano. The sound wave for the same note played on a violin would have the same wavelength (or frequency) as this one, but the “wrinkles” in the wave would be different, corresponding to the differences in timbre between the two sounds. (b) The table shows the main relations between objective aspects of sound and subjective perceptions.

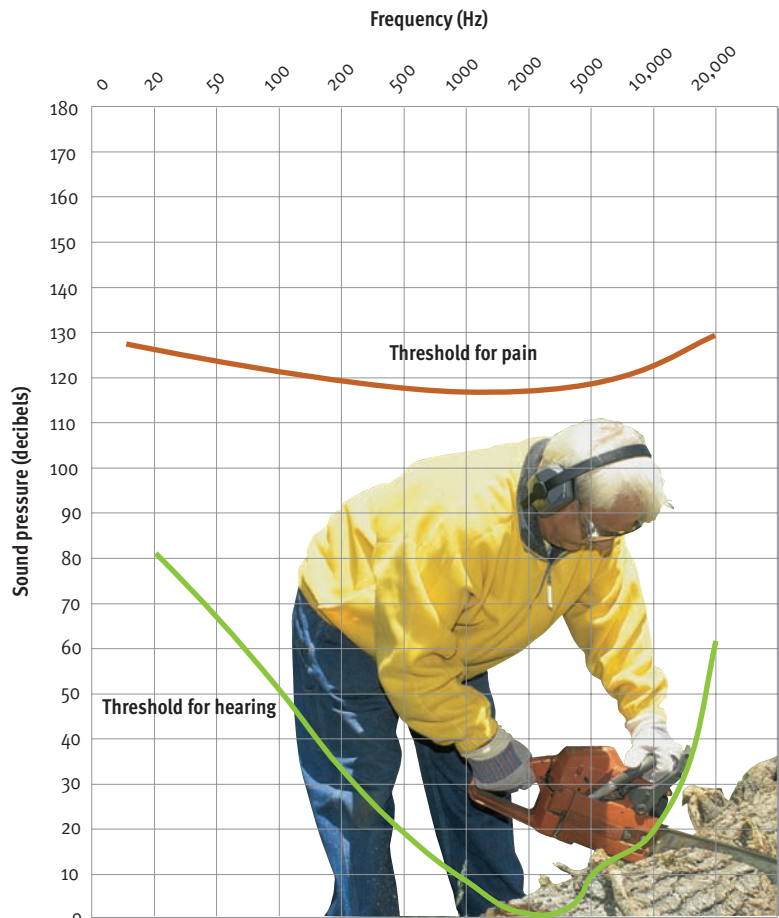


Figure 4.45

Sound pressure and auditory experience. The threshold for human hearing (graphed in green) is a function of both sound pressure (decibel level) and frequency. Human hearing is keenest for sounds at a frequency of about 2000 Hz; at other frequencies, higher decibel levels are needed to produce sounds people can detect. On the other hand, the human threshold for pain (graphed in red) is almost purely a function of decibel level.

Just as the visible spectrum is only a portion of the total spectrum of light, so, too, what people can hear is only a portion of the available range of sounds. Humans can hear sounds ranging from a low of 20 Hz up to a high of about 20,000 Hz. Sounds at either end of this range are harder to hear, and sensitivity to high-frequency tones declines as adults grow older. Other organisms have different capabilities. Low-frequency sounds under 10 Hz are audible to homing pigeons, for example. At the other extreme, bats and porpoises can hear frequencies well above 20,000 Hz.

In general, the greater the amplitude of sound waves, the louder the sound perceived. Whereas frequency is measured in hertz, amplitude is measured in *decibels (dB)*. The relationship between decibels (which measure a physical property of sound) and loudness (a psychological quality) is complex. A rough rule of thumb is that perceived loudness doubles about every 10 decibels (Stevens, 1955). Very loud sounds can jeopardize the quality of your hearing. Even brief exposure to sounds over 120 decibels can be painful and may cause damage to your auditory system (Henry, 1984).

As shown in **Figure 4.45**, the absolute thresholds for the weakest sounds people can hear differ for sounds of various frequencies. The human ear is most sensitive to sounds at frequencies near 2000 Hz. That is, these frequencies yield the lowest absolute thresholds. To summarize, amplitude is the principal determinant of loudness, but loudness ultimately depends on an interaction between amplitude and frequency.

People are also sensitive to variations in the purity of sounds. The purest sound is one that has only a single frequency of vibration, such as that produced by a tuning fork. Most everyday sounds are complex mixtures of many frequencies. The purity or complexity of a sound influences how *timbre* is perceived. To understand timbre, think of a note with precisely the same loudness and pitch played on a French horn and then on a violin. The difference you perceive in the sounds is a difference in timbre.

Sensory Processing in the Ear



Like your eyes, your ears channel energy to the neural tissue that receives it. **Figure 4.46** shows that the human ear can be divided into three sections: the external ear, the middle ear, and the inner ear. Sound is conducted differently in each section. The external ear depends on the *vibration of air molecules*. The middle ear depends on the *vibration of movable bones*. And the inner ear depends on *waves in a fluid*, which

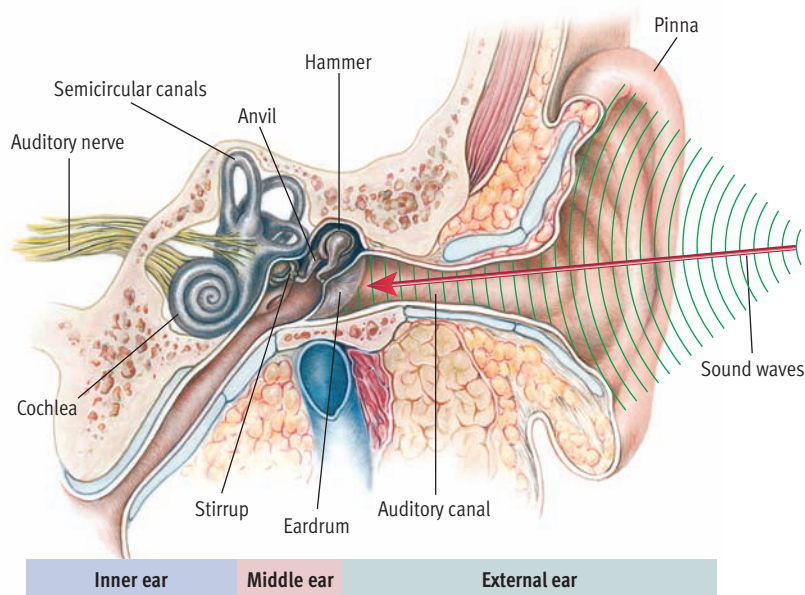


Figure 4.46

The human ear. Converting sound pressure to information processed by the nervous system involves a complex relay of stimuli. Waves of air pressure create vibrations in the eardrum, which in turn cause oscillations in the tiny bones in the inner ear (the hammer, anvil, and stirrup). As they are relayed from one bone to the next, the oscillations are magnified and then transformed into pressure waves moving through a liquid medium in the cochlea. These waves cause the basilar membrane to oscillate, stimulating the hair cells that are the actual auditory receptors (see Figure 4.47).

are finally converted into a stream of neural signals sent to the brain (Moore, 2001).

The *external ear* consists mainly of the *pinna*, a sound-collecting cone. When you cup your hand behind your ear to try to hear better, you are augmenting that cone. Many animals have large external ears that they can aim directly toward a sound source. However, humans can adjust their aim only crudely, by turning their heads. Sound waves collected by the pinna are funneled along the auditory canal toward the *eardrum*, a taut membrane that vibrates in response.

In the *middle ear*, the vibrations of the eardrum are transmitted inward by a mechanical chain made up of the three tiniest bones in your body (the hammer, anvil, and stirrup), known collectively as the *ossicles*. The ossicles form a three-stage lever system that converts relatively large movements with little force into smaller motions with greater force. The ossicles serve to amplify tiny changes in air pressure.

The *inner ear* consists largely of the *cochlea*, a fluid-filled, coiled tunnel that contains the receptors for hearing. The term *cochlea* comes from the Greek word for a spiral-shelled snail, which this chamber resembles (see Figure 4.46). Sound enters the cochlea through the *oval window*, which is vibrated by the ossicles. The ear's neural tissue, analogous to the retina in the eye, lies within the cochlea. This tissue sits on the basilar membrane that divides the cochlea into upper and lower chambers. The *basilar membrane*, which runs the length of the spiraled cochlea, holds the auditory receptors. The auditory re-

ceptors are called *hair cells* because of the tiny bundles of hairs that protrude from them. Waves in the fluid of the inner ear stimulate the hair cells. Like the rods and cones in the eye, the hair cells convert this physical stimulation into neural impulses that are sent to the brain (Hudspeth, 2000).

These signals are routed through the thalamus to the auditory cortex, which is located mostly in the temporal lobes of the brain. Studies demonstrate that the auditory cortex has specialized cells—similar to the feature detectors found in the visual cortex—that have special sensitivity to certain features of sound (Pickles, 1988). Evidence also suggests that the parallel processing of input seen in the visual system also occurs in the auditory pathways (Rouiller, 1997).

Auditory Perception: Theories of Hearing

Theories of hearing need to account for how sound waves are physiologically translated into the perceptions of pitch, loudness, and timbre. To date, most of the theorizing about hearing has focused on the perception of pitch, which is reasonably well understood. Researchers' understanding of loudness and timbre perception is primitive by comparison. Hence, we'll limit our coverage to theories of pitch perception.

Two theories have dominated the debate on pitch perception: *place theory* and *frequency theory*. You'll be able to follow the development of these theories

Web Link 4.6



American Speech-Language-Hearing Association

The site for this national organization of audiologists and speech pathologists has a useful section intended for the public that provides information on the dangerous effects of loud noise, ways to detect hearing loss, the utility of hearing aids, and other topics related to hearing.

Web Link 4.7



The Cochlea: Graphic Tour of the Inner Ear's Machinery

The dynamics of hearing and the workings of the inner ear are graphically demonstrated at this site maintained by the Laboratory of Biophysics at the International School of Advanced Studies (Trieste, Italy). The collection of links to other laboratories studying hearing makes this a fine jumping-off point.

more easily if you can imagine the spiraled cochlea unraveled, so that the basilar membrane becomes a long, thin sheet, lined with about 25,000 individual hair cells (see **Figure 4.47**).

Place Theory

Long ago, Hermann von Helmholtz (1863) proposed that specific sound frequencies vibrate specific portions of the basilar membrane, producing distinct pitches, just as plucking specific strings on a harp produces sounds of varied pitch. This model, called **place theory**, holds that perception of pitch corresponds to the vibration of different portions, or places, along the basilar membrane. Place theory assumes that hair cells at various locations respond independently and that different sets of hair cells are vibrated by different sound frequencies. The brain then detects the frequency of a tone according to which area along the basilar membrane is most active.

Frequency Theory

Other theorists in the 19th century proposed an alternative theory of pitch perception, called frequency theory (Rutherford, 1886). **Frequency theory** holds that perception of pitch corresponds to the rate, or frequency, at which the entire basilar membrane vibrates. This theory views the basilar membrane as more like a drumhead than a harp. According to

frequency theory, the whole membrane vibrates in unison in response to sounds. However, a particular sound frequency, say 3000 Hz, causes the basilar membrane to vibrate at a corresponding rate of 3000 times per second. The brain detects the frequency of a tone by the rate at which the auditory nerve fibers fire.

Reconciling Place and Frequency Theories

The competition between these two theories is reminiscent of the dispute between the trichromatic and opponent process theories of color vision. As with that argument, the debate between place and frequency theories generated roughly a century of research. Although both theories proved to have some flaws, *both turned out to be valid in part*.

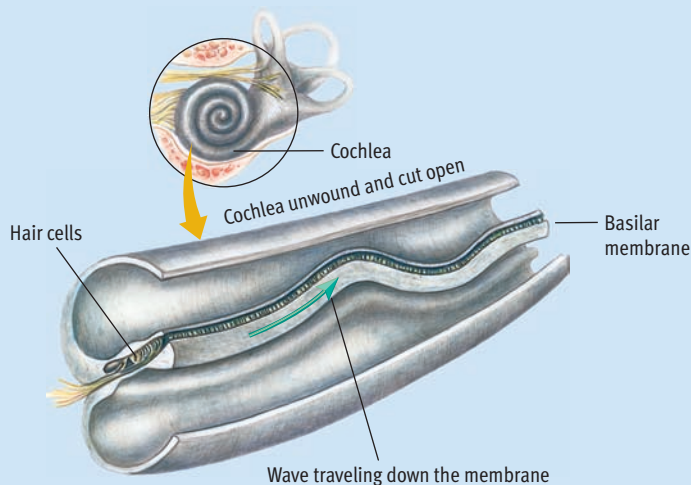
Helmholtz's place theory was basically on the mark except for one detail. The hair cells along the basilar membrane are not independent. They vibrate together, as suggested by frequency theory. The actual pattern of vibration, described in Nobel prize-winning research by Georg von Békésy (1947), is a traveling wave that moves along the basilar membrane. Place theory is correct, however, in that the wave peaks at a particular place, depending on the frequency of the sound wave.

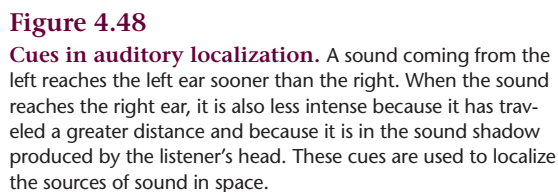
Frequency theory was also found to be flawed when investigators learned that neurons are hard pressed to fire at a maximum rate of about 1000 impulses per second. How, then, can frequency theory account for the translation of 4000 Hz sound waves, which would require 4000 impulses per second? The answer, suggested by Wever and Bray (1937), is that groups of hair cells operate according to the volley principle. **The volley principle** holds that groups of auditory nerve fibers fire neural impulses in rapid succession, creating volleys of impulses. These volleys exceed the 1000-per-second limit. Studies suggest that auditory nerves can team up like this to generate volleys of up to 5000 impulses per second (Zwislocki, 1981).

Although the original theories had to be revised, the current thinking is that pitch perception depends on both place and frequency coding of vibrations along the basilar membrane (Goldstein, 1996). Sounds under 1000 Hz appear to be translated into pitch through frequency coding. For sounds between 1000 and 5000 Hz, pitch perception seems to depend on a combination of frequency and place coding. Sounds over 5000 Hz seem to be handled through place coding only. Again we find that theories that were pitted against each other for decades are complementary rather than contradictory.

Figure 4.47

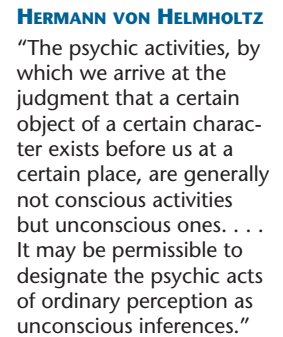
The basilar membrane. This graphic shows how the cochlea might look if it were unwound and cut open to reveal the basilar membrane, which is covered with thousands of hair cells (the auditory receptors). Pressure waves in the fluid filling the cochlea cause oscillations to travel in waves down the basilar membrane, stimulating the hair cells to fire. Although the entire membrane vibrates, as predicted by frequency theory, the point along the membrane where the wave peaks depends on the frequency of the sound stimulus, as suggested by place theory.





You're driving down a street when suddenly you hear a siren wailing in the distance. As the wail grows louder, you glance around, cocking your ear to the sound. Where is it coming from? Behind you? In front of you? From one side? This example illustrates a common perceptual task called **auditory localization**—locating the source of a sound in space. The process of recognizing where a sound is coming from is analogous to recognizing depth or distance in vision. Both processes involve spatial aspects of sensory input. The fact that human ears are set *apart* contributes to auditory localization, just as the separation of the eyes contributes to depth perception.

Many features of sounds can contribute to auditory localization, but two cues are particularly important: the intensity (loudness) and the timing of sounds arriving at each ear (Yost, 2001). For example, a sound source to one side of the head produces a greater intensity at the ear nearer to the sound. This difference is due partly to the loss of sound intensity with distance. Another factor at work is the “shadow,” or partial sound barrier, cast by the head itself (see **Figure 4.48**). The intensity difference between the two ears is greatest when the sound source is well to one side. The human perceptual system uses this difference as a clue in localizing sounds. Because the path to the farther ear is longer, a sound takes longer to reach that ear. This fact means that sounds



Comparing Vision and Hearing

Check your understanding of both vision and hearing by comparing key aspects of sensation and perception in these senses. The dimensions of comparison are listed in the first column below. The second column lists the answers for the sense of vision. Fill in the answers for the sense of hearing in the third column. The answers can be found in Appendix A in the back of the book.

Dimension	Vision	Hearing
1. Stimulus	Light waves	
2. Elements of stimulus and related perceptions	Wavelength/hue	
	Amplitude/brightness	
	Purity/saturation	
3. Receptors	Rods and cones	
4. Location of Receptors	Retina	
5. Main location of processing in brain	Occipital lobe	
	Visual cortex	
6. Spatial aspect of perception	Depth perception	

can be localized by comparing the timing of their arrival at each ear. Such comparison of the timing of sounds is remarkably sensitive. People can detect timing differences as small as 1/100,000 of a second (Durlach & Colburn, 1978). Evidence suggests that people depend primarily on timing differences to localize low-frequency sounds and intensity differences to localize high-frequency sounds (Yost, 2003).

➤ REVIEW OF KEY POINTS

- Sound varies in terms of wavelength (frequency), amplitude, and purity. These properties affect mainly perceptions of pitch, loudness, and timbre, respectively. The human ear is most sensitive to sounds around 2000 Hz. Even brief

exposure to sounds over 120 decibels can be painful and damaging.

- Sound is transmitted through the external ear via air conduction to the middle ear, where sound waves are translated into the vibration of tiny bones called ossicles. In the inner ear, fluid conduction vibrates hair cells along the basilar membrane in the cochlea. These hair cells are the receptors for hearing.
- Place theory proposed that pitch perception depends on where vibrations occur along the basilar membrane. Frequency theory countered with the idea that pitch perception depends on the rate at which the basilar membrane vibrates. Modern evidence suggests that these theories are complementary rather than incompatible.
- Auditory localization involves locating the source of a sound in space. People pinpoint where sounds have come from by comparing interear differences in the intensity and timing of sounds.

➤ Our Chemical Senses: Taste and Smell

PREVIEW QUESTIONS

- Where are the receptors for taste?
- How many basic tastes are there?
- How do people vary in taste sensitivity?
- Where are the receptors for smell?
- Are there primary odors?
- How well do people perform when asked to name odors?

Psychologists have devoted most of their attention to the visual and auditory systems. Although less is known about the chemical senses, taste and smell also play a critical role in people's experience of the world. Let's take a brief look at what psychologists have learned about **the gustatory system—the sensory system for taste**—and its close cousin, **the olfactory system—the sensory system for smell**.

Taste: The Gustatory System

True wine lovers go through an elaborate series of steps when they are served a good bottle of wine. Typically, they begin by drinking a little water to cleanse their palate. Then they sniff the cork from the wine bottle, swirl a small amount of the wine around in a glass, and sniff the odor emerging from the glass. Finally, they take a sip of the wine, rolling it around in their mouth for a short time before swallowing it. At last they are ready to confer their approval or disapproval. Is all this activity really a meaningful way to put the wine to a sensitive test? Or is it just a harmless ritual passed on through tradition? You'll find out in this section.

The physical stimuli for the sense of taste are chemical substances that are soluble (dissolvable in water). The gustatory receptors are clusters of taste cells found in the *taste buds* that line the trenches around tiny bumps on the tongue (see **Figure 4.49**). When these cells absorb chemicals dissolved in saliva, they trigger neural impulses that are routed through the thalamus to the cortex. Interestingly, taste cells have a short life, spanning only about ten days, and they are

constantly being replaced. New cells are born at the edge of the taste bud and migrate inward to die at the center.

It's generally (but not universally) agreed that there are four *primary tastes*: sweet, sour, bitter, and

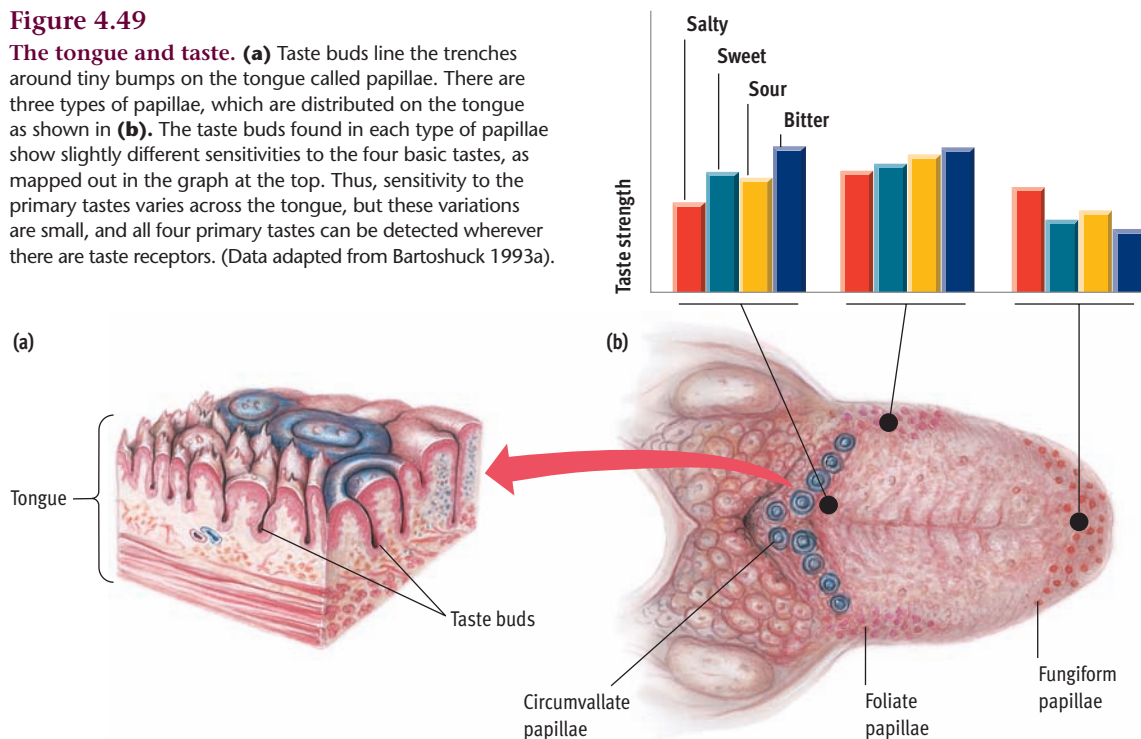


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Are the elaborate wine-tasting rituals of wine lovers just a pretentious tradition, or do they make sense in light of what science has revealed about the gustatory system? Your text answers this question in this section.

Figure 4.49

The tongue and taste. (a) Taste buds line the trenches around tiny bumps on the tongue called papillae. There are three types of papillae, which are distributed on the tongue as shown in (b). The taste buds found in each type of papillae show slightly different sensitivities to the four basic tastes, as mapped out in the graph at the top. Thus, sensitivity to the primary tastes varies across the tongue, but these variations are small, and all four primary tastes can be detected wherever there are taste receptors. (Data adapted from Bartoshuk 1993a).



salty (Buck, 2000). Sensitivity to these tastes is distributed somewhat unevenly across the tongue, but the variations in sensitivity are quite small and highly complicated (Bartoshuk, 1993b; see **Figure 4.49**). Although taste cells respond to more than one of the primary tastes, they typically respond best to a specific taste (Di Lorenzo & Youngentob, 2003). Perceptions of taste quality appear to depend on complex *patterns* of neural activity initiated by taste receptors (Erickson, DiLorenzo, & Woodbury, 1994).

Some basic taste preferences appear to be innate and to be automatically regulated by physiological mechanisms. In humans, for instance, newborn infants react positively to sweet tastes and negatively to strong concentrations of bitter, salty, or sour tastes (Lipsitt & Behl, 1990). To some extent, these innate taste preferences are flexible, changing to accommodate the body's nutritional needs (Scott, 1990).

Although some basic aspects of taste perception may be innate, taste preferences are largely learned and heavily influenced by social processes (Rozin, 1990). Most parents are aware of this fact and intentionally try—with varied success—to mold their children's taste preferences early in life (Patrick et al., 2005). This extensive social influence contributes greatly to the striking ethnic and cultural disparities found in taste preferences (Kittler & Sucher, 1998). Foods that are a source of disgust in Western cultures—such as worms, fish eyes, and blood—may be delicacies in other cultures (see **Figure 4.50** on the next

page). Indeed, Rozin (1990) asserts that feces may be the only universal source of taste-related disgust in humans. To a large degree, variations in taste preferences depend on what one has been exposed to (Capaldi & VandenBos, 1991; Zellner, 1991). Exposure to various foods varies along ethnic lines because different cultures have different traditions in food preparation, different agricultural resources, different climates to work with, and so forth.

Research by Linda Bartoshuk and others reveals that people vary considerably in their sensitivity to certain tastes. These differences depend in part on the density of taste buds on the tongue, which appears to be a matter of genetic inheritance (Bartoshuk, 1993a). People characterized as *nontasters*, as determined by their insensitivity to PTC (phenylthiocarbamide), tend to have about one-quarter as many taste buds per square centimeter as people at the other end of the spectrum, who are called *supertasters* (Miller & Reedy, 1990). In the United States, roughly 25% of people are nontasters, another 25% are supertasters, and the remaining 50% fall in between these extremes and are characterized as *medium tasters* (Di Lorenzo & Youngentob, 2003). Women are more likely to be supertasters than men (Bartoshuk, Duffy, & Miller, 1994). Supertasters and nontasters respond similarly to many foods, but supertasters are much more sensitive to certain sweet and bitter substances. For example, supertasters react far more strongly to the chemical (capsaicin) in hot peppers (Tepper & Nurse,



LINDA BARTOSHUK
 "Good and bad are so intimately associated with taste and smell that we have special words for the experiences (e.g., repugnant, foul). The immediacy of the pleasure makes it seem absolute and thus inborn. This turns out to be true for taste but not for smell."

Figure 4.50

Culture and taste preferences. Taste preferences are heavily influenced by learning and vary dramatically from one society to the next, as these examples demonstrate.



© Malcolm S. Kirk

Grubs. For most North Americans, the thought of eating a worm would be totally unthinkable. For the Asmat of New Guinea, however, a favorite delicacy is the plump, white, 2-inch larva or beetle grub.



Fish eyes. For some Eskimo children, raw fish eyes are like candy. Here you see a young girl using the Eskimo's all-purpose knife to gouge out the eye of an already-filleted Arctic fish.



Guy Mary-Rousellere/Catholic Mission, Northwest, Canada

Blood. Several tribes in East Africa supplement their diet with fresh blood that is sometimes mixed with milk. They obtain the blood by puncturing a cow's jugular vein with a sharp arrow. The blood-milk drink provides a rich source of protein and iron.

© Danielle Pelligrini/Science Source/Photo Researchers, Inc.

1997). Supertasters also respond more intensely to many fatty substances (Bartoshuk, 2000). Some psychologists speculate that the gender gap in this trait may have evolutionary significance. Over the course of evolution, women have generally been more involved than men in feeding children. Increased reactivity to sweet and bitter tastes would have been adaptive in that it would have made women more sensitive to the relatively scarce high-caloric foods (which often taste sweet) needed for survival and to the toxic substances (which often taste bitter) that hunters and gatherers needed to avoid.

Scientists are currently making progress in pinning down the genetic bases for these individual differences in taste sensitivity (Bufo et al., 2005). Recent research suggests that specific genes have a dramatic impact on children's food preferences. For example, one study found that children who carry a particular bitter-sensitive gene are less fond of milk and water and more fond of carbonated beverages and high-sugar cereals than children who do not carry this gene (Mennella, Pepino, & Reed, 2005). This research implies that there may be a molecular basis for some youngsters' resistance to healthy foods. Although we have a long way to go, figuring out the genetic bases for children's food likes and dislikes could have profound implications for efforts to prevent obesity and other diet-influenced diseases.

So far, we've been discussing taste, but what we are really interested in is the *perception of flavor*. Odor contributes greatly to flavor (Lawless, 2001). Although taste and smell are distinct sensory systems, they interact extensively. The ability to identify flavors declines

noticeably when odor cues are absent. You might have noticed this interaction when you ate a favorite meal while enduring a severe head cold. The food probably tasted bland, because your stuffy nose impaired your sense of smell.

Now that we've explored the dynamics of taste, we can return to our question about the value of the wine-tasting ritual. This elaborate ritual is indeed an authentic way to put wine to a sensitive test. The after-effects associated with sensory adaptation make it wise to cleanse one's palate before tasting the wine. Sniffing the cork, and the wine in the glass, is important because odor is a major determinant of flavor. Swirling the wine in the glass helps release the wine's odor. And rolling the wine around in your mouth is especially critical, because it distributes the wine over the full diversity of taste cells. It also forces the wine's odor up into the nasal passages. Thus, each action in this age-old ritual makes a meaningful contribution to the tasting.

Smell: The Olfactory System

In many ways, the sense of smell is much like the sense of taste. The physical stimuli are chemical substances—volatile ones that can evaporate and be carried in the air. These chemical stimuli are dissolved in fluid—specifically, the mucus in the nose. The receptors for smell are *olfactory cilia*, hairlike structures in the upper portion of the nasal passages (see **Figure 4.51**). They resemble taste cells in that they have a short life (30–60 days) and are constantly being replaced (Buck, 2000). Olfactory receptors have

Web Link 4.8



Seeing, Hearing, and Smelling the World
Hosted by the Howard Hughes Medical Institute, this site provides a graphically attractive review of what scientific research has discovered about human sensory systems, with suggestions about where research will be moving in the future.

axons that synapse with cells in the olfactory bulb and then are routed directly to various areas in the cortex. This arrangement is unique. Smell is the only sensory system in which incoming information is not routed through the thalamus before it projects to the cortex.

Odors cannot be classified as neatly as tastes, since efforts to identify primary odors have proven unsatisfactory (Doty, 1991). If primary odors exist, there must be a fairly large number of them. Most olfactory receptors respond to a wide range of odors (Doty, 2001). Thus, the perception of various odors probably depends on a great many types of receptors that are uniquely responsive to specific chemical structures (Bartoshuk & Beauchamp, 1994). Like the other senses, the sense of smell shows sensory adaptation. The perceived strength of an odor usually fades to less than half its original strength within about 4 minutes (Cain, 1988).

Humans can distinguish among about 10,000 different odors (Axel, 1995). However, when people are asked to identify the sources of specific odors (such as smoke or soap), their performance is rather mediocre. For some unknown reason, people have a hard time attaching names to odors (Cowart & Rawson, 2001). Gender differences have been found in the ability to identify odors, as females tend to be somewhat more accurate than males on odor recognition tasks (de Wijk, Schab, & Cain, 1995).

➤ REVIEW OF KEY POINTS

- The taste buds are sensitive to four basic tastes: sweet, sour, bitter, and salty. Sensitivity to these tastes is distributed

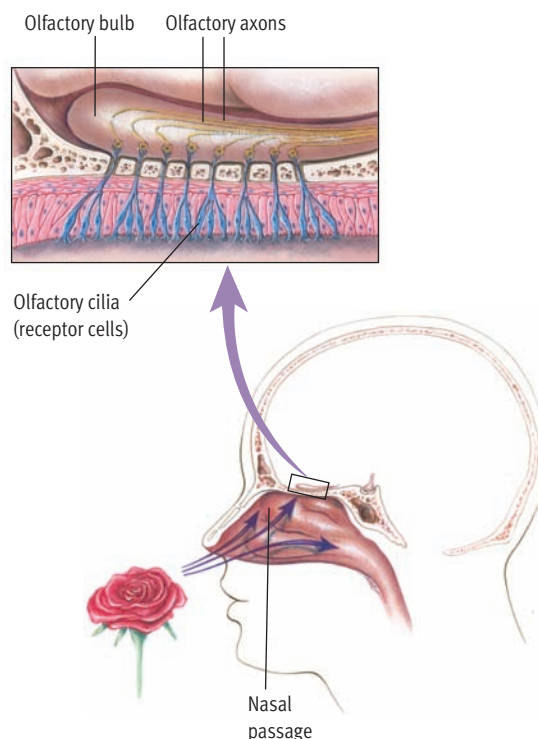


Figure 4.51

The olfactory system.

Odor molecules travel through the nasal passages and stimulate olfactory cilia. An enlargement of these hairlike olfactory receptors is shown in the inset. The olfactory nerves transmit neural impulses through the olfactory bulb to the brain.

uted unevenly across the tongue, but the variations are small.

- Taste preferences are largely learned and are heavily influenced by one's cultural background. Supertasters are more sensitive to some tastes than other people. The perception of flavor is influenced greatly by the odor of food.
- Like taste, smell is a chemical sense. Chemical stimuli activate receptors, called olfactory cilia, that line the nasal passages. Most of these receptors respond to more than one odor. Smell is the only sense that is not routed through the thalamus.

➤ Our Sense of Touch: Sensory Systems in the Skin

If there is any sense that people trust almost as much as sight, it is the sense of touch. Yet, like all the senses, touch involves converting the sensation of physical stimuli into a psychological experience—and it can be fooled.

The physical stimuli for touch are mechanical, thermal, and chemical energy that impinge on the skin. These stimuli can produce perceptions of tactile stimulation (the pressure of touch against the skin), warmth, cold, and pain. The human skin is saturated with at least six types of sensory receptors. To some degree, these different types of receptors are specialized for different functions, such as the registration of pressure, heat, cold, and so forth. However, these distinctions are not as clear as researchers had originally expected (Sinclair, 1981).

Feeling Pressure

If you've been to a mosquito-infested picnic lately, you'll appreciate the need to quickly know where tactile stimulation is coming from. The sense of touch is set up to meet this need for tactile localization with admirable precision and efficiency. Cells in the nervous system that respond to touch are sensitive to specific patches of skin. These skin patches, which vary considerably in size, are the functional equivalents of *receptive fields* in vision. Like visual receptive fields, they often involve a center-surround arrangement (see **Figure 4.52** on the next page). Thus, stimuli falling in the center produce the opposite effect of stimuli falling in the surrounding area (Kandel & Jessell, 1991).

PREVIEW QUESTIONS

- How are tactile inputs routed to the brain?
- How are the two pathways for pain different?
- What does a useful theory of pain perception need to explain?
- How does the physiological evidence relate to gate-control theory?

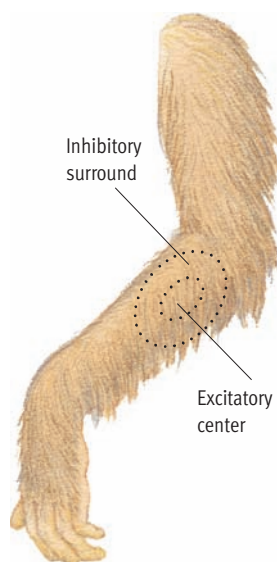


Figure 4.52
Receptive field for touch. A receptive field for touch is an area on the skin surface that, when stimulated, affects the firing of a cell that responds to pressure on the skin. Shown here is a center-surround receptive field for a cell in the thalamus of a monkey.

If a stimulus is applied continuously to a specific spot on the skin, the perception of pressure gradually fades. Hence, sensory adaptation occurs in the perception of touch, as it does in other sensory systems.

The nerve fibers that carry incoming information about tactile stimulation are routed through the spinal cord to the brainstem. There, the fibers from each side of the body cross over mostly to the opposite side of the brain. The tactile pathway then projects through the thalamus and onto the *somatosensory cortex* in the brain's parietal lobe. Some cells in the somatosensory cortex function like the *feature detectors* discovered in vision (Gardner & Kandel, 2000). They respond to specific features of touch, such as a movement across the skin in a particular direction.

Feeling Pain

As unpleasant as it is, the sensation of pain is crucial to survival. Pain is a marvelous warning system. It tells people when they should stop shoveling snow or remove their hand from a hot oven. Although a life without pain may sound appealing, people born with a rare, congenital insensitivity to pain would testify otherwise, as they routinely harm themselves (Coderre, Mogil, & Bushnell, 2003). However, chronic pain is a frustrating, demoralizing affliction that affects over 50 million people in American society, at a cost of more than \$70 billion annually (Gatchel & Maddrey, 2004). Thus, there are pressing practical reasons for psychologists' keen interest in the perception of pain.

Pathways to the Brain

The receptors for pain are mostly free nerve endings in the skin. Pain messages are transmitted to the brain via two types of pathways that pass through different areas in the thalamus (Willis, 1985). One is a *fast pathway* that registers localized pain and relays it to the cortex in a fraction of a second. This is the system that hits you with sharp pain when you first cut your finger. The second system uses a *slow pathway* that lags a second or two behind the fast system. This pathway (which also carries information about temperature) conveys the less localized, longer-lasting, aching or burning pain that comes after the initial injury. The slow pathway depends on thin, unmyelinated neurons called *C fibers*, whereas the fast pathway is mediated by thicker, myelinated neurons called *A-delta fibers* (see Figure 4.53). Pain signals may be sent to many areas in the cortex, as well as to subcortical centers associated with emotion (such as the hypothalamus and amygdala), depending in part on the nature of the pain (Hunt & Mantyh, 2001).

Puzzles in Pain Perception

As with other perceptions, pain is not an automatic result of certain types of stimulation. Some people with severe injuries report little pain, whereas other people with much more modest injuries report agonizing pain (Coderre et al., 2003). The perception of pain can be influenced greatly by beliefs, expectations, personality, mood, and other factors involving higher mental processes (Turk & Okifuji, 2003). The subjective nature of pain is illustrated by placebo effects. As we saw in Chapter 2, many people suffering from pain report relief when given a placebo—such

concept check 4.4



Comparing Taste, Smell, and Touch

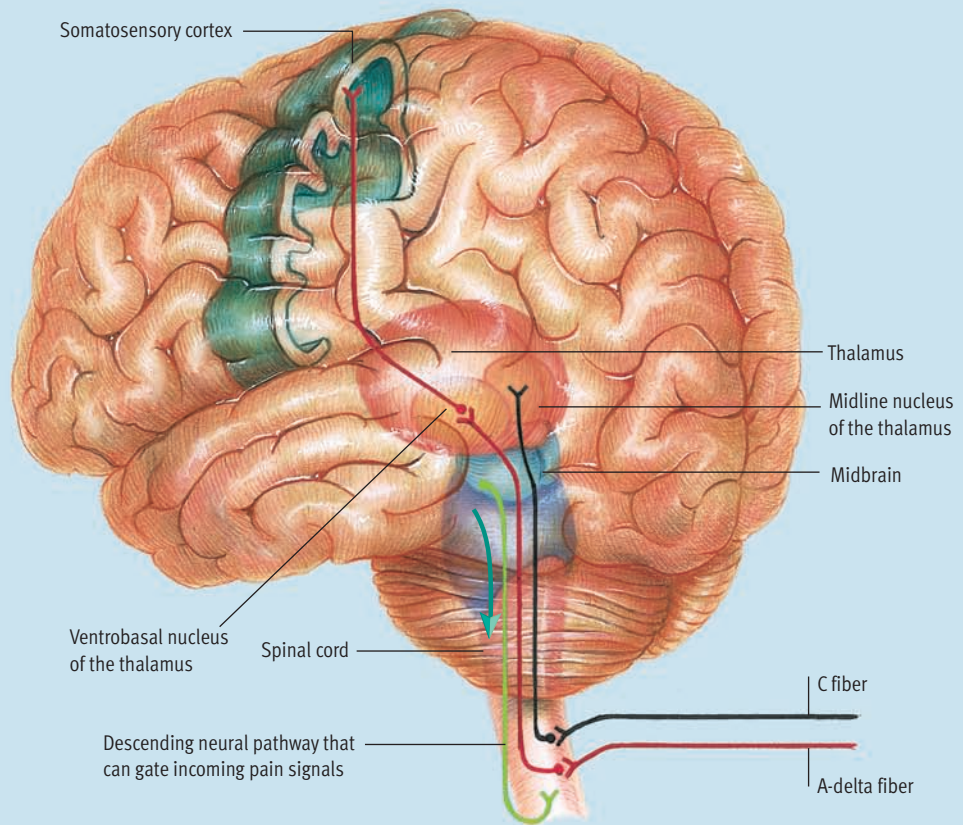
Check your understanding of taste, smell, and touch by comparing these sensory systems on the dimensions listed in the first column below. A few answers are supplied; see whether you can fill in the rest. The answers can be found in Appendix A.

Dimension	Taste	Smell	Touch
1. Stimulus		<i>Volatile chemicals in the air</i>	
2. Receptors			<i>Many (at least six types)</i>
3. Location of receptors		<i>Upper area of nasal passage</i>	
4. Basic elements of perception	<i>Sweet, sour, salty, bitter</i>		

Figure 4.53

Pathways for pain signals.

Pain signals are sent inward from receptors to the brain along the two ascending pathways depicted here in red and black. The fast pathway, shown in red, and the slow pathway, shown in black, depend on different types of nerve fibers and are routed through different parts of the thalamus. The gate-control mechanism hypothesized by Melzack and Wall (1965) apparently depends on signals in a descending pathway (shown in green) that originates in an area of the midbrain.



as an inert “sugar pill” that is presented to them as if it were a painkilling drug (Stewart-Williams, 2004; Vase, Riley, & Price, 2002).

Further evidence regarding the subjective quality of pain has come from studies that have found ethnic and cultural differences in the pain associated with childbirth (Jordan, 1983) and the experience of chronic pain (Bates, Edwards, & Anderson, 1993). According to Melzack and Wall (1982), culture does not affect the process of pain perception so much as the willingness to tolerate certain types of pain, a conclusion echoed by Zatzick and Dimsdale (1990).

The psychological element in pain perception becomes clear when something distracts your attention from pain and the hurting temporarily disappears. For example, imagine that you’ve just hit your thumb with a hammer and it’s throbbing with pain. Suddenly, your child cries out that there’s a fire in the laundry room. As you race to deal with this emergency, you forget all about the pain in your thumb.

As you can see, then, tissue damage that sends pain impulses on their way to the brain doesn’t necessarily result in the experience of pain. Cognitive and emotional processes that unfold in higher brain centers can somehow block pain signals coming from

peripheral receptors. Thus, any useful explanation of pain perception must be able to answer a critical question: How does the central nervous system block incoming pain signals?

In an influential effort to answer this question, Ronald Melzack and Patrick Wall (1965) devised the gate-control theory of pain. **Gate-control theory holds that incoming pain sensations must pass through a “gate” in the spinal cord that can be closed, thus blocking ascending pain signals.** The gate in this model is not an anatomical structure but a pattern of neural activity that inhibits incoming pain signals. Melzack and Wall suggested that this imaginary gate can be closed by signals from peripheral receptors or by signals from the brain. They theorized that the latter mechanism can help explain how factors such as shifts in attention can shut off pain signals. As a whole, research suggests that the concept of a gating mechanism for pain has merit (Craig & Rollman, 1999). However, relatively little support has been found for the neural circuitry originally hypothesized by Melzack and Wall in the 1960s. Other neural mechanisms, discovered after gate-control theory was proposed, appear to be responsible for blocking the perception of pain.



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People tend to assume that the perception of pain is an automatic result of bodily injuries, but the process of pain perception is much more subjective than widely appreciated. For example, in athletic endeavors an injury is often a major competitive setback, which may intensify one's pain.

One of these discoveries was the identification of endorphins. As discussed in Chapter 3, *endorphins* are the body's own natural morphinelike painkillers. Studies suggest that the release of endorphins underlies the pain-relieving effects of placebo drugs (Fields & Levine, 1984). The analgesic effects that can be achieved through the ancient Chinese art of acupuncture may likewise involve endorphins (Murray, 1995). Endorphins are widely distributed in the central nervous system. Scientists are still working out the details of how they suppress pain (Zubieta et al., 2001).

The other discovery involved the identification of a descending neural pathway that mediates the sup-

pression of pain (Basbaum & Jessell, 2000). This pathway appears to originate in an area of the midbrain called the *periaqueductal gray (PAG)*. Neural activity in this pathway is probably initiated by endorphins acting on PAG neurons, which eventually trigger impulses sent down neural circuits that mostly release serotonin. These circuits synapse in the spinal cord, where they appear to release more endorphins, thus inhibiting the activity of neurons that would normally transmit incoming pain impulses to the brain (see **Figure 4.53**). The painkilling effects of morphine appear to be at least partly attributable to activity in this descending pathway, as cutting the fibers in this pathway reduces the analgesic effects of morphine (Jessell & Kelly, 1991). In contrast, activation of this pathway by electrical stimulation of the brain can produce an analgesic effect. Clearly, this pathway plays a central role in gating incoming pain signals.

Our understanding of the experience of pain continues to evolve. The newest discovery is that certain types of *glial cells* may contribute to the modulation of pain. As noted in Chapter 3, only recently have neuroscientists realized that glial cells contribute to signal transmission in the nervous system (Fields, 2004). Two types of glia in the spinal cord (astrocytes and microglia) appear to play an important role in *chronic pain* (Watkins & Maier, 2002). These glia are activated by immune system responses to infection or by signals from neurons in pain pathways. Once activated, these glial cells appear to “egg on neurons in the pain pathway,” thus amplifying the experience of chronic pain (Watkins & Maier, 2003). The discovery that glia play a role in the human pain system may eventually open up new avenues for treating chronic pain.

> Our Other Senses

PREVIEW QUESTIONS

- What does the kinesthetic system monitor?
- What does the vestibular system do?
- Where is the vestibular system located?

We have discussed the dynamics of sensation and perception in five sensory domains—vision, hearing, taste, smell, and touch. Since it is widely known that humans have five senses, that should wrap up our coverage, right? Wrong! People have still other sensory systems: the kinesthetic system (which monitors positions of the body) and the vestibular system (sense of balance).

The Kinesthetic System

The *kinesthetic system* monitors the positions of the various parts of the body. To some extent, you know where your limbs are because you commanded the

muscles that put them there. Nonetheless, the kinesthetic system allows you to double-check these locations. Where are the receptors for your kinesthetic sense? Some reside in the joints, indicating how much they are bending. Others reside within the muscles, registering their tautness, or extension. Most kinesthetic stimulation is transmitted to the brain along the same pathway as tactile stimulation. However, the two types of information are kept separate (Vierck, 1978).

The Vestibular System

The *vestibular system* responds to gravity and keeps you informed of your body's location in space. The

vestibular system provides the sense of balance, or equilibrium, compensating for changes in the body's position. The vestibular system shares space in the inner ear with the auditory system. The *semicircular canals* (consult **Figure 4.47** once again) make up the largest part of the vestibular system. They look like three inner tubes joined at the base. Any rotational motion of the head is uniquely represented by a combination of fluid flows in the semicircular canals (Kelly, 1991). These shifts in fluid are detected by hair cells similar to those found along the basilar membrane in the cochlea (Goldberg & Hudspeth, 2000).

One final point merits emphasis as we close our tour of the human sensory systems. Although we have discussed the various sensory domains separately, it's important to remember that all the senses send signals to the same brain, where the information is pooled. We have already encountered examples of sensory integration. For example, it's at work when the sight and smell of food influence taste. *Sensory integration is the norm in perceptual experience.* For instance, when you sit around a campfire, you *see* it blazing, you *hear* it crackling, you *smell* it burning, and you feel the *touch* of its warmth. If you cook some-

thing over it, you may even *taste* it. Thus, perception involves building a unified model of the world out of integrated input from all the senses (Stein, Wallace, & Stanford, 2001).

➤ REVIEW OF KEY POINTS

- Sensory receptors in the skin respond to pressure, temperature, and pain. Tactile localization depends on receptive fields similar to those seen for vision. Some cells in the somatosensory cortex appear to function like feature detectors.
- Pain signals are sent to the brain along two pathways that are characterized as fast and slow. The perception of pain is highly subjective and may be influenced by mood, attention, and culture. Gate-control theory holds that incoming pain signals can be blocked in the spinal cord. Endorphins and a descending neural pathway appear responsible for the suppression of pain by the central nervous system. Glial cells may contribute to the modulation of pain.
- The kinesthetic system monitors the position of various body parts. Kinesthetic receptors, located in the joints and muscles, send signals to the brain along the same pathway as tactile stimulation. The sense of balance depends primarily on activity in the semicircular canals in the vestibular system.

➤ Reflecting on the Chapter's Themes

In this chapter, three of our unifying themes stood out in sharp relief. Let's discuss the value of theoretical diversity first. Contradictory theories about behavior can be disconcerting and frustrating for theorists, researchers, teachers, and students alike. Yet this chapter provides two dramatic demonstrations of how theoretical diversity can lead to progress in the long run. For decades, the trichromatic and opponent process theories of color vision and the place and frequency theories of pitch perception were viewed as fundamentally incompatible. As you know, in each case the evidence eventually revealed that both theories were needed to fully explain the sensory processes that each sought to explain individually. If it hadn't been for these theoretical debates, current understanding of color vision and pitch perception might be far more primitive.

Our coverage of sensation and perception should also have enhanced your appreciation of why human experience of the world is highly subjective. As ambiguous figures and optical illusions clearly show, there is no one-to-one correspondence between sensory input and perceived experience of the world. Perception is an active process in which people orga-

nize and interpret the information received by the senses. These interpretations are shaped by a host of factors, including the environmental context and perceptual sets. Small wonder, then, that people often perceive the same event in very different ways.

Finally, this chapter provided numerous examples of how cultural factors can shape behavior—in an area of research where one might expect to find little cultural influence. Most people are not surprised to learn that there are cultural differences in attitudes, values, social behavior, and development. But perception is widely viewed as a basic, universal process that should be invariant across cultures. In most respects it is, as the similarities among cultural groups in perception far outweigh the differences. Nonetheless, we saw cultural variations in depth perception, susceptibility to illusions, taste preferences, and pain tolerance. Thus, even a fundamental, heavily physiological process such as perception can be modified to some degree by one's cultural background.

The following Personal Application demonstrates the subjectivity of perception once again. It focuses on how painters have learned to use the principles of visual perception to achieve a variety of artistic goals.



Theoretical Diversity



Subjectivity of Experience



Cultural Heritage

PERSONAL Application

Appreciating Art and Illusion

Answer the following multiple-choice question:

Artistic works such as paintings:

- ___ a render an accurate picture of reality.
- ___ b create an illusion of reality.
- ___ c provide an interpretation of reality.
- ___ d make us think about the nature of reality.
- ___ e all of the above.

The answer to this question is (e), “all of the above.” Historically, artists have pursued many and varied purposes, including each of those listed in the question (Goldstein, 2001). To realize their goals, they have had to use a number of principles of perception—sometimes quite deliberately, and sometimes not. Let’s use the example of painting to explore the role of perceptual principles in art and illusion.

The goal of most early painters was to produce a believable picture of reality. This goal immediately created a problem familiar

to most of us who have attempted to draw realistic pictures: The real world is three dimensional, but a canvas or a sheet of paper is flat. Paradoxically, then, painters who set out to re-create reality have to do so by creating an *illusion* of three-dimensional reality.

Prior to the Renaissance, efforts to create a convincing illusion of reality were relatively awkward by modern standards. Why? Because artists did not understand how to use the full range of depth cues. This is apparent in **Figure 4.54**, a religious scene painted around 1300. The painting clearly lacks a sense of depth. The people seem paper-thin. They have no real position in space.

Although earlier artists made some use of depth cues, Renaissance artists manipulated the full range of pictorial depth cues and really harnessed the crucial cue of linear perspective (Solso, 1994). **Figure 4.55** dramatizes the resulting transition in art. It shows a scene depicted by Gentile and Giovanni Bellini, Italian Renaissance painters. It seems much more realistic and lifelike than the

painting in **Figure 4.54**. Notice how the buildings on the sides converge to make use of linear perspective. Additionally, distant objects are smaller than nearby ones, an application of relative size. This painting also uses height in plane, light and shadow, and interposition. By taking fuller advantage of pictorial depth cues, Renaissance artists enhanced the illusion of reality in paintings.

In the centuries since the Renaissance, painters have adopted a number of viewpoints about the portrayal of reality. For instance, the Impressionists of the 19th century did not want to re-create the photographic “reality” of a scene. They set out to interpret a viewer’s fleeting perception or *impression* of reality. To accomplish this end, they worked with color in unprecedented ways.

Consider for instance, Claude Monet, a French Impressionist who began to work with separate daubs of pure, bright colors that blurred together to create an alternating perceptual experience. If you view his paintings up close, you see only a shimmering mass of color. When you step back, however, the adjacent colors begin to blend, and forms begin to take shape, as you can see in **Figure 4.56**. Monet achieved this duality through careful use of color mixing and by working systematically with complementary colors.

Similar methods were used even more precisely and systematically by Georges Seurat, a French artist who used a technique called *pointillism*. Seurat carefully studied what scientists knew about the composition of color in the 1880s, then applied this knowledge in a calculated, laboratory-like manner. Indeed, critics in his era dubbed him the “little chemist.” Seurat constructed his paintings out of tiny dots of pure, intense colors. He used additive color mixing, a departure from the norm in painting, which usually depends on subtractive mixing of pigments. A famous result of Seurat’s “scientific” approach to painting was his renowned *Sunday Afternoon on the Island of La Grande Jatte*

Figure 4.54

Master of the Arrest of Christ (detail, central part) by S. Francesco, Assisi, Italy (circa 1300). Notice how the paucity of depth cues makes the painting seem flat and unrealistic.



Scala/Art Resource, New York



Scala/Art Resource, New York

Figure 4.55

Brera Predica di S. Marco Pinacoteca by Gentile and Giovanni Bellini (circa 1480). In this painting, the Italian Renaissance artists use a number of depth cues—including linear perspective, relative size, height in plane, light and shadow, and interposition—to enhance the illusion of three-dimensional reality.

(see **Figure 4.57** on the next page). As the work of Seurat illustrates, modernist painters were moving away from attempts to re-create the world as it is literally seen.

If 19th-century painters liberated color, their successors at the turn of the 20th century liberated form. This was particularly true

of the Cubists. Cubism was begun in 1909 by Pablo Picasso, a Spanish artist who went on to experiment with other styles in his prolific career. The Cubists didn't try to *portray* reality so much as to *reassemble* it. They attempted to reduce everything to combinations of geometric forms (lines, circles, tri-

angles, rectangles, and such) laid out in a flat space, lacking depth. In a sense, *they applied the theory of feature analysis to canvas*, as they built their figures out of simple features.

The resulting paintings were decidedly unrealistic, but the painters would leave realistic fragments that provided clues about the

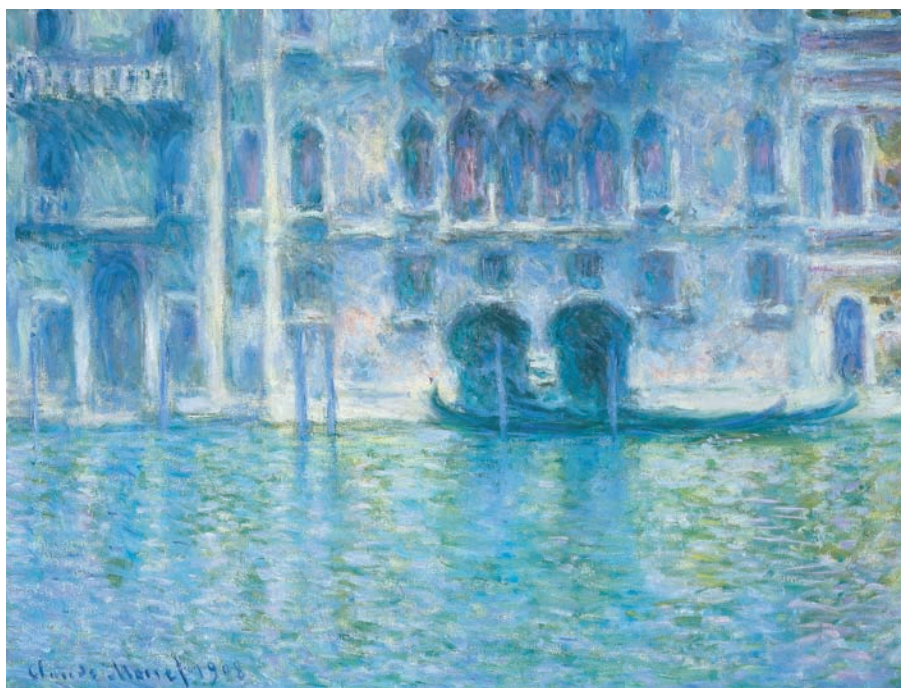


Figure 4.56

Claude Monet's Palazzo da Mula, Venice (1908). The French Impressionist Monet often used complementary colors to achieve his shimmering visual effects.

Claude Monet, *Palazzo da Mula, Venice* (1908). Photo by Richard Carafelli, Chester Dale Collection, © Board of Trustees, National Gallery of Art.

subject. Picasso liked to challenge his viewers to decipher the subject of his paintings. Take a look at the painting in **Figure 4.58** and see whether you can figure out what Picasso was portraying.

The work in **Figure 4.58** is titled *Violin and Grapes*. Note how Gestalt principles of perceptual organization are at work to create these forms. Proximity and similarity serve to bring the grapes together in the bottom

right corner. Closure accounts for your being able to see the essence of the violin.

Other Gestalt principles are the key to the effect achieved in the painting in **Figure 4.59**. This painting, by Marcel Duchamp, a French



Figure 4.58
Violin and Grapes by Pablo Picasso (1912). This painting makes use of the Gestalt principles of proximity, similarity, and closure.

Pablo Picasso, *Violin and Grapes*, Céret and Sorgues (spring-early fall 1912), oil on canvas, 20 X 24 inches (50.6 X 61 cm), collection, The Museum of Modern Art, New York, Mrs. David M. Levy Bequest. Art Resource, New York. © 2005 Estate of Pablo Picasso/Artists Rights Society (ARS), New York.



Figure 4.57
Sunday Afternoon on the Island of La Grande Jatte (without artist's border) (1884–1886). Seurat used thousands of tiny dots of color and the principles of color mixing (see detail). The eye and brain combine the points into the colors the viewer actually sees.

Georges Seurat, French, 1859–1891, *Sunday Afternoon on the Island of La Grande Jatte* (and detail), oil on canvas, 1884–1886, 207.6 X 308 cm, Helen Birch Bartlett Memorial Collection, 1926.224, © 1990 The Art Institute of Chicago. All rights reserved. <http://www.artic.edu/aic>

artist who blended Cubism and a style called Futurism, is titled *Nude Descending a Staircase*. The effect clearly depends on the Gestalt principle of continuity.

The Surrealists toyed with reality in a different way. Influenced by Sigmund Freud's writings on the unconscious, the Surrealists explored the world of dreams and fantasy. Specific elements in their paintings are often depicted realistically, but the strange juxtaposition of elements yields a disconcerting

irrationality reminiscent of dreams. A prominent example of this style is Salvador Dali's *The Hallucinogenic Toreador*, shown in **Figure 4.60**. Notice the reversible figure near the center of the painting. The bullfighter is made up of Venus de Milo sculptures. Dali often used reversible figures to enhance the ambiguity of his bizarre visions.

Perhaps no one has been more creative in manipulating perceptual ambiguity than M. C. Escher, a modern Dutch artist. Escher's

chief goal was to stimulate viewers to think about the nature of reality and the process of visual perception itself. Interestingly, Escher readily acknowledged his debt to psychology as a source of inspiration (Teuber, 1974). He followed the work of the Gestalt psychologists carefully and would even cite specific journal articles that served as the point of departure for his works. For example, *Waterfall*, a 1961 lithograph by Escher, is an impossible figure that appears to defy

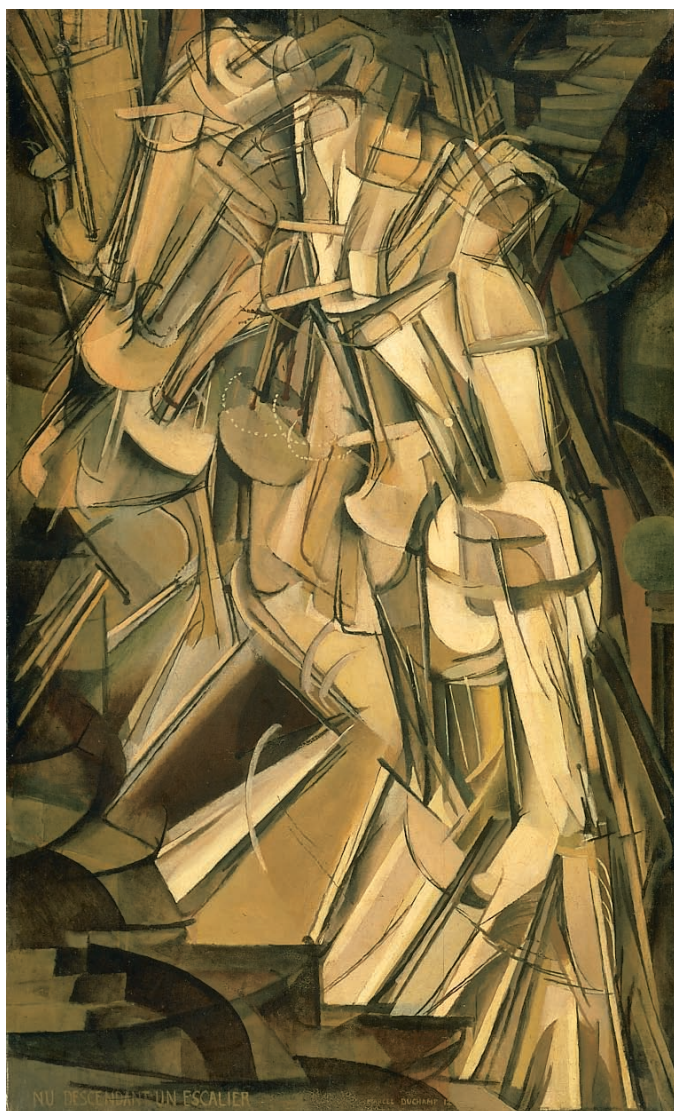


Figure 4.59
Marcel Duchamp's *Nude Descending a Staircase, No. 2* (1912). This painting uses the Gestalt principle of *continuity* and another Gestalt principle not discussed in the text, called *common fate* (elements that appear to move together tend to be grouped together).

Marcel Duchamp, 1912, *Nude Descending a Staircase, No. 2*, oil on canvas, 58" X 35" Philadelphia Museum of Art: Louise and Walter Arensburg Collection, # '50-134-69. Reproduced by permission. © 2005 Artists Rights Society (ARS), New York/ADAGP, Paris/Estate of Marcel Duchamp.



Figure 4.60
Salvador Dali's *The Hallucinogenic Toreador* (1969–1970). This surrealist painting includes a reversible figure (the bullfighter is made up of Venus di Milo statues). Gestalt principles are crucial to the perception of the bull and the dalmatian near the bottom of the painting.

Dali, Salvador. *The Hallucinogenic Toreador* (1969–70), oil on canvas, 157 X 119 inches (398.7 X 302.3 cm). Collection of The Salvador Dali Museum, St. Petersburg, Florida, Copyright © 2005 The Salvador Dali Museum, Inc. © 2005 Gala-Salvador Dali Foundation. Figures Artists Rights Society (ARS), New York.

the law of gravity (see **Figure 4.61**). The puzzling problem here is that a level channel of water terminates in a waterfall that “falls” into the *same* channel two levels “below.” This drawing is made up of two impossible triangles. In case you need help seeing them, the waterfall itself forms one side of each triangle.

The Necker cube, a reversible figure mentioned earlier, was the inspiration for Escher’s 1958 lithograph *Belvedere*, shown in

Figure 4.62. You have to look carefully to realize that this is another impossible figure. Note that the top story runs at a right angle from the first story. Note also how the pillars are twisted around. The pillars that start on one side of the building end up supporting the second story on the other side! Escher’s debt to the Necker cube is manifested in several places. Notice, for instance, the drawing of a Necker cube on the floor next to the seated boy (on the lower left).

Like Escher, Victor Vasarely challenged viewers to think about the process of perception. A Hungarian artist, Vasarely pioneered an approach called Kinetic Art because of his interest in creating illusions of motion. Like Georges Seurat, he went about his work with scientific precision. His paintings are based on optical illusions, as squares seem to advance and recede, or spheres seem to inflate and deflate. For example, note how Vasarely used a variety of depth cues to

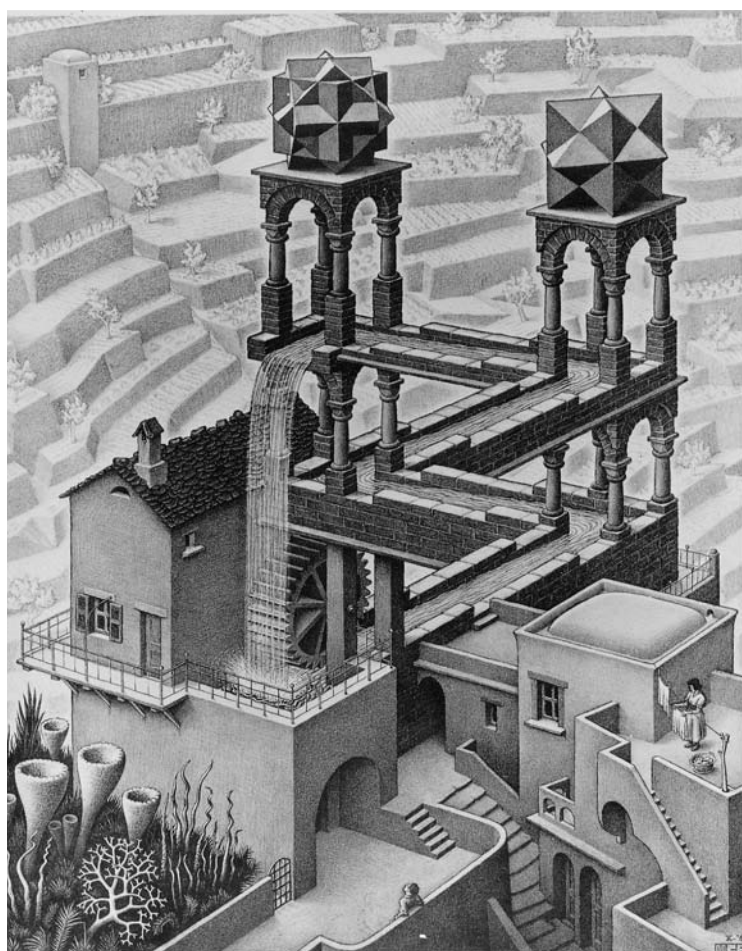


Figure 4.61

Escher’s lithograph *Waterfall* (1961). Escher’s use of depth cues and impossible triangles deceives the brain into seeing water flow uphill.

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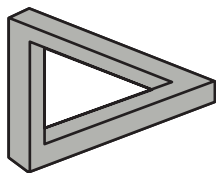
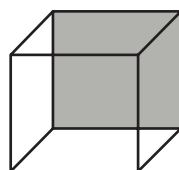


Figure 4.62

Escher’s *Belvedere* (1958). This lithograph depicts an impossible figure inspired by the Necker cube. The cube appears in the architecture of the building, in the model held by the boy on the bench, and in the drawing lying at his feet.

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convey the look of a sphere inflating in his painting *Vega-Tek*, shown in **Figure 4.63**.

While Escher and Vasarely challenged viewers to think about perception, Belgian artist René Magritte challenged people to think about the conventions of painting. Many of his works depict paintings on an easel, with the “real” scene continuing unbroken at the edges. The painting in **Figure 4.64** is such a picture within a picture. In addition, there are two identical triangles in the painting. One represents a road and the other a nearby tower. Notice how the

identical triangles are perceived differently because of the variations in *context*.

Ultimately, Magritte’s painting blurs the line between the real world and the illusory world created by the artist, suggesting that there is no line—that everything is an illusion. In this way, Magritte “framed” the ageless, unanswerable question: What is reality?

▶ REVIEW OF KEY POINTS

- The principles of visual perception are often applied to artistic endeavors. Prior to the Renaissance, efforts to create a convincing illusion of

three-dimensional reality were awkward because artists did not understand how to use depth cues. After the Renaissance, painters began to routinely use pictorial depth cues to make their scenes more lifelike.

- Nineteenth-century painters, such as the Impressionists, manipulated color in creative, new ways. The Cubists were innovative in manipulating form, as they applied the theory of feature analysis to canvas. The Surrealists toyed with reality, exploring the world of fantasy and dreams.
- Modern artists such as Escher and Vasarely have tried to stimulate viewers to think about the process of perception. Among other things, Escher worked with the Necker cube and the impossible triangle.

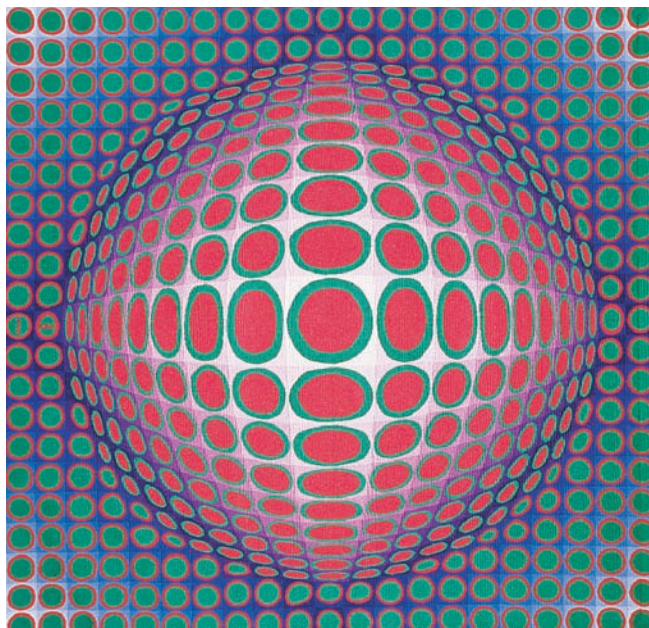


Figure 4.63

Victor Vasarely’s *Vega-Tek* (1969). In this painting, Vasarely manipulates a host of depth cues to create the image of a sphere inflating.

Vasarely, Victor. *Vega-Tek*. Wool Aubusson tapestry. 1969. Copyright Art Resource, New York. Private Collection. © 2005 Artists Rights Society (ARS), New York/ADAGP, Paris.

Figure 4.64

René Magritte’s *Les Promenades d’Euclide* (1955). Notice how the pair of nearly identical triangles look quite different in different contexts.

Magritte, René. *Les Promenades d’Euclide*, The Minneapolis Institute of Arts, The William Hood Dunwoody Fund. Copyright © 2005 Charly Herscovici, Brussels/Artists Rights Society (ARS) New York.



CRITICAL THINKING Application

Recognizing Contrast Effects: It's All Relative

You're sitting at home one night, when the phone rings. It's Simone, an acquaintance from school who needs help with a recreational program for youngsters that she runs for the local park district. She tries to persuade you to volunteer four hours of your time every Friday night throughout the school year to supervise the volleyball program. The thought of giving up your Friday nights and adding this sizable obligation to your already busy schedule makes you cringe with horror. You politely explain to Simone that you can't possibly afford to give up that much time and you won't be able to help her. She accepts your rebuff graciously, but the next night she calls again. This time she wants to know whether you would be willing to supervise volleyball every third Friday. You still feel like it's a big obligation that you really don't want to take on, but the new request seems much more reasonable than the original one. So, with a sigh of resignation, you agree to Simone's request.

What's wrong with this picture? Well, there's nothing wrong with volunteering your time for a good cause, but you just succumbed to a social influence strategy called the *door-in-the face technique*. **The door-in-the-face technique involves making a large request that is likely to be turned down**

as a way to increase the chances that people will agree to a smaller request later (see **Figure 4.65**). The name for this strategy is derived from the expectation that the initial request will be quickly rejected (the "door" is slammed in the "salesperson's" face). Although they may not be familiar with the strategy's name, many people use this manipulative tactic. For example, a husband who wants to coax his frugal wife into agreeing to buy a \$30,000 SUV might begin by proposing that they purchase a \$50,000 sports car. By the time the wife talks her husband out of the \$50,000 car, the \$30,000 price tag may look quite reasonable to her—which is what the husband wanted all along.

Research has demonstrated that the door-in-the-face technique is a highly effective persuasive strategy (Cialdini, 2001). One of the reasons it works so well is that it depends on a simple and pervasive perceptual principle. As noted throughout the chapter, in the domain of perceptual experience, *everything is relative*. This relativity means that people are easily swayed by *contrast effects*. For example, lighting a match or a small candle in a dark room will produce a burst of light that seems quite bright, but if you light the same match or candle in a well-lit room, you may not even detect the addi-

tional illumination. The relativity of perception is apparent in the painting by Josef Albers shown in **Figure 4.66**. The two Xs are exactly the same color, but the X in the top half looks yellow, whereas the X in the bottom half looks brown. These varied perceptions occur because of contrast effects—the two X's are contrasted against different background colors.

The same principles of relativity and contrast that operate when we are making judgments about the intensity or color of visual stimuli also affect the way we make judgments in a wide variety of domains. For example, a 6'3" basketball player, who is really quite tall, can look downright small when surrounded by teammates who are all over 6'8". And a salary of \$36,000 per year for your first full-time job may seem like a princely sum, until a close friend gets an offer of \$65,000 a year. The assertion that everything is relative raises the issue of *relative to what?* **Comparitors are people, objects, events, and other standards used as a baseline for comparison in making judgments.** It is fairly easy to manipulate many types of judgments by selecting *extreme* comparitors that may be unrepresentative.

The influence of extreme comparitors was demonstrated in a couple of interesting

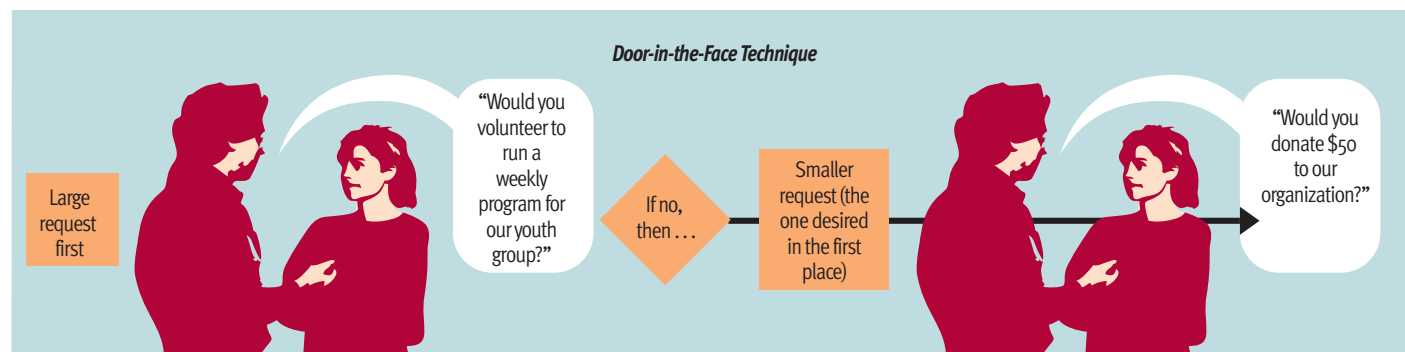


Figure 4.65

The door-in-the-face technique. The door-in-the-face technique is a frequently used compliance strategy in which you begin with a large request and work down to the smaller request you are really after. It depends in part on contrast effects.

Figure 4.66
Contrast effects in visual perception.

This composition by Joseph Albers shows how one color can be perceived differently when contrasted against different backgrounds. The top X looks yellow and the bottom X looks brown, but they're really the same color.

Source: Albers, Joseph. *Interaction of Color*. Copyright © 1963 and reprinted by permission of the publisher, Yale University Press.

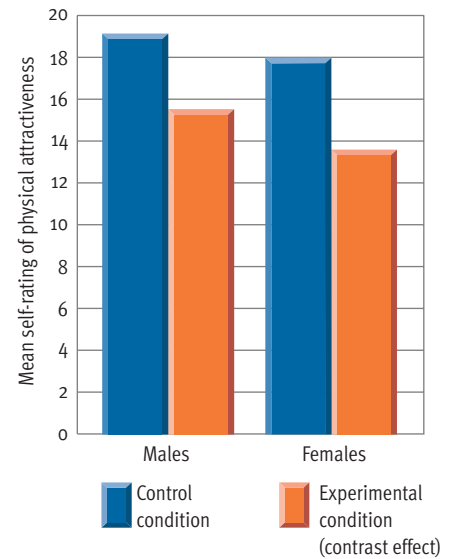
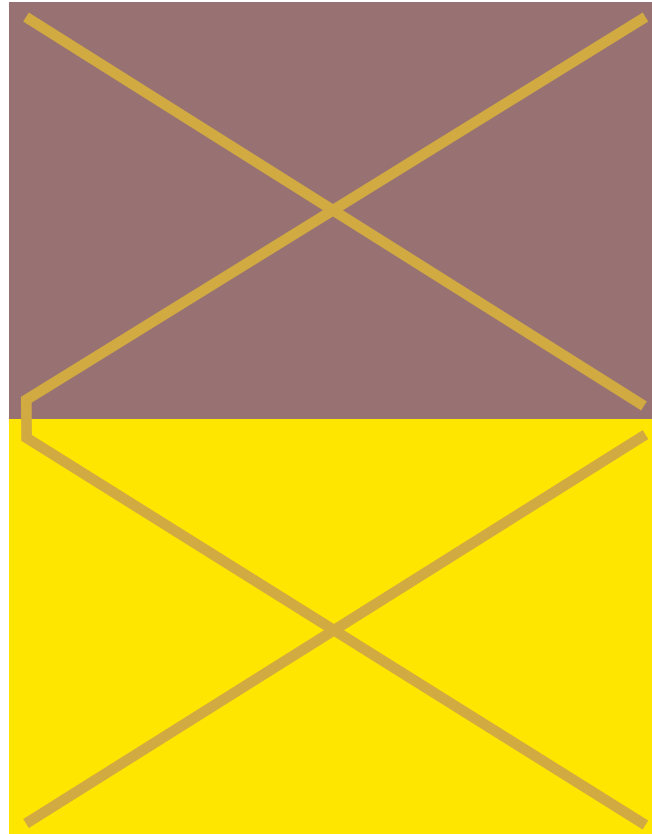


Figure 4.67

Contrast effects in judgments of physical attractiveness. Participants rated their own physical attractiveness under two conditions. In the experimental condition, the ratings occurred after subjects were exposed to a series of photos depicting very attractive models. The resulting contrast effects led to lower self-ratings in this condition. (Data based on Thornton & Moore, 1993)

studies of judgments of physical attractiveness. In one study, undergraduate males were asked to rate the attractiveness of an average-looking female (who was described as a potential date for another male in the dorm) presented in a photo either just before or just after the participants watched a TV show dominated by strikingly beautiful women (Kenrick & Gutierrez, 1980). The female was viewed as less attractive when the ratings were obtained just after the men had seen gorgeous women cavorting on TV as opposed to when they hadn't. In another investigation (Thornton and Moore, 1993), both male and female participants rated *themselves* as less attractive after being exposed to many pictures of extremely attractive models (see Figure 4.67). Thus, contrast effects can influence important social judgments that are likely to affect how people feel about themselves and others.

Anyone who understands how easily judgments can be manipulated by a careful choice of comparitors could influence your thinking. For example, a politician who is

caught in some illegal or immoral act could sway public opinion by bringing to mind (perhaps subtly) the fact that many other politicians have committed acts that were much worse. When considered against a backdrop of more extreme comparitors, the politician's transgression will probably seem less offensive. A defense attorney could use a similar strategy in an attempt to obtain a lighter sentence for a client by comparing the client's offense to much more serious crimes. And a realtor who wants to sell you an expensive house that will require huge mortgage payments will be quick to men-

tion other homeowners who have taken on even larger mortgages.

In summary, critical thinking is facilitated by conscious awareness of the way comparitors can influence and perhaps distort a wide range of judgments. In particular, it pays to be vigilant about the possibility that others may manipulate contrast effects in their persuasive efforts. One way to reduce the influence of contrast effects is to consciously consider comparitors that are both worse and better than the event you are judging, as a way of balancing the effects of the two extremes.

Table 4.2 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding how contrast effects can influence judgments and decisions	The critical thinker appreciates how striking contrasts can be manipulated to influence many types of judgments.
Recognizing when extreme comparitors are being used	The critical thinker is on the lookout for extreme comparitors that distort judgments.

CHAPTER 4 *Recap*

Key Ideas

Psychophysics: Basic Concepts and Issues

- Absolute thresholds, which indicate the minimum stimulus intensity that is detectable in a sensory system, are not really absolute. Weber's law asserts that the size of a just noticeable difference is a constant proportion of the size of the initial stimulus.
- According to signal-detection theory, the detection of sensory inputs is influenced by noise in the system and by decision-making strategies. In recent years, it has become apparent that perception can occur without awareness. Prolonged stimulation may lead to sensory adaptation.

Our Sense of Sight: The Visual System

- Light varies in terms of wavelength, amplitude, and purity. Light enters the eye through the cornea and pupil and is focused on the retina by the lens. Rods and cones are the visual receptors found in the retina. Cones play a key role in daylight vision and color perception, and rods are critical to night vision and peripheral vision. Dark and light adaptation both involve changes in the retina's sensitivity to light.
- The retina transforms light into neural impulses that are sent to the brain via the optic nerve. Receptive fields are areas in the retina that affect the firing of visual cells. Two visual pathways, which engage in parallel processing, send signals through the thalamus to the primary visual cortex. From there, visual signals are shuttled along pathways that have been characterized as the *what* and *where* pathways.
- Perceptions of color (hue) are primarily a function of light wavelength, while amplitude affects brightness and purity affects saturation. Perceptions of many varied colors depend on processes that resemble additive color mixing. The evidence now suggests that both the trichromatic and opponent process theories are necessary to account for color vision.
- Form perception depends on the selection and interpretation of visual inputs. According to feature analysis theories, people detect specific elements in stimuli and build them into forms through bottom-up processing. However, evidence suggests that form perception also involves top-down processing.
- Gestalt psychology emphasized that the whole may be greater than the sum of its parts (features), as illustrated by Gestalt principles of form perception. Other approaches to form perception emphasize that people develop perceptual hypotheses about the distal stimuli that could be responsible for the proximal stimuli that are sensed.
- Depth perception depends primarily on monocular cues. Binocular cues such as retinal disparity and convergence can also contribute to depth perception. Conscious perceptions of geographical slant tend to be greatly exaggerated, but haptic judgments seem largely immune to this perceptual bias.
- Perceptual constancies help viewers deal with the ever-shifting nature of proximal stimuli. Visual illusions demonstrate that perceptual hypotheses can be inaccurate and that perceptions are not simple reflections of objective reality.

Our Sense of Hearing: The Auditory System

- Sound varies in terms of wavelength (frequency), amplitude, and purity. These properties affect mainly perceptions of pitch, loudness, and timbre, respectively. Auditory signals are transmitted through the thalamus to the auditory cortex in the temporal lobe.
- Modern evidence suggests that place theory and frequency theory are complementary rather than incompatible explanations of pitch perception. People pinpoint the source of sounds by comparing interaural differences in the intensity and timing of sounds.

Our Chemical Senses: Taste and Smell

- The taste buds are sensitive to four basic tastes: sweet, sour, bitter, and salty. Taste preferences are largely learned and are heavily influenced by one's cultural background. Supertasters are more sensitive to bitter and sweet tastes than others are.
- Like taste, smell is a chemical sense. Chemical stimuli activate olfactory receptors lining the nasal passages. Most of these receptors respond to more than one odor. Humans exhibit surprising difficulty attaching names to odors.

Our Sense of Touch: Sensory Systems in the Skin

- Sensory receptors in the skin respond to pressure, temperature, and pain. Pain signals are sent to the brain along two pathways characterized as fast and slow. The perception of pain is highly subjective and may be influenced by mood, attention, personality, and culture.
- Gate-control theory holds that incoming pain signals can be blocked in the spinal cord. Endorphins and a descending neural pathway appear responsible for the suppression of pain by the central nervous system.

Our Other Senses

- The kinesthetic system monitors the position of various body parts. The sense of balance depends on activity in the vestibular system.

PERSONAL APPLICATION • Appreciating Art and Illusion

- The principles of visual perception are often applied to artistic endeavors. Painters routinely use pictorial depth cues to make their scenes more lifelike. Color mixing, feature analysis, Gestalt principles, reversible figures, and impossible figures have also been used in influential paintings.

CRITICAL THINKING APPLICATION • Recognizing Contrast Effects: It's All Relative

- The study of perception often highlights the relativity of experience. This relativity can be manipulated by arranging for contrast effects. Critical thinking is enhanced by an awareness of how comparitors can distort many judgments.

Key Terms

Absolute threshold (p. 120)
Additive color mixing (p. 133)
Afterimage (p. 134)
Auditory localization (p. 153)
Basilar membrane (p. 151)
Binocular depth cues (p. 142)
Bottom-up processing (p. 137)
Cochlea (p. 151)
Color blindness (p. 134)
Comparitors (p. 168)
Complementary colors (p. 134)
Cones (p. 127)
Convergence (p. 142)
Dark adaptation (p. 128)
Depth perception (p. 142)
Distal stimuli (p. 140)
Door-in-the-face technique (p. 168)
Farsightedness (p. 127)
Feature analysis (p. 136)
Feature detectors (p. 130)
Fovea (p. 128)
Frequency theory (p. 152)
Gate-control theory (p. 159)
Gustatory system (p. 154)
Impossible figures (p. 147)
Inattention blindness (p. 136)
Just noticeable difference (JND) (p. 121)
Kinesthetic system (p. 160)
Lateral antagonism (p. 129)
Lens (p. 125)
Light adaptation (p. 128)
Monocular depth cues (p. 142)
Motion parallax (p. 142)
Nearsightedness (p. 125)
Olfactory system (p. 154)
Opponent process theory (p. 135)
Optic chiasm (p. 130)
Optic disk (p. 127)

Parallel processing (p. 130)
Perception (p. 119)
Perceptual constancy (p. 146)
Perceptual hypothesis (p. 140)
Perceptual set (p. 136)
Phi phenomenon (p. 138)
Pictorial depth cues (p. 142)
Place theory (p. 152)
Proximal stimuli (p. 140)
Psychophysics (p. 120)
Pupil (p. 127)
Receptive field of a visual cell (p. 128)
Retina (p. 127)
Retinal disparity (p. 142)
Reversible figure (pp. 135–136)
Rods (p. 128)
Sensation (p. 119)
Sensory adaptation (p. 123)
Signal-detection theory (p. 121)
Subjective contours (p. 137)
Subliminal perception (p. 122)
Subtractive color mixing (p. 133)
Top-down processing (p. 137)
Trichromatic theory (p. 133)
Vestibular system (p. 160)
Visual illusion (p. 146)
Volley principle (p. 152)
Weber's law (p. 121)

Key People

Linda Bartoshuk (p. 155)
Gustav Fechner (pp. 120–121)
Hermann von Helmholtz (pp. 152–153)
David Hubel and Torsten Wiesel (pp. 130–132)
Ronald Melzack and Patrick Wall (p. 159)
Max Wertheimer (p. 138)

CHAPTER 4 Practice Test

- In psychophysical research, the absolute threshold has been arbitrarily defined as:
 - the stimulus intensity that can be detected 100% of the time.
 - the stimulus intensity that can be detected 50% of the time.
 - the minimum amount of difference in intensity needed to tell two stimuli apart.
 - a constant proportion of the size of the initial stimulus.
- A tone-deaf person would probably not be able to tell two musical notes apart unless they were very different. We could say that this person has a relatively large:
 - just noticeable difference.
 - relative threshold.
 - absolute threshold.
 - detection threshold.
- In their study of the influence of subliminal perception on attitudes, Krosnick and his colleagues (1992) found:
 - absolutely no evidence of such influence.
 - overwhelming evidence that subliminal stimuli can and do influence subjects' attitudes.
 - that subliminal stimuli do not really exist.
 - small but measureable effects.
- In farsightedness:
 - close objects are seen clearly but distant objects appear blurry.
 - the focus of light from close objects falls behind the retina.
 - the focus of light from distant objects falls a little short of the retina.
 - a and b.
 - a and c.
- The collection of rod and cone receptors that funnel signals to a particular visual cell in the retina make up that cell's:
 - blind spot.
 - optic disk.
 - opponent process field.
 - receptive field.
- The visual pathway that has been characterized as _____ travels through the dorsal stream to the parietal lobes, whereas the pathway that has been labeled the _____ travels through the ventral stream to the temporal lobes.
 - the *what* pathway; the *where* pathway
 - the *where* pathway; the *what* pathway
 - the *opponent process* pathway; the *trichromatic* pathway
 - the *trichromatic* pathway; the *opponent process* pathway
- Which theory would predict that the American flag would have a green, black, and yellow afterimage?
 - subtractive color mixing
 - opponent process theory
 - additive color mixing
 - trichromatic theory
- The illusion of movement created by presenting visual stimuli in rapid succession is called:
 - convergence.
 - retinal disparity.
 - motion parallax.
 - the phi phenomenon.
- In a painting, train tracks may look as if they go off into the distance because the artist draws the tracks as converging lines, a pictorial cue to depth known as:
 - interposition.
 - texture gradient.
 - convergence.
 - linear perspective.
- Sarah has just finished a long, exhausting 6-mile run. She and her friend Jamal are gazing at a hill they need to climb to get back to their car. Jamal asks Sarah, "Gee, how steep do you think that hill is?" Based on research by Proffitt and his colleagues, Sarah is likely to:
 - make a reasonably accurate estimate of the hill's slant, as most people do.
 - underestimate the hill's slant, as most people do.
 - overestimate the hill's slant, but to a lesser degree than she would have before her exhausting run.
 - overestimate the hill's slant to an even greater degree than she would have before her exhausting run.
- The fact that cultural groups with less exposure to carpentered buildings are less susceptible to the Müller-Lyer illusion suggests that:
 - not all cultures test perceptual hypotheses.
 - people in technologically advanced cultures are more gullible.
 - optical illusions can be experienced only by cultures that have been exposed to the concept of optical illusions.
 - perceptual inferences can be shaped by experience.
- Perception of pitch can best be explained by:
 - place theory.
 - frequency theory.
 - both place theory and frequency theory.
 - neither theory.
- In what way(s) is the sense of taste like the sense of smell?
 - There are four primary stimulus groups for both senses.
 - Both systems are routed through the thalamus on the way to the cortex.
 - The physical stimuli for both senses are chemical substances dissolved in fluid.
 - All of the above.
 - None of the above.
- Which school of painting applied the theory of feature analysis to canvas by building figures out of simple features?
 - Kineticism
 - Impressionism
 - Surrealism
 - Cubism
- In the study by Kenrick and Gutierrez (1980), exposing male subjects to a TV show dominated by extremely beautiful women:
 - had no effect on their ratings of the attractiveness of a prospective date.
 - increased their ratings of the attractiveness of a prospective date.
 - decreased their ratings of the attractiveness of a prospective date.
 - increased their ratings of their own attractiveness.

1 B p. 120	6 B p. 132	11 D pp. 148-149
2 A p. 121	7 B pp. 134-135	12 C p. 152
3 D p. 123	8 D p. 138	13 C pp. 154-157
4 B pp. 126-127	9 D pp. 142-143	14 D p. 163
5 D pp. 128-129	10 D pp. 144-146	15 C p. 169

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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Companion Website

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CHAPTER

5

Variations in Consciousness



On the Nature of Consciousness

Variations in Levels of Awareness
The Evolutionary Roots of Consciousness
Consciousness and Brain Activity

Biological Rhythms and Sleep

The Role of Circadian Rhythms
Ignoring Circadian Rhythms
Realigning Circadian Rhythms

The Sleep and Waking Cycle

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Culture and Sleep
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FEATURED STUDY • Gauging the Impact of Sleep Deprivation on College Students

Problems in the Night: Sleep Disorders

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The Contents of Dreams
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Culture and Dreams
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Hypnosis: Altered Consciousness or Role Playing?

Hypnotic Induction and Susceptibility
Hypnotic Phenomena
Theories of Hypnosis

Meditation: Pure Consciousness or Relaxation?

Physiological Correlates
Long-Term Benefits

Altering Consciousness with Drugs

Principal Abused Drugs and Their Effects
Factors Influencing Drug Effects
Mechanisms of Drug Action
Drug Dependence
Drugs and Health

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Addressing Practical Questions About Sleep and Dreams

Common Questions About Sleep
Common Questions About Dreams

CRITICAL THINKING APPLICATION • Is Alcoholism a Disease? The Power of Definitions

The Power to Make Definitions
Definitions, Labels, and Circular Reasoning

Recap

Practice Test

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Nathaniel Kleitman and Eugene Aserinsky couldn't believe their eyes—or their subjects' eyes, either. It was the spring of 1952, and Kleitman, a physiologist and prominent sleep researcher, was investigating the slow, rolling eye movements displayed by subjects at the onset of sleep. Kleitman had begun to wonder whether these slow eye movements would show up during later phases of sleep. The trouble was that watching a subject's closed eyelids all night long was a surefire way to put the *researcher* to sleep. Cleverly, Kleitman and Aserinsky, a graduate student, came up with a better way to document eye movements. They hooked subjects up to an apparatus that was connected to electrodes pasted near the eyes. The electrodes picked up the small electrical signals generated by moving eyeballs. In turn, these signals moved a pen on a chart recorder, much like an electroencephalograph (EEG) traces brain waves (see Chapter 3). The result was an objective record of subjects' eye movements during sleep that could be studied at leisure (Dement, 1992).

One night, while one of their subjects was asleep, the researchers were astonished to see a tracing in the recording that suggested a different, much more rapid eye movement. This result was so unexpected that they suspected the recording device was defective. "It was a rickety old thing, anyway," a technician in Kleitman's lab recalled (Coren, 1996, p. 21). Only when they decided to walk in and personally observe sleeping subjects were they convinced that the eye movements were real. The subjects were deeply asleep, yet the bulges in their closed eyelids showed that their eyeballs were moving laterally in sharp jerks, first in one direction and then in the other. It was almost as if the sleeping subjects were watching a chaotic movie. The researchers wondered—what in the world was going on?

In retrospect, it's amazing that no one had discovered these rapid eye movements before. It turns out that periods of rapid eye movement are a routine characteristic of sleep in humans and many animals. In fact, you can observe them for yourself in your pet dog or cat. The phenomenon had been there for everyone to see for eons, but those who noticed must not have attached any significance to it.

Kleitman and Aserinsky's discovery might have remained something of an oddity, but then they had a brainstorm. Could the rapid eye movements be related to dreaming? With the help of William Dement, a medical student who was interested in dreams, they

soon found the answer. When Dement woke up subjects during periods of rapid eye movement, about 80 percent reported that they had just been having a vivid dream. Another 10 percent reported thoughts or images that might have signified dreaming. By contrast, only a small minority of subjects awakened during other phases of sleep reported that they had been dreaming. Dement knew that he was on to something. "I was overwhelmed with excitement," he wrote later (Dement, 1992, pp. 24–25). Subsequently, EEG recordings showed that periods of rapid eye movement were also associated with marked changes in brain-wave patterns. What Kleitman and his graduate students had stumbled on was considerably more than an oddity: It was a window into the most private aspect of consciousness imaginable—the experience of dreaming.

As you will learn in this chapter, the discovery of rapid eye movement (REM) sleep blossomed into a number of other fascinating insights about what goes on in the brain during sleep. This research is just one example of how contemporary psychologists have tried to come to grips with the slippery topic of consciousness. Over time, consciousness has represented something of a paradox for psychology. On the one hand, our conscious experience—our awareness of ourselves and the world around us, our thoughts, and even our dreams—would seem to be an obvious and central concern for psychologists. On the other hand, psychology is committed to the empirical approach, which requires having objective, replicable ways of studying a given phenomenon. And consciousness is the ultimate in subjective experience. We can't directly observe another's consciousness. We have a hard enough time even describing our own conscious experience to anyone else (Schooler & Fiore, 1997). Yet in recent decades researchers have been finding inventive ways to shed some objective light on the mysteries of consciousness.

We'll begin our tour of variations in consciousness with a few general points about the nature of consciousness. After that, much of the chapter will be a "bedtime story," as we take a long look at sleep and dreaming. We'll continue our discussion of consciousness by examining hypnosis, meditation, and the effects of mind-altering drugs. The Personal Application will address a number of practical questions about sleep and dreams. Finally, the Critical Thinking Application looks at the concept of alcoholism to highlight the power of definitions.

> On the Nature of Consciousness

PREVIEW QUESTIONS

- What is consciousness?
- What did Freud have to say about levels of awareness?
- Is there any awareness during sleep?
- How might consciousness be adaptive?
- How are variations in consciousness associated with EEG activity?

Consciousness is the awareness of internal and external stimuli. Your consciousness includes (1) your awareness of external events (“The professor just asked me a difficult question about medieval history”), (2) your awareness of your internal sensations (“My heart is racing and I’m beginning to sweat”), (3) your awareness of your self as the unique being having these experiences (“Why me?”), and (4) your awareness of your thoughts about these experiences (“I’m going to make a fool of myself!”). To put it more concisely, consciousness is personal awareness.

The contents of your consciousness are continually changing. Rarely does consciousness come to a standstill. It moves, it flows, it fluctuates, it wanders (Wegner, 1997). Recognizing this fact, William James (1902) christened this continuous flow the *stream of consciousness*. If you could tape-record your thoughts, you would find an endless flow of ideas that zigzag in all directions. As you will soon learn, even when you sleep your consciousness moves through a series of transitions. Constant shifting and changing seem to be part of the essential nature of consciousness.

Variations in Levels of Awareness

Whereas William James emphasized the stream of consciousness, Sigmund Freud (1900) wanted to examine what went on beneath the surface of this stream. As explained in Chapter 1, Freud argued that people’s feelings and behavior are influenced by *unconscious* needs, wishes, and conflicts that lie below the surface of conscious awareness. According to Freud, the stream of consciousness has depth. Conscious and unconscious processes are different *levels of awareness*. Thus, Freud was one of the first theorists to recognize that consciousness is not an all-or-none phenomenon.

Since Freud’s time, research has shown that people continue to maintain some awareness during sleep and even when they are put under anesthesia for surgery. How do we know? Because some stimuli can still penetrate awareness. For example, people under surgical anesthesia occasionally hear comments made during their surgery, which they later repeat to their surprised surgeons (Bennett, 1993; Merikle & Daneman, 1996). Other research indicates that while people are asleep they remain aware of external events to some degree (Campbell, 2000; Evans, 1990). A good example is the new parent who can sleep through a loud thunderstorm or a buzzing alarm clock but who

immediately hears the muffled sound of the baby crying down the hall. The parent’s selective sensitivity to sounds means that some mental processing must be going on even during sleep.

The Evolutionary Roots of Consciousness

Why do humans experience consciousness? Like other aspects of human nature, consciousness must have evolved because it helped our ancient ancestors survive and reproduce (Ornstein & Dewan, 1991). That said, there is plenty of debate about exactly how consciousness proved adaptive (Guzeldere, Flanagan, & Hardcastle, 2000). One line of thinking is that consciousness allowed our ancestors to think through courses of action and their consequences—and attempt to choose the best course—without actually executing ill-advised actions (by trial and error) that may have led to disastrous consequences (Plotkin, 1998). In other words, a little forethought and planning may have proved valuable in efforts to obtain food, avoid predators, and find mates. Although this analysis seems plausible, a number of alternative explanations focus on other adaptive benefits of personal awareness, and relatively little empirical evidence exists to judge their merits. Thus, the evolutionary bases of consciousness remain elusive.

Consciousness and Brain Activity



Consciousness does not arise from any distinct structure in the brain but rather from activity in distributed networks of neural pathways (Kinsbourne, 1997). Thus, one of the best physiological indicators of variations in consciousness is the EEG, which records activity from broad swaths of the cortex. **The electroencephalograph (EEG) is a device that monitors the electrical activity of the brain over time by means of recording electrodes attached to the surface of the scalp.** Ultimately, the EEG summarizes the rhythm of cortical activity in the brain in terms of line tracings called *brain waves*. These brain-wave tracings vary in *amplitude* (height) and *frequency* (cycles per second, abbreviated *cps*). You can see what brain waves look like if you glance ahead to **Figure 5.4**. Human brain-wave activity is usually divided into four principal bands based on the frequency of the brain waves. These bands, named after letters in the Greek alpha-

Table 5.1 EEG Patterns Associated with States of Consciousness

EEG pattern	Frequency (cps)	Typical States of Consciousness
Beta (β)	13–24	Normal waking thought, alert problem solving
Alpha (α)	8–12	Deep relaxation, blank mind, meditation
Theta (θ)	4–7	Light sleep
Delta (Δ)	less than 4	Deep sleep

bet, are *beta* (13–24 cps), *alpha* (8–12 cps), *theta* (4–7 cps), and *delta* (under 4 cps).

Different patterns of EEG activity are associated with different states of consciousness, as is summarized in **Table 5.1**. For instance, when you are alertly engaged in problem solving, beta waves tend to dominate. When you are relaxed and resting, alpha waves increase. When you slip into deep, dreamless sleep, delta waves become more prevalent. Although these correlations are far from perfect, changes in EEG activity are closely related to variations in consciousness (Wallace & Fisher, 1999).

As is often the case with correlations, researchers are faced with a chicken-or-egg puzzle when it comes to the relationship between mental states and the brain's electrical activity. If you become drowsy while you are reading this passage, your brain-wave activity will probably change. But are these changes causing your drowsiness, or is your drowsiness causing the changes in brain-wave activity? Or are the drowsiness and the shifts in brain-wave activity both caused by a *third* factor—perhaps signals coming from a subcortical area in the brain? (See **Figure 5.1**.) Frankly, no one knows. All that is known for sure is that variations in consciousness are correlated with variations in brain activity.

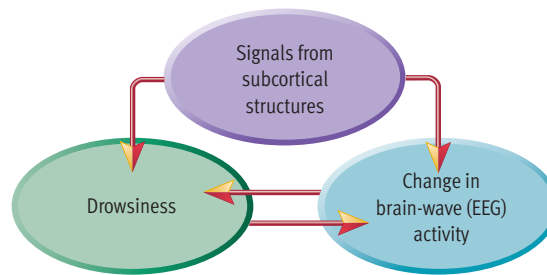


Figure 5.1

The correlation between mental states and cortical activity. As discussed in Chapter 2, because of the “third-variable problem,” correlations alone do not establish causation. For example, there are strong correlations between drowsiness and a particular pattern of cortical activity, as reflected by EEG brain waves. But does drowsiness cause a change in cortical activity, or do changes in cortical activity cause drowsiness? Or does some third variable—such as signals from the brainstem or other subcortical structures—account for the changes in both brain waves and drowsiness?

Measures of brain-wave activity have provided investigators with a method for mapping out the mysterious state of consciousness called sleep. As we will see in the next two sections of the chapter, this state turns out to be far more complex and varied than you might expect.

➤ REVIEW OF KEY POINTS

- William James emphasized that consciousness is a continually changing stream of mental activity. Consciousness varies along a continuum of levels of awareness.
- Consciousness may have evolved because it allowed humans to think through the possible consequences of their actions and avoid some negative consequences. People maintain some degree of awareness during sleep and sometimes while under anesthesia.
- Brain waves vary in amplitude and frequency (cps) and are divided into four bands: beta, alpha, theta, and delta. Variations in consciousness are related to variations in brain activity, as measured by the EEG.

➤ Biological Rhythms and Sleep

Variations in consciousness are shaped in part by biological rhythms. Rhythms pervade the world around us. The daily alternation of light and darkness, the annual pattern of the seasons, and the phases of the moon all reflect this rhythmic quality of repeating cycles. Humans, many other animals, and even plants display biological rhythms that are tied to these planetary rhythms (Foster, 2004). **Biological rhythms are periodic fluctuations in physiological functioning.** The existence of these rhythms means that or-

ganisms have internal “biological clocks” that somehow monitor the passage of time.

The Role of Circadian Rhythms



Circadian rhythms are the 24-hour biological cycles found in humans and many other species. In humans, circadian rhythms are particularly influential in the regulation of sleep (Lavie, 2001). However,

PREVIEW QUESTIONS

- How are circadian rhythms related to falling asleep?
- Which physiological structures control our biological clocks?
- How do jet lag and rotating work shifts affect circadian rhythms?
- What can be done to help people realign circadian rhythms?

daily cycles also produce rhythmic variations in blood pressure, urine production, hormonal secretions, and other physical functions (see **Figure 5.2**), as well as alertness, short-term memory, and other aspects of cognitive performance (Czeisler, Buxton, & Khalsa, 2005; Van Dongen & Dinges, 2005). For instance, body temperature varies rhythmically in a daily cycle, usually peaking in the afternoon and reaching its low point in the depths of the night.

Research indicates that people generally fall asleep as their body temperature begins to drop and awaken as it begins to ascend once again (Kumar, 2004). Investigators have concluded that circadian rhythms can leave individuals physiologically primed to fall asleep most easily at a particular time of day (Richardson, 1993). This optimal time varies from person to person, depending on their schedules, but it's interesting to learn that each individual may have an "ideal" time for going to bed. This ideal bedtime may also promote better quality sleep during the night (Akerstedt et al., 1997), which is interesting in light of evidence that sleep *quality* may be more strongly correlated with health and well-being than the sheer quantity of sleep (Pilcher, Ginter, & Sadowsky, 1997).

To study biological clocks, researchers have monitored physiological processes while subjects are cut off from exposure to the cycle of day and night and all other external time cues. These studies have demonstrated that circadian rhythms generally persist even when external time cues are eliminated. However, when people are isolated in this way, their cy-

cles run a little longer than normal, about 24.2 hours on the average (Czeisler et al., 2005). Investigators aren't sure why this slight drift toward a longer cycle occurs, but it is not apparent under normal circumstances because daily exposure to light *readjusts* people's biological clocks.

In fact, researchers have worked out many of the details regarding how the day-night cycle resets biological clocks. When exposed to light, some receptors in the retina send direct inputs to a small structure in the hypothalamus called the *suprachiasmatic nucleus (SCN)* (Gooley & Saper, 2005). The SCN sends signals to the nearby *pineal gland*, whose secretion of the hormone *melatonin* plays a key role in adjusting biological clocks (Harrington & Mistlberger, 2000). Circadian rhythms in humans actually appear to be regulated by *multiple* internal clocks, but the central pacemaker clearly is located in the SCN (Foster, 2004).

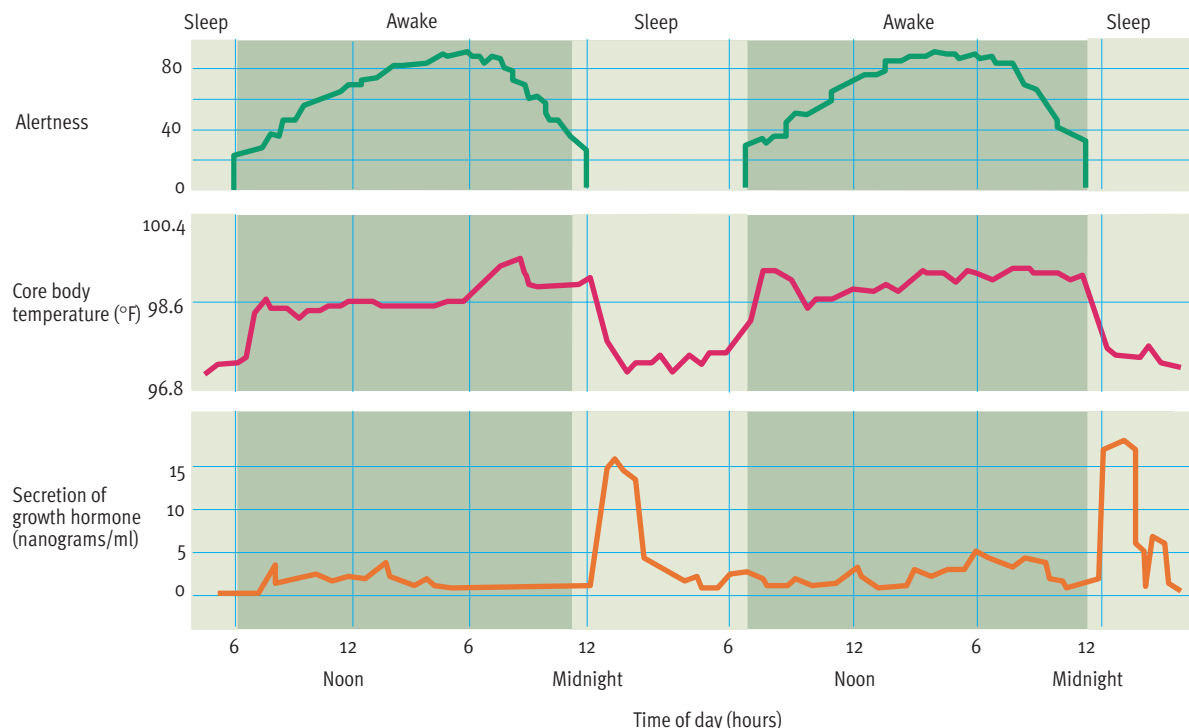
Ignoring Circadian Rhythms



What happens when you ignore your biological clock and go to sleep at an unusual time? Typically, the quality of your sleep suffers. Getting out of sync with your circadian rhythms also causes *jet lag*. When you fly across several time zones, your biological clock keeps time as usual, even though official clock time changes. You then go to sleep at the "wrong" time and are likely to experience difficulty falling asleep and poor quality sleep. This inferior sleep, which can

Figure 5.2
Examples of circadian rhythms. These graphs show how alertness, core body temperature, and the secretion of growth hormone typically fluctuate in a 24-hour rhythm. Note how body temperature declines when people fall asleep.

Source: Adapted from Coleman, R. (1986). *Wide awake at 3:00 A.M.* New York: W. H. Freeman. Copyright © 1986 by Richard M. Coleman. Reprinted by permission of Henry Holt & Co., LLC.



continue to occur for several days, can make you feel fatigued, sluggish, and irritable during the daytime (Arendt, Stone, & Skene, 2005).

People differ in how quickly they can reset their biological clocks to compensate for jet lag, but a rough rule of thumb is that the readjustment process takes about a day for each time zone crossed (Moline, 1993). In addition, the speed of readjustment depends on the direction traveled. Generally, it's easier to fly westward and lengthen your day than it is to fly eastward and shorten it (Arendt et al., 2005). This east-west disparity in jet lag is sizable enough to have an impact on the performance of sports teams. Studies have found that teams flying westward perform significantly better than teams flying eastward in professional baseball (Recht, Lew, & Schwartz, 1995; see **Figure 5.3**) and college football (Worthen & Wade, 1999).

Rotating work shifts that force many nurses, firefighters, and other workers to keep changing their sleep schedule also play havoc with biological rhythms. Shift rotation, which affects about 20% of the United States workforce, tends to have far more detrimental effects than jet lag (Monk, 2000). People suffering from jet lag get their circadian rhythms realigned within a matter of days, but workers on rotating shifts are constantly at odds with local time cues and normal rhythms. Studies show that workers get less total sleep and poorer quality sleep when they go on rotating shifts. Shift rotation can also have a negative impact on employees' productivity and accident-proneness at work, the quality of their social relations at home, and their physical and mental health

(Cruz, della Rocco, & Hackworth, 2000; Hossain & Shapiro, 1999). For example, one study found a 40% increase in shift workers' risk for cardiovascular disease (Boggild & Knutsson, 1999). Other studies have found that shiftwork for women is associated with irregular menstrual cycles, reduced fertility, and an increased risk of premature births (Rogers & Dinges, 2002).

Realigning Circadian Rhythms

As scientists have come to appreciate the importance of circadian rhythms, they have begun to look for new ways to help people realign their daily rhythms. One promising line of research has focused on giving people small doses of the hormone melatonin, which appears to regulate the human biological clock. The evidence from a number of studies suggests that melatonin *can* reduce the effects of jet lag by helping travelers resynchronize their biological clocks, but the research results are inconsistent (Arendt & Skene, 2005; Takahashi et al., 2002). One reason for the inconsistent findings is that when melatonin is used to ameliorate jet lag, the timing of the dose is crucial; because calculating the optimal timing is rather complicated, it is easy to get it wrong (Czeisler, Cajochen, & Turek, 2000).

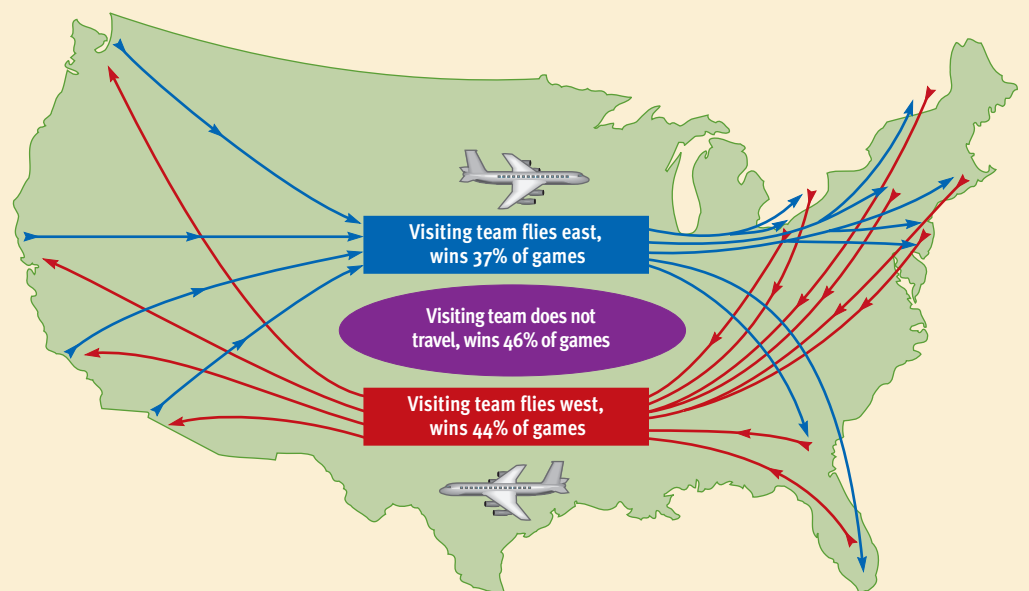
Researchers have also tried carefully timed exposure to bright light as a treatment to realign circadian rhythms in rotating shift workers in industrial settings. Positive effects have been seen in some studies

Figure 5.3

Effects of direction traveled on the performance of professional baseball teams.

To gain some insight into the determinants of jet lag, Recht, Lew, and Schwartz (1995) analyzed the performance of visiting teams in major league baseball over a three-year period. In baseball, visiting teams usually play 3–4 games in each destination city, so there are plenty of games in which the visiting team has not traveled the day before. These games, which served as a baseline for comparison, were won by the visiting team 46% of the time. Consistent with the observation that flying west creates less jet lag than flying east, visiting teams that flew westward the day (or night) before performed only slightly worse, winning 44% of the time. In contrast, visiting teams that flew eastward the day before won only 37% of their games, presumably because flying east and shortening one's day creates greater jet lag.

Source: Adapted from Kalat, J. W. (2001). *Biological psychology*. Belmont, CA: Wadsworth. Reprinted by permission.



(Lowden, Akerstedt, & Wibom, 2004). This treatment can accelerate workers' adaptation to a new sleep-wake schedule, leading to improvements in sleep quality and alertness during work hours. However, the effects of bright-light administration have been modest and somewhat inconsistent (Rogers & Dinges, 2002), and it isn't a realistic option in many work settings. Another strategy to help rotating shift workers involves carefully planning their rotation schedules to reduce the severity of their circadian disruption. The negative effects of shift rotation can be reduced if workers move through progressively later starting times (instead of progressively earlier starting times) and if they have longer periods between shift changes (Kostreva, McNelis, & Clemens, 2002). Although enlightened scheduling practices can help, the unfor-

tunate reality is that most people find rotating shift work very difficult.

➤ REVIEW OF KEY POINTS

- The cycle of sleep and wakefulness is influenced considerably by circadian rhythms. Exposure to light resets biological clocks by affecting the activity of the suprachiasmatic nucleus and the pineal gland, which secretes the hormone melatonin.
- Ignoring your biological clock by going to sleep at an unusual time may have a negative effect on your sleep. Being out of sync with circadian rhythms is one reason for jet lag and for the unpleasant nature of rotating shift work.
- Melatonin may have value in efforts to alleviate the effects of jet lag. Bright light administration and circadian-friendly rotation schedules can sometimes reduce the negative effects of rotating shift work.

➤ The Sleep and Waking Cycle

PREVIEW QUESTIONS

- What happens when people fall asleep?
- How is REM sleep different from non-REM sleep?
- How do sleep stages evolve over the course of a night's sleep?
- How does age affect patterns of sleeping?
- Which aspects of sleep are influenced by culture?
- Which brain centers and neurotransmitters are involved in the modulation of sleep?

Although it is a familiar state of consciousness, sleep is widely misunderstood. Historically, people have thought of sleep as a single, uniform state of physical and mental inactivity, during which the brain is "shut down" (Dement, 2003). In reality, sleepers experience quite a bit of physical and mental activity throughout the night. Scientists have learned a great deal about sleep since the landmark discovery of REM sleep in the 1950s.

The advances in psychology's understanding of sleep are the result of hard work by researchers who have spent countless nighttime hours watching other people sleep. This work is done in sleep laboratories, where volunteer subjects come to spend the night. Sleep labs have one or more "bedrooms" in which the subjects retire, usually after being hooked up to a variety of physiological recording devices. In addition to an EEG, the other two crucial devices are an **electromyograph (EMG)**, which records muscular activity and tension, and an **electrooculograph (EOG)**, which records eye movements (Carskadon & Rechtschaffen, 2005). Typically, other instruments are also used to monitor heart rate, breathing, pulse rate, and body temperature. The researchers observe the sleeping subject through a window (or with a video camera) from an adjacent room, where they also monitor their elaborate physiological recording equipment (see the adjacent photo). For most people, it takes just one night to adapt to the strange bedroom and the recording devices and return to their normal mode of sleeping (Carskadon & Dement, 1994).

Cycling Through the Stages of Sleep



Not only does sleep occur in a context of daily rhythms, but subtler rhythms are evident within the experience of sleep itself. During sleep, people cycle through a series of five stages. Let's take a look at what researchers have learned about the changes that occur during each of these stages (Carskadon & Dement, 2005).

Stages 1–4



Although it may only take a few minutes, the onset of sleep is gradual and there is no obvious transition



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Researchers in a sleep laboratory can observe subjects while using elaborate equipment to record physiological changes during sleep. This kind of research has disclosed that sleep is a complex series of physical and mental states.

Web Link 5.1



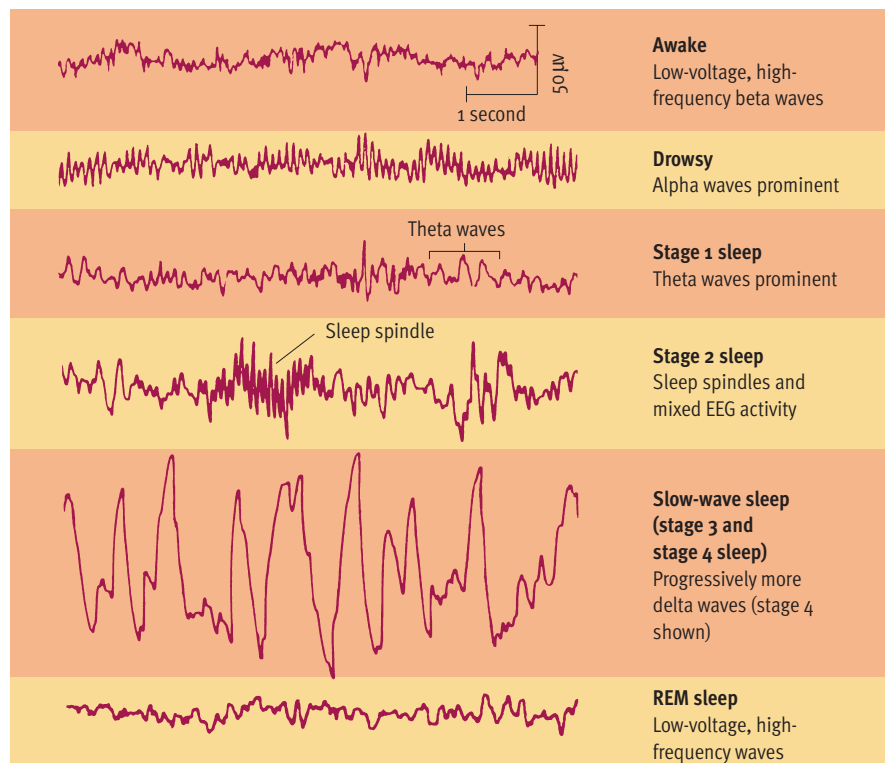
SleepNet
This extensive website offers a wealth of information on sleep disorders, sleep labs, sleep aids, and sleep research. It also includes links to other websites dedicated to the topic of sleep.

point between wakefulness and sleep (Rechtschaffen, 1994). The length of time it takes people to fall asleep varies considerably, but the *average* in a recent study of over 35,000 people from 10 countries was 25 minutes (Soldatos et al., 2005). Falling-asleep time depends on quite an array of factors, including how long it has been since the person has slept, where the person is in his or her circadian cycle, the amount of noise or light in the sleep environment, and the person's age, desire to fall asleep, recent caffeine or drug intake, and stress level, among other things (Broughton, 1994). In any event, stage 1 is a brief transitional stage of light sleep that usually lasts only a few (1–7) minutes. Breathing and heart rate slow as muscle tension and body temperature decline. The alpha waves that probably dominated EEG activity just before falling asleep give way to lower-frequency EEG activity in which theta waves are prominent (see **Figure 5.4**). *Hypnic jerks*, those brief muscular contractions that occur as people fall asleep, generally occur during stage 1 drowsiness (Broughton, 1994).

As the sleeper descends through stages 2, 3, and 4 of the cycle, respiration rate, heart rate, muscle tension, and body temperature continue to decline. During stage 2, which typically lasts about 10–25 minutes, brief bursts of higher-frequency brain waves, called *sleep spindles*, appear against a background of mixed EEG activity (refer to **Figure 5.4** once again). Gradually, brain waves become higher in amplitude and slower in frequency, as the body moves into a deeper form of sleep, called slow-wave sleep. **Slow-wave sleep (SWS) consists of sleep stages 3 and 4, during which high-amplitude, low-frequency delta waves become prominent in EEG recordings.** Typically, individuals reach slow-wave sleep in about a half-hour and stay there for roughly 30 minutes. Then the cycle reverses itself and the sleeper gradually moves back upward through the lighter stages. That's when things start to get especially interesting.

REM Sleep

When sleepers reach what should be stage 1 once again, they usually go into the *fifth* stage of sleep, which is most widely known as *REM sleep*. As we have seen, REM is an abbreviation for the *rapid eye movements* prominent during this stage of sleep. In a sleep lab, researchers use an electrooculograph to monitor these lateral (side-to-side) movements that occur beneath the sleeping person's closed eyelids. However, these movements can be seen with the naked eye if you closely watch someone in the REM stage of sleep (little ripples move back and forth across his or her closed eyelids).



As discussed at the beginning of the chapter, the discovery of REM sleep was made accidentally in the 1950s in Nathaniel Kleitman's lab at the University of Chicago (Aserinsky & Kleitman, 1953; Dement, 2005). The term *REM sleep* was coined by medical student William Dement, who recalls, "At the time, I defined sleep stages quite casually, having no idea that the same names would still be used 50 years later. Since I was the only one in the whole world who was looking at this aspect of human existence, there was no one to dispute me" (Dement, 2003, p. 291). Little did Dement know that his groundbreaking work would revolutionize the study of sleep. Decades of research have shown that virtually all mammals and birds exhibit REM sleep (see the photo below for a notable exception).



Figure 5.4

EEG patterns in sleep and wakefulness. Characteristic brain waves vary depending on one's state of consciousness. Generally, as people move from an awake state through deeper stages of sleep, their brain waves decrease in frequency (cycles per second) and increase in amplitude (height). However, brain waves during REM sleep resemble "wide-awake" brain waves.

Source: Adapted from Hauri, P. (1982). *Current concepts: The sleep disorders*. Kalamazoo, MI: The Upjohn Company. Reprinted by permission.

REM sleep is not unique to humans. Nearly all mammals and birds exhibit REM sleep. The only known exceptions among warm-blooded vertebrates are dolphins and some whales (Morrison, 2003). Dolphins are particularly interesting, as they sleep while swimming, resting one hemisphere of the brain while the other hemisphere remains alert.

In humans, the REM stage tends to be a “deep” stage of sleep in the sense that people are relatively hard to awaken from it (although arousal thresholds vary during REM). The REM stage is also marked by irregular breathing and pulse rate. Muscle tone is extremely relaxed—so much so that bodily movements are minimal and the sleeper is virtually paralyzed. *Although REM is a relatively deep stage of sleep, EEG activity is dominated by high-frequency beta waves that resemble those observed when people are alert and awake* (see **Figure 5.4** again).

This paradox is probably related to the association between REM sleep and dreaming. As noted earlier, when subjects are awakened during various stages of sleep and asked whether they are dreaming, most dream reports come from the REM stage (Dement, 1978; McCarley, 1994). Although decades of research have revealed that some dreaming also occurs in the non-REM stages, dreaming is most frequent, vivid, and memorable during REM sleep (Pace-Schott, 2005).

To summarize, **REM sleep is a relatively deep stage of sleep marked by rapid eye movements, high-frequency, low-amplitude brain waves, and vivid dreaming.** It is such a special stage of sleep that the other four stages are often characterized simply as “non-REM sleep.” **Non-REM (NREM) sleep consists**

of sleep stages 1 through 4, which are marked by an absence of rapid eye movements, relatively little dreaming, and varied EEG activity.



Repeating the Cycle

During the course of a night, people usually repeat the sleep cycle about four times. As the night wears on, the cycle changes gradually. The first REM period is relatively short, lasting only a few minutes. Subsequent REM periods get progressively longer, peaking at around 40–60 minutes in length. Additionally, NREM intervals tend to get shorter, and descents into NREM stages usually become more shallow. These trends can be seen in **Figure 5.5**, which provides an overview of a typical night's sleep cycle. These trends mean that most slow-wave sleep occurs early in the sleep cycle and that REM sleep tends to pile up in the second half of the sleep cycle. Summing across the entire cycle, young adults typically spend about 20% of their sleep time in slow-wave sleep and another 20% in REM sleep.

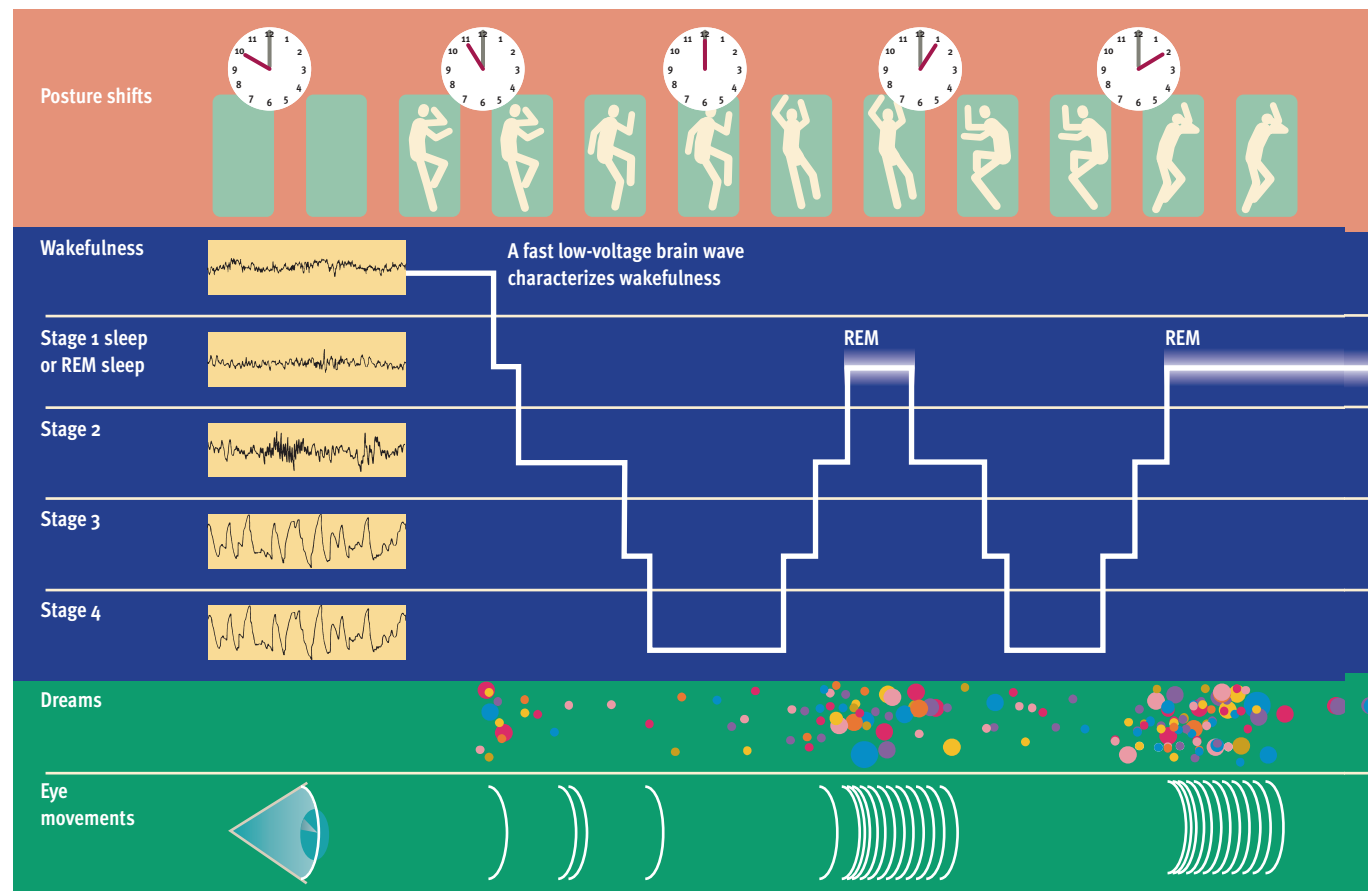


Age Trends in Sleep

Age alters the sleep cycle. What we have described so far is the typical pattern for young adults. Chil-

Figure 5.5

An overview of the cycle of sleep. The white line charts how a typical, healthy, young adult moves through the various stages of sleep during the course of a night. This diagram also shows how dreams and rapid eye movements tend to coincide with REM sleep, whereas posture changes occur between REM periods (because the body is nearly paralyzed during REM sleep). Notice how the person cycles into REM four times, as descents into NREM sleep get shallower and REM periods get longer. Thus, slow-wave sleep is prominent early in the night, while REM sleep dominates the second half of a night's sleep. Although these patterns are typical, keep in mind that sleep patterns vary from one person to another and that they change with age.



dren, however, display different patterns. Newborns will sleep six to eight times in a 24-hour period, often exceeding a total of 16 hours of sleep. Fortunately for parents, during the first several months much of this sleep begins to get consolidated into one particularly long nighttime sleep period (Webb, 1992a). Interestingly, infants spend much more of their sleep time in the REM stage than adults do. In the first few months, REM accounts for about 50% of babies' sleep, as compared to 20% of adults' sleep. During the remainder of the first year, the REM portion of infants' sleep declines to roughly 30% (Ohayon et al., 2004). The REM portion of sleep continues to decrease gradually until it levels off at about 20% (see **Figure 5.6** on the next page).

During adulthood, gradual, age-related changes in sleep continue. Although the proportion of REM sleep remains fairly stable, the percentage of slow-wave sleep declines and the percentage of time spent in stage 1 increases slightly, with these trends stronger in men than women (Bliwise, 2005). These shifts toward lighter sleep *may* contribute to the increased frequency of nighttime awakenings seen among the elderly (Klerman et al., 2004). As **Figure 5.6** shows, the average amount of total sleep time also declines with advancing age. However, these averages mask impor-

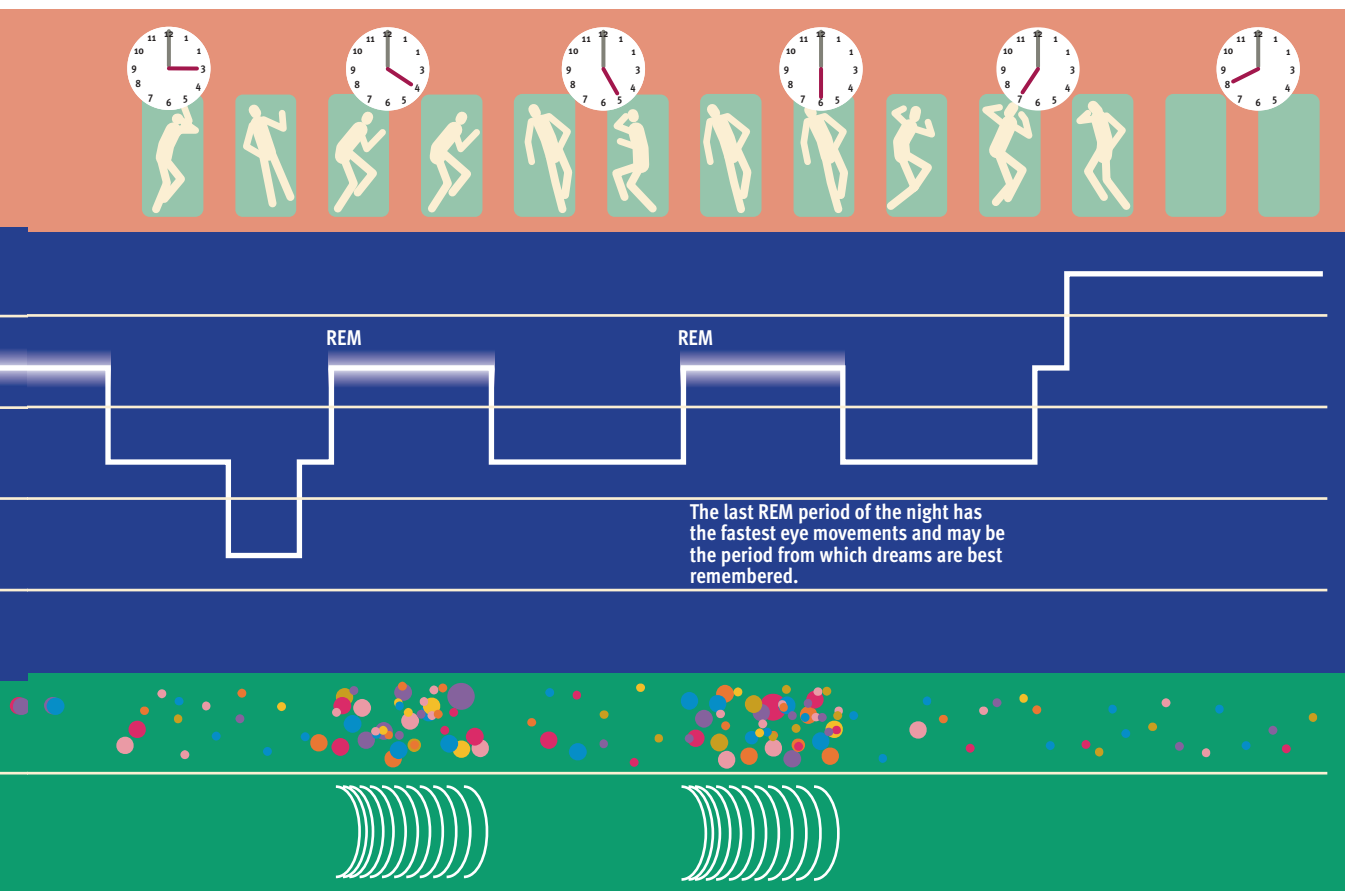
concept check 5.1



Comparing REM and NREM Sleep

A table here could have provided you with a systematic comparison of REM sleep and NREM sleep, but that would have deprived you of the opportunity to check your understanding of these sleep phases by creating your own table. Fill in each of the blanks below with a word or phrase highlighting the differences between REM and NREM sleep with regard to the various characteristics specified. You can find the answers in the back of the book in Appendix A.

Characteristic	REM sleep	NREM sleep
1. Type of EEG activity	_____	_____
2. Eye movements	_____	_____
3. Dreaming	_____	_____
4. Depth (difficulty in awakening)	_____	_____
5. Percentage of total sleep (in adults)	_____	_____
6. Increases or decreases (as percentage of sleep) during childhood	_____	_____
7. Timing in sleep cycle (dominates early or late)	_____	_____



Web Link 5.2



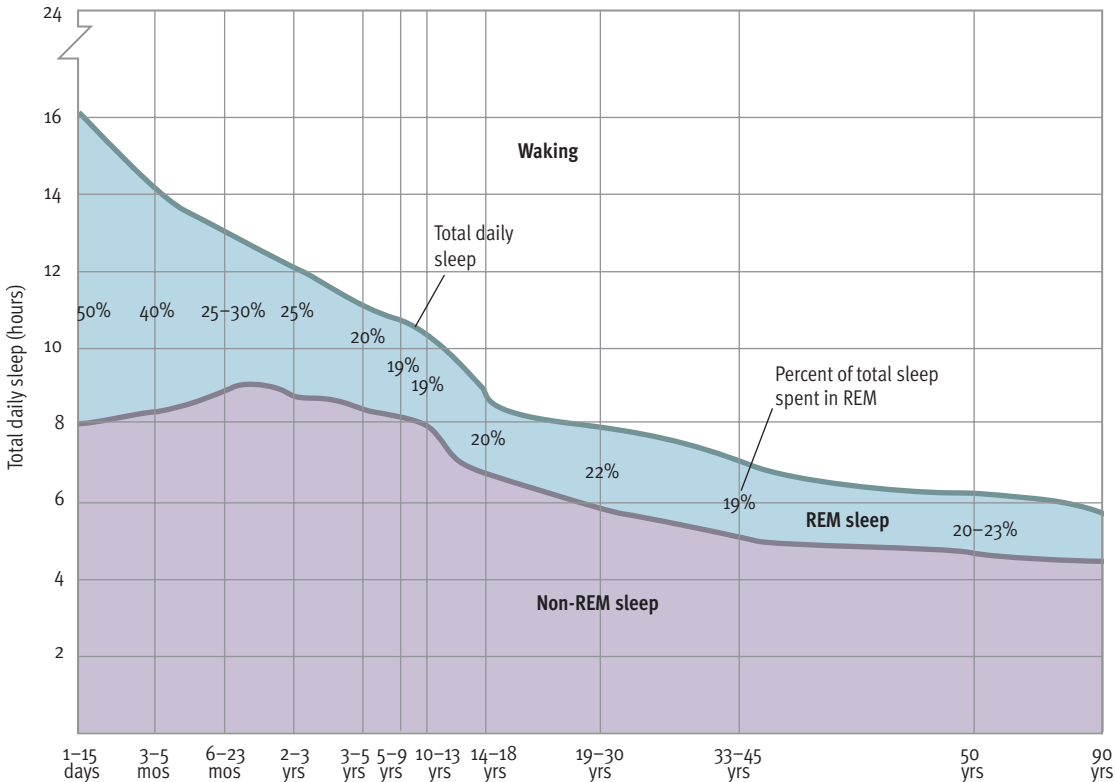
SleepQuest

Leading sleep researcher William Dement of Stanford University—the founder of sleep medicine—is the Chief Scientific Advisor at this site. Visitors can access an archive of “columns” written by Dr. Dement and a diverse array of resources on sleep disorders.

Figure 5.6
Changes in sleep patterns over the life span.

Both the total amount of sleep per night and the portion of sleep that is REM sleep change with age. Sleep patterns change most dramatically during infancy, with total sleep time and amount of REM sleep declining sharply in the first two years of life. After a noticeable drop in the average amount of sleep in adolescence, sleep patterns remain relatively stable, although total sleep and slow-wave sleep continue to decline gradually with age.

Source: Adapted from an updated revision of a figure in Roffwarg, H. P., Muzio, J. N., & Dement, W. C. (1966). Ontogenetic development of human sleep-dream cycle. *Science*, 152, 604–609. American Association for the Advancement of Science. Adapted and revised by permission of the authors.



tant variability, as total sleep *increases* with age in a substantial minority of older people (Webb, 1992a).

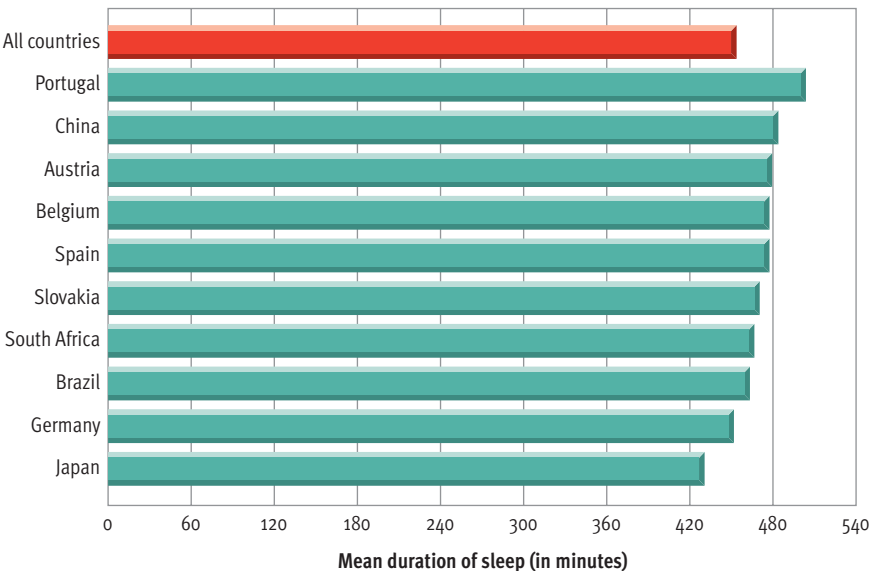
Culture and Sleep

Although age clearly affects the nature and structure of sleep itself, the psychological and physiological experience of sleep does not appear to vary much across cultures. For example, a recent cross-cultural survey (Soldatos et al., 2005) found relatively modest differences in the average amount of time that people

sleep and in the time it takes for them to fall asleep (see **Figure 5.7**). Cultural disparities in sleep are limited to more peripheral matters, such as sleeping arrangements and napping customs. For instance, there are cultural differences in *co-sleeping*, the practice of children and parents sleeping together (McKenna, 1993). In modern Western societies, co-sleeping is actively discouraged. As part of their effort to foster self-reliance, American parents teach their children to sleep alone. In contrast, co-sleeping is more widely accepted in Japanese culture, which emphasizes inter-

Figure 5.7
Cultural variations in how long people tend to sleep.

A recent study (Soldatos et al., 2005) surveyed over 35,000 people in 10 countries about various aspects of their sleep habits. This graph shows the average duration of nighttime sleep reported by the respondents in each country. Although Japan was a bit of an “outlier,” the cultural differences are rather modest. Cultural variability in the average time required to fall asleep was also modest. Consistent with previous findings, the results of this study suggest that the basic architecture of sleep does not vary much across cultures. (Data from Soldatos et al., 2005)



dependence and group harmony (Latz et al., 1999). Around the world as a whole, co-sleeping is normative (Ball, Hooker, & Kelly, 2000). Strong pressure against co-sleeping appears to be largely an urban, Western phenomenon. Interestingly, a recent 18-year study of youngsters in California found no association between co-sleeping and any problematic consequences (Okami, Weisner, & Olmstead, 2002).

Napping practices also vary along cultural lines. In many societies, shops close and activities are curtailed in the afternoon to permit people to enjoy a 1-to 2-hour midday nap. These “siesta cultures” are found mostly in tropical regions of the world (Webb & Dinges, 1989). There, this practice is adaptive in that it allows people to avoid working during the hottest part of the day. The siesta is not a fixture in all tropical societies, however. It is infrequent among nomadic groups and those that depend on irregular food supplies. As a rule, the siesta tradition is not found in industrialized societies, where it conflicts with the emphasis on productivity and the philosophy that “time is money.” Moreover, when industrialization comes to a siesta culture, it undermines the practice. For instance, modernization in Spain has led to a decline in midday napping there (Kribbs, 1993).

The Neural Bases of Sleep

The rhythm of sleep and waking appears to be regulated by subcortical structures that lie deep within the brain. One brain structure that is important to sleep and wakefulness is the *reticular formation* in the core of the brainstem (Steriade, 2005). **The ascending reticular activating system (ARAS) consists of the afferent fibers running through the reticular formation that influence physiological arousal.** As you can see in **Figure 5.8**, the ARAS projects diffusely into many areas of the cortex. When these ascending fibers are cut in the brainstem of a cat, the result is continuous sleep (Moruzzi, 1964). Electrical stimulation along the same pathways produces arousal and alertness.

Although the ARAS contributes to the neural regulation of sleep and waking, many other brain structures are also involved (Hobson, 1995). For example, activity in the *pons* and adjacent areas in the midbrain seems to be critical to the generation of REM sleep (Siegel, 2005). Specific areas in the medulla, thalamus, hypothalamus, and limbic system have also been implicated in the control of sleep and waking (see **Figure 5.8**). Thus, the ebb and flow of sleep and waking is regulated through activity in a *constellation* of interacting brain centers.

Efforts to identify the neurotransmitters involved in the regulation of sleep and waking have uncov-

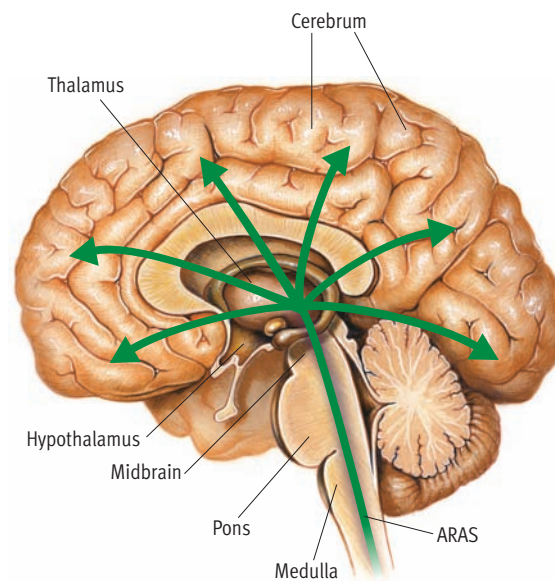


Figure 5.8
The ascending reticular activating system (ARAS). A number of brain areas and structures interact to regulate sleep and waking, including all those highlighted in this graphic. Particularly important is the ARAS (represented by the green arrows), which conveys neural stimulation to many areas of the cortex.

ered similar diffusion of responsibility. Serotonin and GABA appear to play especially important roles in sleep (Siegel, 2004; Ursin, 2002). However, a variety of other neurotransmitters—norepinephrine, dopamine, and acetylcholine—clearly influence the course of sleep and arousal, and several other chemicals play contributing roles (Jones, 2005; Mendelson, 2001). In summary, no single structure in the brain serves as a “sleep center,” nor does any one neurotransmitter serve as a “sleep chemical.” Instead, sleep depends on the interplay of many neural centers and neurotransmitters.

The Evolutionary Bases of Sleep

What is the evolutionary significance of sleep? The fact that sleep is seen in a highly diverse array of organisms and that it appears to have evolved independently in birds and mammals suggests that it has considerable adaptive value. But theorists disagree about *how* exactly sleep is adaptive. One hypothesis is that sleep evolved to conserve organisms’ energy. According to this notion, sleep evolved millions of years ago in service of warmbloodedness, which requires the maintenance of a constant, high body temperature by metabolic means. An alternative hypothesis is that the immobilization associated with sleep is adaptive because it reduces exposure to predators and other sources of danger. A third hypothesis is that sleep is adaptive because it helps animals restore energy and other bodily resources depleted by waking activities. Overall, the evidence seems strongest for the energy conservation hypothesis, but there is room for extensive debate about the evolutionary bases of sleep (Zepelin, Siegel, & Tobler, 2005).

Web Link 5.3



National Sleep Foundation

This attractive, well-organized website houses a great deal of information on sleep. Highlights include an interactive test to assess your sleep habits; electronic pamphlets on practical sleep topics, such as strategies for shift workers, the dangers of drowsy driving, and ways to reduce jet lag; and extensive coverage of the full range of sleep disorders.

➤ REVIEW OF KEY POINTS

- Research on sleep is typically done in laboratories where volunteers come to spend the night. Participants are hooked up to an EEG, EOG, EMG, and instruments that monitor heart rate, respiration, pulse rate, and body temperature.
- When people fall asleep, they pass through a series of stages in cycles of approximately 90 minutes. Slow-wave sleep consists of stages 3 and 4, during which delta waves are prominent. During the REM stage, sleepers experience rapid eye movements, brain waves that are characteristic of waking thought, and vivid dreaming. The sleep cycle tends to be repeated about four times a night, as REM sleep gradually becomes more predominant and NREM sleep dwindles.
- The REM portion of sleep declines during childhood, leveling off at around 20%. During adulthood, slow-wave sleep tends to decline. Total sleep time decreases for most elderly people. Culture appears to have little impact on the physiological experience of sleep, but it does influence napping patterns and sleeping arrangements, such as co-sleeping.
- The neural bases of sleep are complex. Arousal depends on activity in the ascending reticular activating system, but a constellation of brain structures and neurotransmitters contribute to regulation of the sleep and waking cycle. Hypotheses about the evolutionary bases of sleep focus on energy conservation, reduced exposure to predators, and restoration of resources depleted by waking activity.

PREVIEW QUESTIONS

- What are the effects of sleep restriction?
- What are the effects of REM and SWS deprivation?
- What is known about the causes and prevalence of insomnia?
- What is the role of sedative drugs in the treatment of insomnia?
- What are the symptoms of narcolepsy? Sleep apnea? Nightmares? Night terrors? Somnambulism?

Doing Without: Sleep Deprivation

Scientific research on sleep deprivation presents something of a paradox. On the one hand, research suggests that sleep deprivation is not as detrimental as one might expect. On the other hand, evidence suggests that sleep deprivation may be a major social problem, undermining efficiency at work and contributing to countless accidents.

Sleep Restriction

Research has mostly focused on *partial sleep deprivation*, or *sleep restriction*, which occurs when people make do with substantially less sleep than normal over a period of time. Many sleep experts believe that much of American society chronically suffers from partial sleep deprivation (Walsh, Dement, & Dinges, 2005). It appears that more and more people are trying to squeeze additional waking hours out of their days as they attempt to juggle work, family,

household, and school responsibilities, leading William Dement to comment that “most Americans no longer know what it feels like to be fully alert” (Toufexis, 1990, p. 79).

How serious are the effects of partial sleep deprivation? Studies suggest that the effects of sleep restriction depend on the amount of sleep lost and on the nature of the task at hand (Bonnet, 2000). Negative effects are most likely when subjects are asked to work on long-lasting, difficult, or monotonous tasks, or when subjects are asked to restrict their sleep to 6 hours or fewer for many nights (Gillberg & Akerstedt, 1998; Van Dongen et al., 2003). Recent research has also found variability among individuals in how sensitive they are to sleep restriction. Over a series of three carefully controlled sleep-deprivation episodes, Van Dongen et al. (2004) found that some subjects were more vulnerable to the negative effects of sleep deprivation than others. Interestingly, people often do not appreciate the degree to which sleep deprivation has a negative impact on their functioning, a finding that was apparent in our Featured Study for this chapter.

FEATURED Study

Source: Pilcher, J. J., & Walters, A. S. (1997). How sleep affects psychological variables related to college students' cognitive performance. *Journal of American College Health*, 46, 121–126.

Gauging the Impact of Sleep Deprivation on College Students

Whether it's because they want to fit in more time for partying or for studying, college students routinely deprive themselves of sleep. This study assessed the effects of 24 hours of sleep deprivation on students' cognitive performance and attempted to identify some factors, such as negative mood or poor attention, that might contribute to any decrements in cognitive functioning. The investigators also wanted to see whether sleep deprivation altered participants' ability to make accurate assessments of their concentration, effort, and performance.

Method

Participants. Volunteers were solicited from five psychology classes. Of the original 65 volunteers, 44 (26 women and 18 men) completed the study. Their mean age was 20.5 years.

Measures. Cognitive performance was evaluated with the Watson-Glaser Critical Thinking Appraisal, a challenging standardized test that resembles the normal tests college students encounter. Mood was assessed with the Profile of Mood States, and attention was measured with the Cognitive Interference Questionnaire. The participants also rated their effort, concentration, and performance on seven-point scales.

Procedure. After a normal day with no napping, participants reported to a sleep lab at 10 P.M. on a Friday night. At that time, the students were randomly assigned to the experimental (sleep-deprived) and control (non-deprived) groups. Members of the control group were sent home and instructed to get about 8 hours of sleep. The sleep-deprived subjects remained at the lab, where they watched movies, played video and board games, and worked on personal projects, under the supervision of research assistants. The participants in both groups completed the various tests and other measures on Saturday at 10 A.M.

Results

As anticipated, the sleep-deprived group scored significantly lower on the measure of cognitive performance (see **Figure 5.9**). Contrary to expectation, the differences between the two groups on the Profile of Mood States and the Cognitive Interference Questionnaire were minimal and unenlightening. However, the participants' self-ratings yielded more interesting data, as the sleep-deprived subjects rated their effort, concentration, and performance significantly *higher* than the non-deprived subjects did.

Discussion

Although the sleep-deprived group performed substantially worse on the cognitive test, their subjective estimates of their effort, concentration, and performance were inconsistent with this reality. Thus, the investigators conclude that "college students are not aware of the extent to which sleep deprivation impairs their ability to complete cognitive tasks successfully" (p. 125).

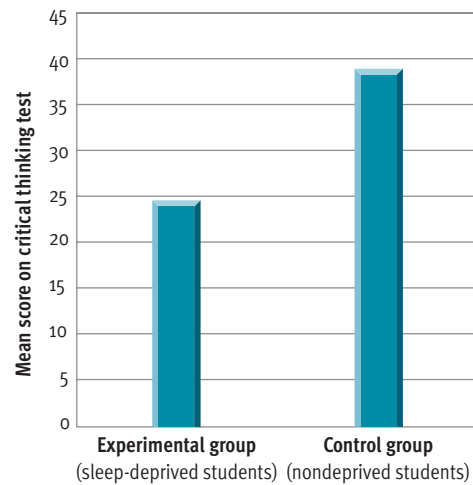


Figure 5.9

Effect of sleep deprivation on cognitive performance.

Experimental subjects in the Pilcher and Walters (1997) study underwent 24 hours of sleep deprivation prior to taking the Watson-Glaser Critical Thinking Appraisal. As you can see, their performance on this cognitive test was clearly inferior to that of the control subjects, who had not experienced sleep deprivation.

Comment

This study was selected for its straightforward examination of a practical issue that is obviously relevant to students' lives. The negative impact of sleep deprivation on the participants' cognitive functioning was striking. The study also provides yet another demonstration that human experience is highly subjective. Although sleep-deprived subjects showed clear impairment on an objective measure of their cognitive performance, they *felt* that their performance was fine.

Our Featured Study is representative of a great deal of recent research suggesting that the effects of sleep deprivation are not as benign as widely believed. Studies indicate that sleep restriction can impair individuals' attention, reaction time, motor coordination, and decision making and may also have negative effects on endocrine and immune system functioning (Dinges, Rogers, & Baynard, 2005). Evidence suggests that sleep deprivation contributes to errors in medical treatment by physicians in training (medical residents), who often work 80–100 hours a week without adequate rest (Weinger & Ancoli-Israel, 2002). Sleep deprivation has also been blamed for a large proportion of transportation accidents and mishaps in the workplace (Walsh et al., 2005). For example, sleepiness appears to be a contributing factor in roughly 20% of motor vehicle accidents (MacLean, Davies, & Thiele, 2003). Sleep deprivation seems to be particularly problematic among truck drivers, young drivers, drivers with sleep disorders, and drivers who work rotating shifts (Lyznicki et al., 1998).

Studies also suggest that nighttime workers in many industries frequently fall asleep on the job (Roehrs et al., 2005). Obviously, for a person running a punch press, driving a bus, or working as an air traffic controller, a momentary lapse in attention could be very, very costly. In recent years, a number of major disasters, such as the nuclear accidents at Three Mile Island and Chernobyl, the running aground of the Exxon *Valdez* in Alaska, and the *Challenger* space shuttle tragedy, have been blamed in part on lapses in judgment and attention resulting from sleep deprivation (Doghranji, 2001). Experts have *estimated* that accidents attributed to drowsiness induced by sleep deprivation cost the U.S. economy over \$56 billion annually, lead to the loss of over 52 million work days each year, and result in over 24,000 deaths per year (Coren, 1996).

Selective Deprivation

The unique quality of REM sleep led researchers to look into the effects of a special type of sleep deprivation.



WILLIAM DEMENT

"Sleep deprivation is a major epidemic in our society. . . . Americans spend so much time and energy chasing the American dream, that they don't have much time left for actual dreaming."

Image Not Available

Image Not Available

A large number of traffic accidents occur because drivers get drowsy or fall asleep at the wheel. Although the effects of sleep deprivation seem innocuous, sleep loss can be deadly.

vation: *selective deprivation*. In a number of laboratory studies, subjects were awakened over a period of nights whenever they began to go into the REM stage. These subjects usually got a decent amount of sleep in NREM stages, but they were selectively deprived of REM sleep.

What are the effects of REM deprivation? The evidence suggests that it has little discernible impact on daytime functioning, but it *does* have some interesting effects on subjects' patterns of sleeping (Bonnet, 2005). As the nights go by in REM-deprivation studies, it becomes necessary to awaken the subjects more and more often to deprive them of their REM sleep, because they spontaneously shift into REM more and more frequently. In one study, researchers had to awaken a subject 64 times by the third night of REM deprivation, as shown in **Figure 5.10** (Borbely, 1986). Furthermore, when a REM-deprivation experiment comes to an end and subjects are allowed to sleep without interruption, they experience a "rebound effect." That is, they spend extra time in REM periods

for one to three nights to make up for their REM deprivation (Bonnet, 2005).

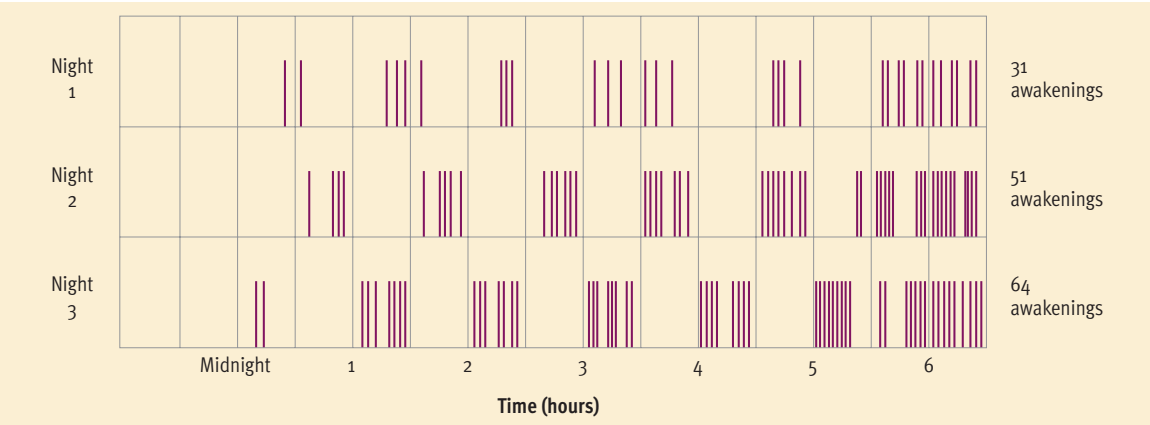
Similar results have been observed when subjects have been selectively deprived of slow-wave sleep (Klerman, 1993). As the nights go by, more awakenings are required to prevent SWS, and after deprivation of SWS, people experience a rebound effect (Borbely & Achermann, 2005). What do theorists make of these spontaneous pursuits of REM and slow-wave sleep? They conclude that people must have specific *needs* for REM and slow-wave sleep—and rather strong needs, at that.

Why do we need REM and slow-wave sleep? Some recent studies suggest that REM and slow-wave sleep contribute to firming up learning that takes place during the day—a process called *memory consolidation* (Gais & Born, 2004; Stickgold, 2001). Efforts to explore this hypothesis have led to some interesting findings in recent years. For example, in one study participants were given training on a perceptual-motor task and then retested 12 hours later. Subjects who slept during the 12-hour interval showed substantial *improvement* in performance that was not apparent in subjects who did not sleep (Walker et al.,

Figure 5.10
The effects of REM deprivation on sleep.

This graph plots how often researchers had to awaken a subject over the course of three nights of REM deprivation. Notice how the awakenings rapidly became more frequent during the course of each night and from night to night. This pattern of awakenings illustrates how a REM-deprived subject tends to compensate by repeatedly slipping back into REM sleep.

Source: Adapted from Borbely, A. (1986). *Secrets of sleep* (English translation). New York: Basic Books. Copyright © 1986 by Basic Books. Reprinted by permission of Basic Books, Inc.



2002). A host of similar studies have shown that sleep seems to enhance subjects' memory of specific learning activities that occurred during the day (Walker & Stickgold, 2004). These studies also find that the length of time spent in REM and SWS correlates with subjects' increments in learning. Some studies even suggest that sleep may foster creative insights the next morning related to the previous day's learning (Stickgold & Walker, 2004; Wagner et al., 2004). The theoretical meaning of these findings is still being debated, but the most widely accepted explanations center on how time spent in specific stages of sleep may stabilize or solidify memories formed during the day (Stickgold, 2005). The practical meaning of these results, however, should be rather obvious: Sound sleep habits should facilitate learning.

Problems in the Night: Sleep Disorders

Not everyone is able to consistently enjoy the luxury of a good night's sleep. In this section we will briefly discuss what is currently known about a variety of sleep disorders.

Insomnia

Insomnia is the most common sleep disorder. *Insomnia refers to chronic problems in getting adequate sleep.* It occurs in three basic patterns: (1) difficulty in falling asleep initially, (2) difficulty in remaining asleep, and (3) persistent early-morning awakening. Difficulty falling asleep is the most common problem among young people, whereas trouble staying asleep and early-morning awakenings are the most common syndromes among middle-aged and elderly people (Hublin & Partinen, 2002). Insomnia may sound like a minor problem to those who haven't struggled with it, but it can be a very unpleasant malady. Insomniacs have to endure the agony of watching their precious sleep time tick away as they toss and turn in restless frustration. Moreover, insomnia is associated with daytime fatigue, impaired functioning, an elevated risk for accidents, reduced productivity, absenteeism at work, depression, and increased health problems (Benca, 2001; Edinger & Means, 2005).

Prevalence. Estimates of the prevalence of insomnia vary considerably because surveys have to depend on respondents' highly subjective judgments of whether their sleep is adequate. Another complicating consideration is that nearly everyone suffers *occasional* sleep difficulties because of stress, disrup-

tions of biological rhythms, or other temporary circumstances. Fortunately, these problems clear up spontaneously for most people. Caveats aside, the best estimates suggest that about 34%–35% of adults report problems with insomnia and about half of these people (15%–17%) suffer from severe or frequent insomnia (Zorick & Walsh, 2000). The prevalence of insomnia increases with age and is about 50% more common in women than in men (Partinen & Hublin, 2005).

Some people may suffer from “pseudoinomnia,” or *sleep state misperception*, which means that they just *think* they are getting an inadequate amount of sleep (Edinger & Krystal, 2003). When actually monitored in a sleep clinic, about 5% of insomniac patients show sound patterns of sleep (Hauri, 2000). In one well-known case of exaggerated complaining, a British insomniac claimed that he hadn't slept in 10 years! When invited to stay at a sleep clinic for observation, he seemed determined to prove his chronic sleeplessness. However, on the second night he nodded out for 20 minutes. By the fourth night, he could barely keep his eyes open, and soon he was snoring blissfully for hours (Oswald & Adam, 1980). Misperceptions of sleep efficiency are not unique to pseudoinomniacs. Many people underestimate how much sleep they get (Reynolds et al., 1991). The discrepancy between individuals' feelings about how much they sleep and objective reality shows once again that states of consciousness are highly subjective.

Causes. Insomnia has many causes (Hauri, 2002; Roehrs, Zorick, & Roth, 2000; Roth & Drake, 2004). In some cases, excessive anxiety and tension prevent relaxation and keep people awake. Insomnia is frequently a side effect of emotional problems, such as depression, or of significant stress, such as pressures at work. Understandably, health problems such as back pain, ulcers, and asthma can lead to difficulties falling or staying asleep. The use of certain drugs, especially stimulants, may also lead to problems in sleeping.

Treatment. The most common approach to the treatment of insomnia is the prescription of several classes of sedative drugs. *Benzodiazepine medications*, which were originally designed to relieve anxiety, have become the most widely prescribed class of sedatives (Roehrs & Roth, 2004). The various types of sedative medications are fairly effective in helping people fall asleep more quickly, and they reduce nighttime awakenings and increase total sleep (Mendelson, 2005). Nonetheless, sedative drugs may be used to combat insomnia *too* frequently. Many sleep ex-



Sleep Medicine Homepage

This site, assembled by sleep-wake specialist Michael J. Thorpy (Montefiore Medical Center), brings together a broad range of Internet links regarding sleep in all its aspects, along with information on clinical problems associated with disruptions in normal sleep and waking patterns.

perts argue that in the past physicians prescribed sleeping pills far too readily. As a result of this criticism, prescriptions for sleeping pills have declined significantly in recent decades (Walsh & Schweitzer, 1999). Nonetheless, about 5%–15% of adults still use sleep medication with some regularity (Hublin & Partinen, 2002).

Sedatives can be a poor long-term solution for insomnia, for a number of reasons (Roehrs & Roth, 2000; Wesson et al., 2005). One problem is that sedatives have carryover effects that can make people drowsy and sluggish the next day and impair their functioning (Vermeeren, 2004). They can also cause an overdose in combination with alcohol or opiate drugs. Although the abuse of sleeping medications appears to be less common than widely assumed, there are legitimate concerns about people becoming physically dependent on sedatives (Ballenger, 2000). Moreover, with continued use sedatives gradually become less effective, so some people increase their dose to higher levels, creating a vicious circle of escalating dependency and daytime sluggishness (Lader, 2002; see **Figure 5.11**). Ironically, most sedatives also disrupt the normal cycle of sleep. Although they promote sleep, they decrease the proportion of time spent in slow-wave sleep, and some of the older drugs also reduce REM sleep (Nishino, Mignot, & Dement, 1995).

Fortunately, the newer generation of sedatives, such as zolpidem (trade name: Ambien), reduce some

of the problems associated with traditional sleeping pills (Sanger, 2004). People suffering from insomnia can also turn to melatonin, the hormone that has been used to treat jet lag (see p. 177), which is available over the counter in the United States. Research indicates that melatonin can function as a mild sedative and that it has some value in the treatment of insomnia (Turek & Gillete, 2004).

In conclusion, sedatives *do* have an important place in the treatment of insomnia, but they need to be used cautiously and conservatively. They should be used primarily for short-term treatment (2–4 weeks) of sleep problems. Beyond discouraging overreliance on drugs, it is difficult to generalize about how insomnia should be treated because its many causes call for different solutions. Relaxation procedures and behavioral interventions can be helpful for many individuals (Morin, 2002, 2005). Recent studies suggest that behavioral treatments are just as effective as medication in the short term and that behavioral interventions produce more long-lasting benefits than drug therapies (Morin et al., 1999; Smith et al., 2002). Some additional insights about how to combat insomnia are presented in the Personal Application at the end of this chapter.

Other Sleep Problems

Although insomnia is the most common difficulty associated with sleep, people are plagued by many other types of sleep problems as well. Here we'll look at the symptoms, causes, and prevalence of five additional sleep problems, as described by Kryger, Roth, and Dement (2005) and Bootzin et al. (2001).

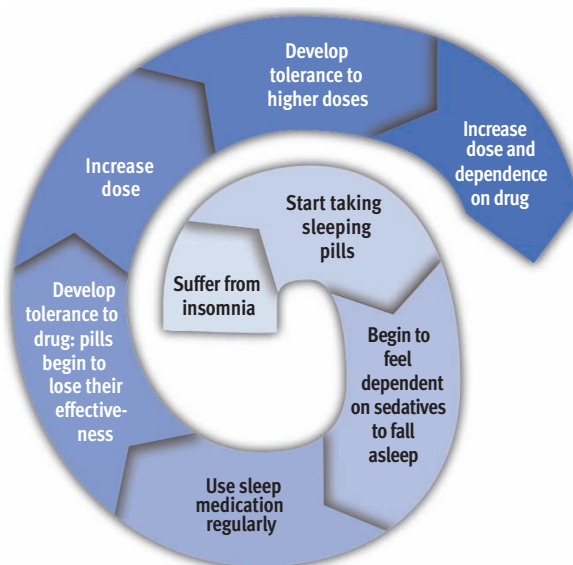
Narcolepsy is a disease marked by sudden and irresistible onsets of sleep during normal waking periods. A person suffering from narcolepsy goes directly from wakefulness into REM sleep, usually for a short period of time (10–20 minutes). This is a potentially dangerous condition, since some victims fall asleep instantly, even while driving a car or operating machinery. Narcolepsy is relatively infrequent, as it is seen in only about 0.05% of the population (Partinen & Hublin, 2005). Its causes are not well understood, but some people appear to be genetically predisposed to the disease (Mignot, 2005). Stimulant drugs have been used to treat this condition with modest success (Guilleminault & Fromherz, 2005). But as you will see in our upcoming discussion of drugs, stimulants carry many problems of their own.

Sleep apnea involves frequent, reflexive gasping for air that awakens a person and disrupts sleep. Some victims are awakened from their sleep hundreds of times a night. Apnea occurs when a person

Figure 5.11

The vicious circle of dependence on sleeping pills.

Because of the body's ability to develop tolerance to drugs, using sedatives routinely to "cure" insomnia can lead to a vicious circle of escalating dependency as larger and larger doses of the sedative are needed to produce the same effect.



literally stops breathing for a minimum of 10 seconds. This disorder, which is usually accompanied by loud snoring, is seen in about 2% of women and about 4% of men between the ages of 30 and 60 (Basiri & Guilleminault, 2000). As you might expect, sleep apnea often leads to insomnia as a side effect. Apnea may be treated with surgery or drug therapy.

Nightmares are anxiety-arousing dreams that lead to awakening, usually from REM sleep (see **Figure 5.12**). Typically, a person who awakens from a nightmare recalls a vivid dream and may have difficulty getting back to sleep. Significant stress in one's life is associated with increased frequency and intensity of nightmares. In adults, there is a correlation between nightmare distress and depression and neuroticism (Blagrove, Farmer, & Williams, 2004). Although about 10% of adults have occasional troubles with nightmares, these frightening episodes are mainly a problem among children. Most youngsters have sporadic nightmares, but *persistent* nightmares may reflect an emotional disturbance. If a child's nightmares are frequent and unpleasant, counseling may prove helpful. Otherwise, treatment is unnecessary, as most children outgrow the problem.

Night terrors (also called sleep terrors) are abrupt awakenings from NREM sleep accompanied by intense autonomic arousal and feelings of panic. Night terrors, which can produce remarkable accelerations of heart rate, usually occur during stage 4 sleep early in the night, as shown in **Figure 5.12** (Nielsen & Zadra, 2000). Victims typically let out a piercing cry, bolt upright, and then stare into space. They do not usually recall a coherent dream, although they may remember a simple, frightening image. The panic normally fades quickly, and a return to sleep is fairly easy. Night terrors occur in adults, but they are especially common in children ages 3 to 8. Night terrors are *not* indicative of an emotional disturbance. Treatment may not be necessary, as night terrors are often a temporary problem.

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"Wait! Don't! It can be dangerous to wake them!"

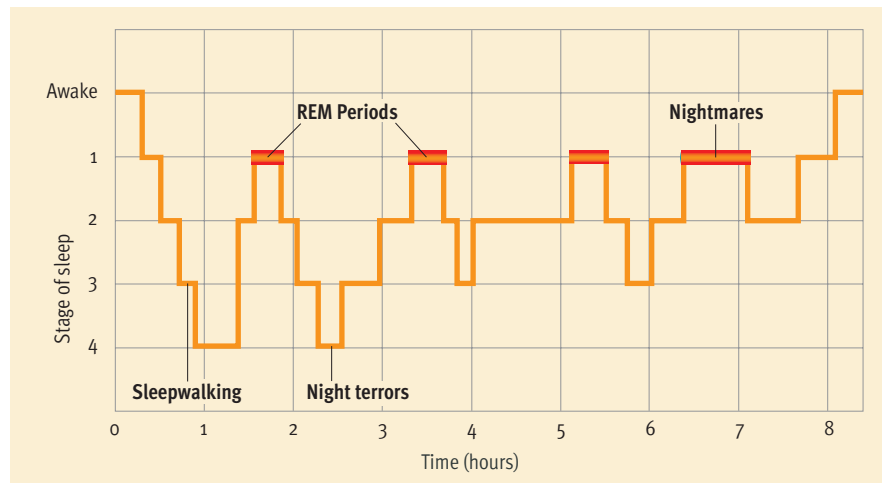


Figure 5.12
Sleep problems and the cycle of sleep. Different sleep problems tend to occur at different points in the sleep cycle. Whereas sleepwalking and night terrors are associated with slow-wave sleep, nightmares are associated with the heightened dream activity of REM sleep.

Somnambulism, or sleepwalking, occurs when a person arises and wanders about while remaining asleep. Sleepwalking tends to occur during the first 2 hours of sleep, when individuals are in slow-wave sleep (see **Figure 5.12**). Episodes may last from 15 seconds to 30 minutes (Aldrich, 2000). Sleepwalkers may awaken during their journey, or they may return to bed without any recollection of their excursion. The causes of this unusual disorder are unknown, although it appears to have a genetic predisposition (Keefauver & Guilleminault, 1994). Sleepwalking does not appear to be a manifestation of underlying emotional or psychological problems (Mahowald, 1993). However, sleepwalkers *are* prone to accidents. In this regard, contrary to popular myth, it is safe to awaken people (gently) from a sleepwalking episode—much safer than letting them wander about.

➤ REVIEW OF KEY POINTS

- The effects of sleep restriction depend on a variety of factors. Our Featured Study showed that college students underestimate the impact of sleep deprivation. Increased sleepiness can be a significant problem that appears to contribute to many transportation accidents and mishaps at work.
- Research on selective sleep deprivation suggests that people need REM sleep and slow-wave sleep. These stages of sleep may contribute to memory consolidation.
- Many people are troubled by sleep disorders. Insomnia has a variety of causes. Sleeping pills generally are a poor solution. The optimal treatment for insomnia depends on its apparent cause.
- Narcolepsy is a disease marked by sudden, irresistible onsets of sleep during normal waking periods. Sleep apnea involves frequent gasping for air, which occurs when people stop breathing. Night terrors are abrupt awakenings from NREM sleep accompanied by panic, whereas nightmares are anxiety-arousing dreams that typically awaken one from REM sleep. Somnambulism (sleepwalking) typically occurs during slow-wave sleep.

> The World of Dreams

PREVIEW QUESTIONS

- What is a dream, and how are views on this question changing?
- What is known about the contents of people's dreams?
- Can external events affect the content of dreams?
- How does culture affect dream recall and dream content?
- How do the Freudian, cognitive, and activation-synthesis models view dreams?

For the most part, dreams are not taken very seriously in Western societies. Paradoxically, though, Robert Van de Castle (1994) points out that dreams have sometimes changed the world. For example, Van de Castle describes how René Descartes's philosophy of dualism, Frederick Banting's discovery of insulin, Elias Howe's refinement of the sewing machine, Mohandas Gandhi's strategy of nonviolent protest, and Lyndon Johnson's withdrawal from the 1968 presidential race were all inspired by dreams. He also explains how Mary Shelley's *Frankenstein* and Robert Louis Stevenson's *The Strange Case of Dr. Jekyll and Mr. Hyde* emerged out of their dream experiences. In his wide-ranging discussion, Van de Castle also relates how the Surrealist painter Salvador Dali characterized his works as "dream photographs" and how legendary filmmakers Ingmar Bergman, Orson Welles, and Federico Fellini all drew on their dreams in making their films. Thus, Van de Castle concludes that "dreams have had a dramatic influence on almost every important aspect of our culture and history" (p. 10).

What exactly is a dream? This question is more complex and controversial than you might guess (Pagel et al., 2001). The conventional view is that dreams are mental experiences during REM sleep that have a storylike quality, include vivid visual imagery, are often bizarre, and are regarded as perceptually real by the dreamer (Antrobus, 1993). However, theorists have begun to question virtually every aspect of this characterization. Decades of research on the contents of dreams, which we will discuss momentarily, has shown that dreams are not as bizarre as widely assumed (Cartwright, 1994). Recent years have seen renewed interest in the fact that dreams are not the exclusive property of REM sleep (Antrobus, 2000). Moreover, studies that have focused on dream reports from non-REM stages of sleep have found that these dreams appear to be less vivid, visual, and storylike than REM dreams (Verdone, 1993). And research suggests that dreamers realize they are dreaming more often than previously thought and that mental processes during sleep are more similar to waking thought processes than is widely assumed (Kahan & LaBerge, 1994, 1996). Thus, the concept of dreaming is undergoing some revision in scientific circles.

The Contents of Dreams

What do people dream about? Overall, dreams are not as exciting as advertised. Perhaps dreams are seen as exotic because people are more likely to remember

their more bizarre nighttime dramas (De Koninck, 2000). After analyzing the contents of more than 10,000 dreams, Calvin Hall (1966) concluded that most dreams are relatively mundane. They tend to unfold in familiar settings with a cast of characters dominated by family, friends, and colleagues.

Certain themes tend to be more common than others in dreams. **Figure 5.13** lists the most common dream themes reported by 1181 college students in a recent study of typical dream content (Nielsen et al., 2003). If you glance through this list, you will see that people dream quite a bit about sex, aggression, and misfortune. According to Hall, dreams tend to center on classic sources of internal conflict, such as the conflict between taking chances and playing it safe. Hall was struck by how rarely people dream about public affairs and current events. Typically, dreams are self-centered; people dream mostly about themselves.

Researchers have found some modest dream-content differences between men and women that seem to reflect conventional gender roles in modern society (Van de Castle, 1993). For example, strangers show up more often in men's dreams, while women are more likely to dream of children. Men are more likely to dream about acting aggressively; women are more likely to dream about being the target of aggression. In their sexual dreams, men tend to have liaisons with attractive female strangers, whereas women are more likely to dream about sex with their boyfriends and husbands.

Links Between Dreams and Waking Life

Though dreams seem to belong in a world of their own, what people dream about is affected by what is going on in their lives (Kramer, 1994). If you're struggling with financial problems, worried about an upcoming exam, or sexually attracted to a classmate, these themes may very well show up in your dreams. As Domhoff (2001) puts it, "Dream content in general is continuous with waking conceptions and emotional preoccupations" (p. 13). Freud noticed long ago that the contents of waking life tend to spill into dreams; he labeled this spillover the *day residue*.

A recent study suggests that people may often dream about aversive matters that they would just as soon forget (Wegner, Wenzlaff, & Kozak, 2004). In this study, participants who were instructed to *avoid thinking about a certain person* just before falling asleep ended up dreaming about that person more than sub-

Web Link 5.5



DreamResearch

If you are interested in what people dream about, this is probably the best source of information on the web. Maintained by veteran dream researcher Bill Domhoff (University of California, Santa Cruz) and his colleague Adam Schneider, this site provides access to a searchable database of thousands of dream reports. Visitors can also check out many seminal research articles on dreams.



Rank	Dream content	Total prevalence
1	Chased or pursued, not physically injured	81.5
2	Sexual experiences	76.5
3	Falling	73.8
4	School, teachers, studying	67.1
5	Arriving too late, e.g., missing a train	59.5
6	Being on the verge of falling	57.7
7	Trying again and again to do something	53.5
8	A person now alive as dead	54.1
9	Flying or soaring through the air	48.3
10	Vividly sensing . . . a presence in the room	48.3
11	Failing an examination	45.0
12	Physically attacked (beaten, stabbed, raped)	42.4
13	Being frozen with fright	40.7
14	A person now dead as alive	38.4
15	Being a child again	36.7
16	Being killed	34.5
17	Insects or spiders	33.8
18	Swimming	34.3
19	Being nude	32.6
20	Being inappropriately dressed	32.5
21	Discovering a new room at home	32.3
22	Losing control of a vehicle	32.0
23	Eating delicious foods	30.7
24	Being half awake and paralyzed in bed	27.2
25	Finding money	25.7

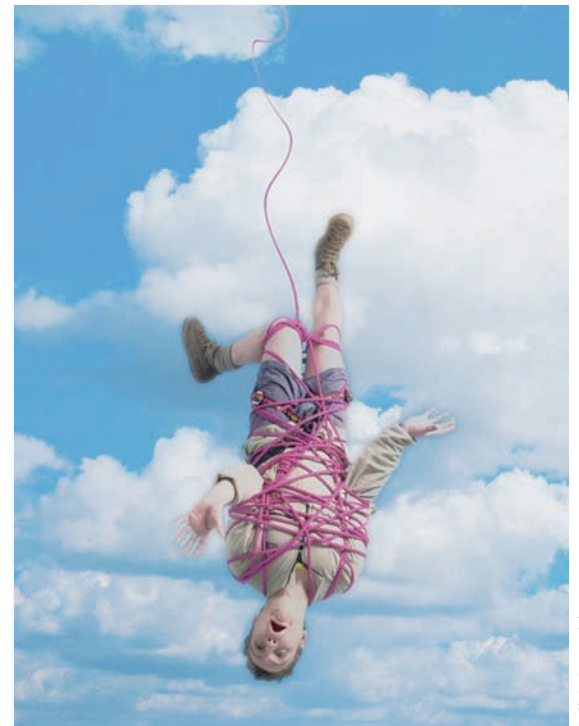


Figure 5.13

Common themes in dreams. Studies of dream content find that certain themes are particularly common. The data shown here are from a recent study of 1181 college students in Canada (Nielsen et al., 2003). This list shows the 25 dreams most frequently reported by the students. Total prevalence refers to the percentage of students reporting each dream.

Source: Nielsen, T. A., Zadra, A. L., Simard, V., Saucier, S., Stenstrom, P., Smith, C., & Kuiken, D. (2003). The typical dreams of Canadian university students. *Dreaming*, 13, 211–235. Copyright © 2003 Association for the Study of Dreams. [from Table 1, p. 217]

jects who were instructed to deliberately think about the target person. This finding suggests that thoughts that we try to suppress during the day (about say, trouble at work or health concerns) may be especially likely to show up in our dreams. Not that this finding makes dreaming any different from waking thought. Studies show that topics people try to suppress during the day also tend to intrude on their consciousness while awake (Wenzlaff & Wegner, 2000).

On occasion, the content of dreams can also be affected by stimuli experienced while one is dream-

ing (De Koninck, 2000). For example, William Dement sprayed water on one hand of sleeping subjects while they were in the REM stage (Dement & Wolpert, 1958). Subjects who weren't awakened by the water were awakened by the experimenter a short time later and asked what they had been dreaming about. Dement found that 42% of the subjects had incorporated the water into their dreams. They said that they had dreamt that they were in rainfalls, floods, baths, swimming pools, and the like. Some people report that they occasionally experience the same sort of

phenomenon at home when the sound of their alarm clock fails to awaken them. The alarm is incorporated into their dream as a loud engine or a siren, for instance. As with day residue, the incorporation of external stimuli into dreams shows that people's dream world is not entirely separate from their real world.

Culture and Dreams

Striking cross-cultural variations occur in beliefs about the nature of dreams and the importance attributed to them. In modern Western society, people typically make a distinction between the "real" world they experience while awake and the "imaginary" world they experience while dreaming. Some people realize that events in the real world can affect their dreams, but few believe that events in their dreams hold any significance for their waking life. Although a small minority of individuals take their dreams seriously, in Western cultures dreams are largely written off as insignificant, meaningless meanderings of the unconscious (Tart, 1988).

In many non-Western cultures, however, dreams are viewed as important sources of information about oneself, about the future, or about the spiritual world (Kracke, 1991). Although no culture confuses dreams with waking reality, many view events in dreams as another type of reality that may be just as important as events experienced while awake. Among Australian aborigines, for example, "Dreaming is the focal point of traditional aboriginal existence and simultaneously determines their way of life, their culture, and their relationship to the physical and spiritual environment" (Dawson, 1993, p. 1). In some instances, people are even held responsible for their dream actions. Among the New Guinea Arapesh, for example, an erotic dream about someone may be viewed as the equivalent of an adulterous act. People in some cultures believe that dreams provide information about the future—good or bad omens about upcoming battles, hunts, births, and so forth (Tedlock, 1992).

In regard to dream content, both similarities and differences occur across cultures in the types of dreams that people report (Domhoff, 2005b; Hunt, 1989). Some basic dream themes appear to be nearly universal (falling, being pursued, having sex). However, the contents of dreams vary some from one culture to another because people in different societies deal with different worlds while awake. For example, in a 1950 study of the Siriono, a hunting-and-gathering people of the Amazon who were almost always hungry and spent most of their time in a grim search for food, *half* of the reported dreams focused on hunting, gathering, and eating food (D'Andrade, 1961).

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Theories of Dreaming

Many theories have been proposed to explain why people dream. Sigmund Freud (1900), who analyzed clients' dreams in therapy, believed that the principal purpose of dreams is *wish fulfillment*. He thought that people fulfill ungratified needs from waking hours through wishful thinking in dreams. For example, someone who is sexually frustrated might have highly erotic dreams, while an unsuccessful person might dream about great accomplishments. Although these examples involve blatant wishful thinking, Freud asserted that the wish-fulfilling quality of many dreams may not be readily apparent because the true meaning of dreams may be disguised. Freud distinguished between the *manifest content* and the *latent content* of a dream. **The manifest content consists of the plot of a dream at a surface level. The latent content refers to the hidden or disguised meaning of the events in the plot.** Freud's influential theory sounded plausible when it was proposed over 100 years ago, but research has not provided much support for Freud's conception of dreaming (Fisher & Greenberg, 1996). That said, efforts are under way to modernize and rehabilitate the Freudian view of dreams (Solms, 2000, 2004). Whether these efforts will prove to be influential remains to be seen.

Other theorists, such as Rosalind Cartwright (1977; Cartwright & Lamberg, 1992), have proposed that dreams provide an opportunity to work through everyday problems and emotional issues in one's life. According to her *cognitive, problem-solving view*, considerable continuity exists between waking and sleeping thought. Proponents of this view believe that dreams allow people to engage in creative thinking about pressing personal issues because dreams are not restrained by logic or realism. Consistent with this view, Cartwright (1991) has found that women going through divorce frequently dream about divorce-



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SIGMUND FREUD

"[Dreams are] the royal road to the unconscious."



Image Not Available

ROSALIND CARTWRIGHT

"One function of dreams may be to restore our sense of competence. . . . It is also probable that in times of stress, dreams have more work to do in resolving our problems and are thus more salient and memorable."

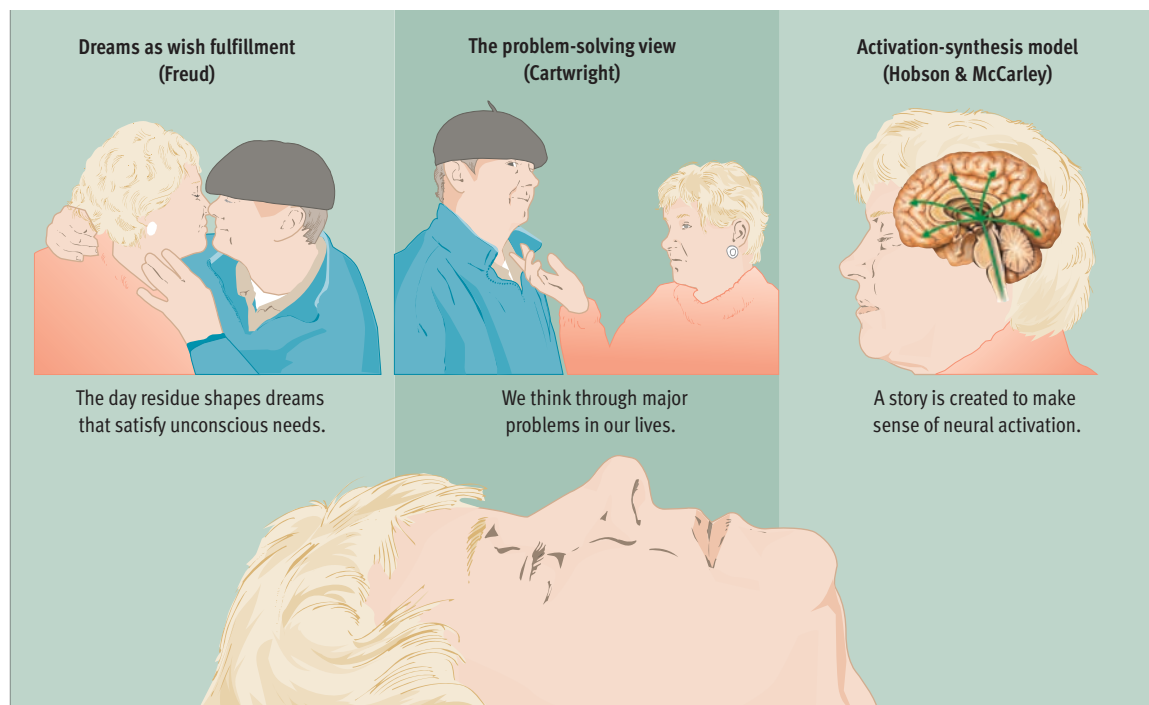


Figure 5.14
Three theories of dreaming. Dreams can be explained in a variety of ways. Freud stressed the wish-fulfilling function of dreams. Cartwright emphasizes the problem-solving function of dreams. Hobson and McCarley assert that dreams are merely a by-product of periodic neural activation. All three theories are speculative and have their critics.

related problems. Cartwright's analysis is thought provoking, but critics point out that just because people dream about problems from their waking life doesn't mean they are dreaming up solutions (Blagrove, 1992, 1996). Nonetheless, recent research showing that sleep can enhance learning (Walker & Stickgold, 2004) adds new credibility to the problem-solving view of dreams (Cartwright, 2004).

J. Allan Hobson and Robert McCarley argue that dreams are simply the by-product of bursts of activity emanating from subcortical areas in the brain (Hobson & McCarley, 1977; Hobson, Pace-Schott, & Stickgold, 2000; Hobson, 2002). Their *activation-synthesis model* proposes that dreams are *side effects* of the neural activation that produces "wide awake" brain waves during REM sleep. According to this model, neurons firing periodically in lower brain centers send random signals to the cortex (the seat of complex thought). The cortex supposedly synthesizes (constructs) a dream to make sense out of these signals. The activation-synthesis model does *not* assume that dreams are meaningless. As Hobson (1988) puts it, "Dreams are as meaningful as they can be under the adverse working conditions of the brain in REM sleep" (p. 214). In contrast to the theories of Freud and Cartwright, this theory obviously downplays the role of emotional factors as determinants of dreams. Like other theories of dreams, the activation-synthesis model has its share of critics. They point out that the model has a hard time accommodating the fact that dreaming occurs outside of REM sleep and that the contents of dreams are considerably more meaning-

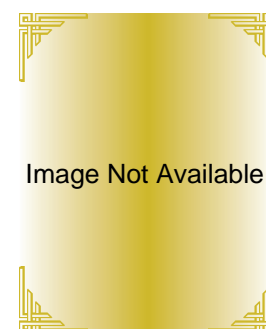
ful than the model would predict (Domhoff, 2005a; Foulkes, 1996).

These approaches, summarized in **Figure 5.14**, are only three out of a host of theories about the functions of dreams. All theories of dreaming include a great deal of conjecture and some liberal extrapolations from research. In the final analysis, the purpose of dreaming remains a mystery.

We'll encounter more unsolved mysteries in the next two sections of this chapter as we discuss hypnosis and meditation. Whereas sleep and dreams are familiar to everyone, most people have little familiarity with hypnosis and meditation, which both involve deliberate efforts to temporarily alter consciousness.

➤ REVIEW OF KEY POINTS

- The conventional view is that dreams are mental experiences during REM sleep that have a storylike quality, include vivid imagery, are often bizarre, and are regarded as real by the dreamer, but theorists have begun to question many aspects of this view.
- Researchers have found modest differences between men and women in dream content that seem to reflect conventional gender roles. The content of one's dreams may be affected by what is going on in one's life and by external stimuli that are experienced during the dream.
- In many non-Western cultures, dreams are viewed as important sources of information. Cultures vary in beliefs about the nature of dreams, dream recall, dream content, and dream interpretation.
- Freud argued that the principal purpose of dreams is wish fulfillment. Cartwright has articulated a problem-solving view, whereas Hobson and McCarley assert that dreams are side effects of the neural activation seen during REM sleep.



J. ALLEN HOBSON

"Activation-synthesis ascribes dreaming to brain activation in sleep. The principal engine of this activation is the reticular formation of the brainstem."

> Hypnosis: Altered Consciousness or Role Playing?

PREVIEW QUESTIONS

- What is the history of hypnosis?
- What are some correlates of hypnotic susceptibility?
- What are some prominent hypnotic phenomena?
- What lines of evidence support the role-playing theory of hypnosis?
- Does hypnosis produce an altered state of consciousness?

Hypnosis has a long and checkered history. It all began with a flamboyant 18th-century Austrian physician by the name of Franz Anton Mesmer. Working in Paris, Mesmer claimed to cure people of illnesses through an elaborate routine involving a “laying on of hands.” Mesmer had some complicated theories about how he had harnessed “animal magnetism.” However, we know today that he had simply stumbled onto the power of suggestion. It was rumored that the French government offered him a princely amount of money to disclose how he effected his cures. He refused, probably because he didn’t really know. Eventually he was dismissed as a charlatan and run out of town by the local authorities. Although officially discredited, Mesmer inspired followers—practitioners of

“mesmerism”—who continued to ply their trade. To this day, our language preserves the memory of Franz Mesmer: When we are under the spell of an event or a story, we are “mesmerized.”

Eventually, a Scottish physician, James Braid, became interested in the trancelike state that could be induced by the mesmerists. It was Braid who popularized the term *hypnotism* in 1843, borrowing it from the Greek word for sleep. Braid thought that hypnotism could be used to produce anesthesia for surgeries. However, just as hypnosis was catching on as a general anesthetic, more powerful and reliable chemical anesthetics were discovered, and interest in hypnotism dwindled.

Since then, hypnotism has led a curious dual existence. On the one hand, it has been the subject of numerous scientific studies. Furthermore, it has enjoyed considerable use as a clinical tool by physicians, dentists, and psychologists for over a century and has empirically supported value in the treatment of a variety of psychological and physical maladies (Lynn et al., 2000; Spiegel, Greenleaf, & Spiegel, 2000). On the other hand, however, an assortment of entertainers and quacks have continued in the less respectable tradition of mesmerism, using hypnotism for parlor tricks and chicanery. It is little wonder, then, that many myths about hypnosis have come to be widely accepted (see **Figure 5.15**). In this section, we’ll work on clearing up some of the confusion surrounding hypnosis.

Hypnotic Induction and Susceptibility

Hypnosis is a systematic procedure that typically produces a heightened state of suggestibility. It may also lead to passive relaxation, narrowed attention, and enhanced fantasy. If only in popular films, virtually everyone has seen a *hypnotic induction* enacted with a swinging pendulum. Actually many techniques can be used for inducing hypnosis (Meyer, 1992). Usually, the hypnotist will suggest to the subject that he or she is relaxing. Repetitively, softly, subjects are told that they are getting tired, drowsy, or sleepy. Often, the hypnotist vividly describes bodily sensations that should be occurring. Subjects are told that their arms are going limp, their feet are getting warm, their eyelids are getting heavy. Gradually, most subjects succumb and become hypnotized.

People differ in how well they respond to hypnotic induction. Ernest and Josephine Hilgard have

Figure 5.15

Misconceptions regarding hypnosis. Mistaken ideas about the nature of hypnosis are common. Some widely believed myths about hypnosis are summarized here along with more accurate information on each point, based on an article by Michael Nash (2001), a prominent hypnosis researcher. Many of these myths and realities are discussed in more detail in the text.

Source: Adapted from Nash, M. R. (2001, July). The truth and the hype of hypnosis. *Scientific American*, 285, 36–43. Copyright © 2001 by Scientific American, Inc.

Hypnosis: Myth and Reality	
If you think . . .	The reality is . . .
Relaxation is an important feature of hypnosis.	It's not. Hypnosis has been induced during vigorous exercise.
It's mostly just compliance.	Many highly motivated subjects fail to experience hypnosis.
It's a matter of willful faking.	Physiological responses indicate that hypnotized subjects generally are not lying.
It has something to do with a sleeplike state.	It does not. Hypnotized subjects are fully awake.
Responding to hypnosis is like responding to a placebo.	Placebo responsiveness and hypnotizability are not correlated.
People who are hypnotized lose control of themselves.	Subjects are perfectly capable of saying no or terminating hypnosis.
Hypnosis can enable people to "relive" the past.	Age-regressed adults behave like adults playing as children.
When hypnotized, people can remember more accurately.	Hypnosis may actually muddle the distinction between memory and fantasy and may artificially inflate confidence.
Hypnotized people do not remember what happened during the session.	Posthypnotic amnesia does not occur spontaneously.
Hypnosis can enable people to perform otherwise impossible feats of strength, endurance, learning, and sensory acuity.	Performance following hypnotic suggestions for increased muscle strength, learning and sensory acuity does not exceed what can be accomplished by motivated subjects outside hypnosis.

done extensive research on this variability in *hypnotic susceptibility*. Not everyone can be hypnotized. About 10% of the population doesn't respond well at all. At the other end of the continuum, about 10% of people are exceptionally good hypnotic subjects (Hilgard, 1965). Responsiveness to hypnosis is a stable, measurable trait. It can be estimated pretty effectively with the Stanford Hypnotic Susceptibility Scale (SHSS) or its derivative, the Harvard Group Scale of Hypnotic Susceptibility (Perry, Nadon, & Button, 1992). The distribution of scores on the SHSS is graphed in **Figure 5.16**.

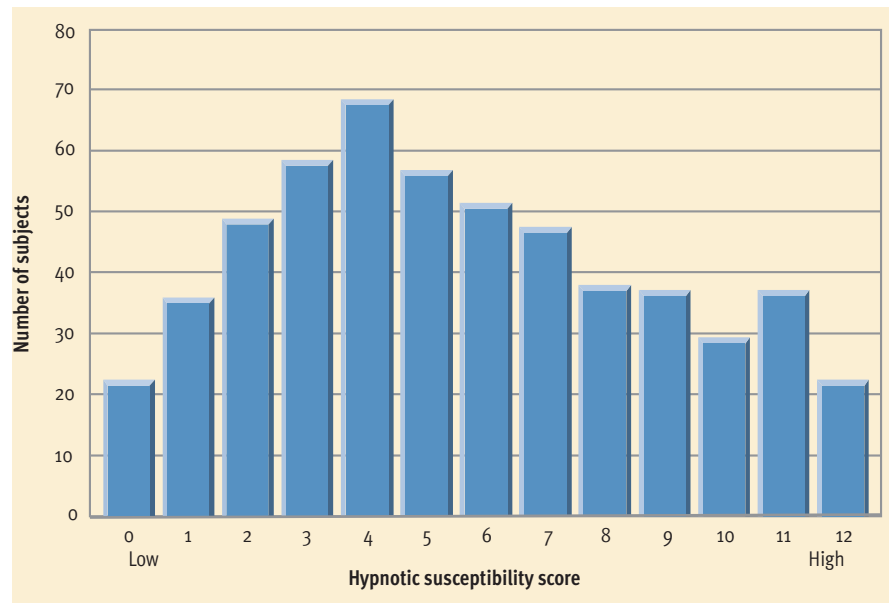
What makes some people highly susceptible to hypnosis? Variations in hypnotic susceptibility have traditionally been attributed to differences in personality traits, but decades of research on personality and hypnotizability have actually turned up relatively little (Dixon & Laurence, 1992). The only personality factors found to be related to hypnotic susceptibility are the overlapping traits of *absorption* and *imaginativeness*. People who can become deeply absorbed in an intense experience and people with a vivid imagination tend to be more susceptible to hypnosis, but even these correlations are rather weak (Kirsch & Council, 1992). Recent research has suggested that highly hypnotizable people have exceptional sensory and perceptual gating abilities that permit them to block certain stimuli from awareness (Barnier, McConkey, & Wright, 2004).

Hypnotic Phenomena

Many interesting effects can be produced through hypnosis. Some of the more prominent include:

1. *Anesthesia*. Under the influence of hypnosis, some participants can withstand treatments that would normally cause considerable pain (Patterson, 2004). As a result, some physicians and dentists have used hypnosis as a substitute for anesthetic drugs. Admittedly, drugs are far more reliable pain relievers, making hypnosis something of a scientific curiosity as a solo treatment for acute pain (Gibson & Heap, 1991). Nonetheless, hypnosis can be surprisingly effective in the treatment of both acute and chronic pain (Patterson & Jensen, 2003).

2. *Sensory distortions and hallucinations*. Hypnotized participants may be led to experience auditory or visual hallucinations (Spiegel, 2003b). They may hear sounds or see things that are not there, or fail to hear or see stimuli that are present. In one study, for instance, hypnotized participants were induced to "see" a cardboard box that blocked their view of a television (Spiegel et al., 1985). Subjects may also have their sensations distorted so that some-



thing sweet tastes sour or an unpleasant odor smells fragrant.

3. *Disinhibition*. Generally, it is difficult to get hypnotized participants to do things that they would normally consider unacceptable. Nonetheless, hypnosis *can* sometimes reduce inhibitions that would normally prevent subjects from acting in ways that they would see as socially undesirable. In experiments, hypnotized participants have been induced to throw what they believed to be a toxic substance into the face of a research assistant. Similarly, stage hypnotists are sometimes successful in getting people to disrobe in public. One lay hypnotist even coaxed a man into robbing a bank (Deyoub, 1984). This disinhibition effect may occur simply because hypnotized people feel that they cannot be held responsible for their actions while they are hypnotized.

4. *Posthypnotic suggestions and amnesia*. Suggestions made during hypnosis may influence a subject's later behavior (Barnier, 2002). The most common posthypnotic suggestion is the creation of posthypnotic amnesia. That is, participants are told that they will remember nothing that happened while they were hypnotized. Such subjects usually claim to remember nothing, as ordered. However, when pressed, many of these subjects acknowledge that they have not really forgotten the information (Kirsch & Lynn, 1998).

Theories of Hypnosis

Although a number of theories have been developed to explain hypnosis, it is still not well understood. One popular view is that hypnotic effects occur because participants are put into a special, altered state of consciousness, called a *hypnotic trance*. Although

Figure 5.16

Variation in hypnotic susceptibility. This graph shows the distribution of scores of more than 500 subjects on the Stanford Hypnotic Susceptibility Scale. As you can see, responsiveness to hypnotism varies widely, and many people are not very susceptible to hypnotic induction.

Source: Adapted from Hilgard, E. (1965). *Hypnotic susceptibility*. San Diego: Harcourt Brace Jovanovich. Copyright © 1965 by Ernest R. Hilgard. Reprinted by permission of Ernest R. Hilgard.



States of Consciousness
PsychWeb, Russ Dewey's (Georgia Southern University) superb resource page, hosts this fine collection of scientifically grounded guides to three topics that too often provoke nonsensical claims: hypnosis, out-of-body experiences, and dreaming.

hypnotized subjects may feel as though they are in an altered state, their patterns of EEG activity cannot be distinguished from their EEG patterns in normal waking states (Dixon & Laurence, 1992; Orne & Dinges, 1989). The failure to find any special physiological changes associated with hypnosis has led some theorists to conclude that hypnosis is a normal state of consciousness that is simply characterized by dramatic role playing.

Hypnosis as Role Playing

Theodore Barber (1979) and Nicholas Spanos (1986; Spanos & Coe, 1992) have been the leading advocates of the view that hypnosis produces a normal mental state in which suggestible people act out the role of a hypnotic subject and behave as they think hypnotized people are supposed to. According to this notion, it is subjects' *role expectations* that produce hypnotic effects, rather than a special trancelike state of consciousness.

Two lines of evidence support the role-playing view. First, many of the seemingly amazing effects of hypnosis have been duplicated by nonhypnotized participants or have been shown to be exaggerated (Kirsch, 1997). For example, much has been made of the fact that hypnotized subjects can be used as "human planks," but it turns out that nonhypnotized subjects can easily match this feat (Barber, 1986). In a similar vein, anecdotal reports that hypnosis can enhance memory have not stood up well to empirical testing. Although hypnosis may occasionally facilitate recall in some people, experimental studies have tended to find that hypnotized participants make more memory errors than nonhypnotized participants, even though they often feel more confident about their recollections (McConkey, 1992; Scoboria et al., 2002). These findings suggest that no special state of consciousness is required to explain hypnotic feats.

The second line of evidence involves demonstrations that hypnotized participants are often acting out a role. For example, Martin Orne (1951) regressed hypnotized subjects back to their sixth birthday and asked them to describe it. They responded with detailed descriptions that appeared to represent great feats of hypnosis-enhanced memory. However, instead of accepting this information at face value, Orne compared it with information that he had obtained from the subjects' parents. It turned out that many of the participants' memories were inaccurate and invented! Many other studies have also found that age-regressed subjects' recall of the distant past tends to be more fanciful than factual (Green, 1999; Perry,



AP/Wide World Photos

Some feats performed under hypnosis can be performed equally well by nonhypnotized subjects. Here "the Amazing Kreskin" demonstrates that proper positioning is the only requirement for the famous human plank feat.

Kusel, & Perry, 1988). Thus, the role-playing explanation of hypnosis suggests that situational factors lead some subjects to act out a certain role in a highly cooperative manner.

Hypnosis as an Altered State of Consciousness

Despite the doubts raised by role-playing explanations, many prominent theorists still maintain that hypnotic effects are attributable to a special, altered state of consciousness (Beahrs, 1983; Fromm, 1979, 1992; Hilgard, 1986; Spiegel, 1995, 2003a). These theorists argue that it is doubtful that role playing can explain all hypnotic phenomena. For instance, they assert that even the most cooperative subjects are unlikely to endure surgery without a drug anesthetic just to please their physician and live up to their expected role. They also cite studies in which hypnotized participants have continued to display hypnotic responses when they thought they were alone and not being observed (Perugini et al., 1998). If hypnotized participants were merely acting, they would drop the act when alone. The most impressive research undermining the role-playing view has come from recent brain-imaging studies, which suggest that hypnotized participants experience changes in brain activity that appear consistent with their reports of hypnosis-induced hallucinations (Spiegel, 2003b) or pain suppression (Hofbauer et al., 2001).

The most influential explanation of hypnosis as an altered state of awareness has been offered by



THEODORE BARBER

"Thousands of books, movies, and professional articles have woven the concept of 'hypnotic trance' into the common knowledge. And yet there is almost no scientific support for it."

Ernest Hilgard (1986, 1992). According to Hilgard, hypnosis creates a *dissociation* in consciousness. **Dissociation is a splitting off of mental processes into two separate, simultaneous streams of awareness.** In other words, Hilgard theorizes that hypnosis splits consciousness into two streams. One stream is in communication with the hypnotist and the external world, while the other is a difficult-to-detect “hidden observer.” Hilgard believes that many hypnotic effects are a product of this divided consciousness. For instance, he suggests that a hypnotized subject might appear unresponsive to pain because the pain isn’t registered in the portion of consciousness that communicates with other people.

One appealing aspect of Hilgard’s theory is that *divided consciousness* is a common, normal experience. For example, people will often drive a car a great

distance, responding to traffic signals and other cars, with no recollection of having consciously done so. In such cases, consciousness is clearly divided between driving and the person’s thoughts about other matters. Interestingly, this common experience has long been known as *highway hypnosis*. In this condition, there is even an “amnesia” for the component of consciousness that drove the car, similar to post-hypnotic amnesia. In summary, Hilgard presents hypnosis as a plausible variation in consciousness that has continuity with everyday experience.

The debate about whether hypnosis involves an altered or normal state of consciousness appears likely to continue for the foreseeable future (Kihlstrom, 1998a; Kirsch & Lynn, 1998). As you will see momentarily, a similar debate has dominated the scientific discussion of meditation.



ERNEST HILGARD

“Many psychologists argue that the hypnotic trance is a mirage. It would be unfortunate if this skeptical view were to gain such popularity that the benefits of hypnosis are denied to the numbers of those who could be helped.”

> Meditation: Pure Consciousness or Relaxation?

Recent years have seen growing interest in the ancient discipline of meditation. **Meditation refers to a family of practices that train attention to heighten awareness and bring mental processes under greater voluntary control.** There are many approaches to meditation. In North America, the most widely practiced approaches are those associated with yoga, Zen, and transcendental meditation (TM). All three of these approaches are rooted in Eastern religions (Hinduism, Buddhism, and Taoism). However, meditation has been practiced throughout history as an element of all religious and spiritual traditions, including Judaism and Christianity. Moreover, the practice of meditation can be largely divorced from religious beliefs. In fact, most Americans who meditate have only vague ideas regarding its religious significance. Of interest to psychology is the fact that meditation involves a deliberate effort to alter consciousness.

Most meditative techniques are deceptively simple. For example, in TM a person is supposed to sit in a comfortable position with eyes closed and silently focus attention on a *mantra*. A mantra is a specially assigned Sanskrit word that is personalized to each meditator. This exercise in mental self-discipline is to be practiced twice daily for about 20 minutes. The technique has been described as “diving from the active surface of the mind to its quiet depths” (Bloomfield & Kory, 1976, p. 49). Most proponents of TM believe it involves an altered state of “pure consciousness” that has many unique benefits. Many skeptics

counter that meditation is merely an effective relaxation technique. Let’s look at the evidence.

Physiological Correlates

What happens when an experienced meditator goes into the meditative state? One intriguing finding is that alpha waves and theta waves become more prominent in EEG recordings. Many studies also find that subjects’ heart rate, skin conductance, respiration rate, oxygen consumption, and carbon dioxide elimination decline (see **Figure 5.17** on the next page; Dillbeck & Orme-Johnson, 1987; Fenwick, 1987; Travis, 2001). Taken together, these changes suggest that meditation leads to a potentially beneficial physiological state characterized by suppression of bodily arousal. However, some researchers have argued that a variety of systematic relaxation training procedures can produce similar results (Holmes, 1987; Shapiro, 1984). Mere relaxation hardly seems like an adequate explanation for the transcendent experiences reported by many meditators. Hence, debate continues about whether unique physiological changes are associated with meditation (Shear & Jevning, 1999; Travis & Pearson, 2000).

Long-Term Benefits

What about the long-term benefits that have been claimed for meditation? Research suggests that med-

PREVIEW QUESTIONS

- What is meditation and how is it practiced?
- How does meditation affect physiological responding?
- What’s the evidence on the long-term benefits of meditation?

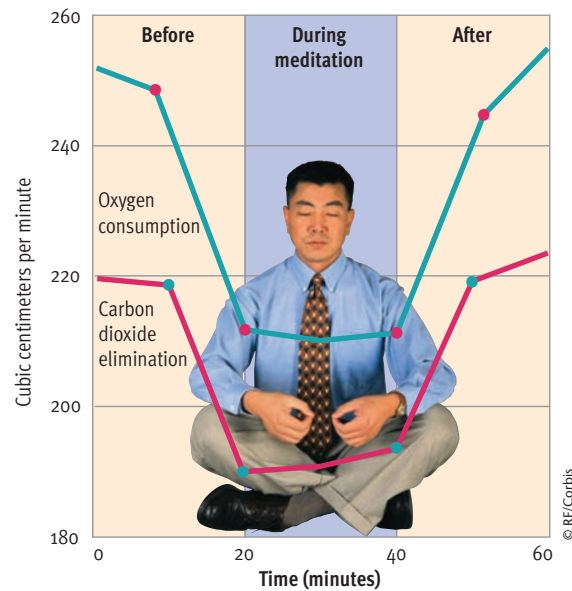


Figure 5.17
The suppression of physiological arousal during transcendental meditation. The physiological changes shown in the graph are evidence of physical relaxation during the meditative state. However, critics argue that similar changes may also be produced by systematic relaxation procedures.

Source: Adapted from Wallace, R. K., & Benson, H. (1972, February). The physiology of meditation. *Scientific American*, 226, 85–90. Graphic redrawn from illustration on p. 86 by Lorelle A. Raboni. Copyright © 1972 by Scientific American, Inc.

itation may have some value in reducing the effects of stress (Anderson et al., 1999; Winzelberg & Luskin, 1999). In particular, regular meditation is associated with lower levels of some “stress hormones” (Infante et al., 2001) and enhanced immune response (Davidson et al., 2003a). Research also suggests that meditation can improve mental health while reducing anxiety and drug abuse (Alexander et al., 1994). Other studies report that meditation may have beneficial effects on blood pressure (Barnes, Treiber, & Davis, 2001), self-esteem (Emavardhana & Tori, 1997), mood

and one’s sense of control (Easterlin & Cardena, 1999), happiness (Smith, Compton, & West, 1995), and overall physical health and well-being (Reibel et al., 2001). One recent study even reported that regular meditation led to increased creativity and intelligence in a sample of high school students (So & Orme-Johnson, 2001).

At first glance these results are profoundly impressive, but they need to be viewed with caution. At least some of these effects may be just as attainable through systematic relaxation or other mental focusing procedures (Shapiro, 1984; Smith, 1975). Critics also wonder whether placebo effects, sampling bias, inability to use double-blind procedures, and other methodological problems may contribute to some of the reported benefits of meditation (Bishop, 2002; Canter, 2003; Caspi & Bursleson, 2005). In a relatively enthusiastic review of meditation research, the authors acknowledge that many meditation studies “do not use rigorous research design (including lack of randomization, lack of follow-up, and imprecise measurement of constructs) and sometimes are based on small samples” (Shapiro, Schwartz, & Santerre, 2002).

In summary, it seems safe to conclude that meditation is a potentially worthwhile relaxation strategy. And it’s entirely possible that meditation involves much more than mere relaxation, as meditation advocates insist. Certainly, it is hard to envision mere relaxation providing such a diverse constellation of benefits. At present, however, there is great debate about the notion that meditation produces a unique state of “pure consciousness” and healthy skepticism about some of its alleged long-term benefits.

➤ REVIEW OF KEY POINTS

- Hypnosis has had a long and curious history since the era of Mesmerism in the 18th century. Hypnotic susceptibility is a stable trait. It is only weakly correlated with personality, but highly hypnotizable people tend to score somewhat higher than others in absorption and imaginativeness. Hypnosis can produce anesthesia, sensory distortions, disinhibition, and posthypnotic amnesia.
- One approach to hypnosis is to view it as a normal state of consciousness in which subjects play the role of being hypnotized. Another approach asserts that hypnosis leads to an altered state in which consciousness is split into two streams of awareness.
- Meditation refers to a family of practices that train attention to heighten awareness and bring mental processes under greater voluntary control. Evidence suggests that meditation leads to a potentially beneficial physiological state characterized by suppression of bodily arousal. However, some experts suggest that the benefits of meditation are not unique to meditation and are a product of any effective relaxation procedure.

concept check 5.2



Relating EEG Activity to Variations in Consciousness

Early in the chapter we emphasized the intimate relationship between brain activity and variations in consciousness. Check your understanding of this relationship by indicating the kind of EEG activity (alpha, beta, theta, or delta) that would probably be dominant in each of the following situations. The answers are in Appendix A.

1. You are playing a video game.
2. You are deep in meditation.
3. You have just fallen asleep.
4. You are sleepwalking across the lawn.
5. You are in the midst of a terrible nightmare.

> Altering Consciousness with Drugs

Like hypnosis and meditation, drugs are commonly used in deliberate efforts to alter consciousness. In this section, we focus on the use of drugs for non-medical purposes, commonly referred to as “drug abuse” or “recreational drug use.” Drug abuse reaches into every corner of modern society. Although small declines appear to have occurred in the overall abuse of drugs in recent years, survey data show that illicit drug use has mostly been increasing since the 1960s (Winick & Norman, 2005). In spite of extraordinary efforts to reduce drug abuse, it seems reasonable to conclude that widespread recreational drug use is here to stay for the foreseeable future.

As with other controversial social problems, recreational drug use often inspires more rhetoric than reason. For instance, a former president of the American Medical Association made headlines when he declared that marijuana “makes a man of 35 sexually like a man of 70.” In reality, the research findings do not support this assertion. This influential physician later retracted his statement, admitting that he had made it simply to campaign against marijuana use (Leavitt, 1995). Unfortunately, such scare tactics can backfire by undermining the credibility of drug education efforts.

Recreational drug use involves personal, moral, political, and legal issues that are not matters for science to resolve. However, the more knowledgeable you are about drugs, the more informed your decisions and opinions about them will be. Accordingly, this section describes the types of drugs that are most commonly used for recreational purposes and summarizes their effects on consciousness, behavior, and health.

Principal Abused Drugs and Their Effects



The drugs that people use recreationally are *psychoactive*. **Psychoactive drugs are chemical substances that modify mental, emotional, or behavioral functioning.** Not all psychoactive drugs produce effects that lead to recreational use. Generally, people prefer drugs that elevate their mood or produce other pleasurable alterations in consciousness.

The principal types of recreational drugs are described in **Table 5.2**. The table lists representative drugs in each of six categories. It also summarizes

PREVIEW QUESTIONS

- What are the principal categories of abused drugs, and what are their main effects?
- What kinds of factors influence drug experiences?
- Where do drugs exert their effects in the brain?
- What is the difference between physical and psychological dependence?
- What are the three ways in which abused drugs can harm health?
- What are the health risks associated with the use of marijuana and MDMA?

Table 5.2 Psychoactive Drugs: Methods of Ingestion, Medical Uses, and Effects

Drugs	Methods of Ingestion	Principal Medical Uses	Desired Effects	Potential Short-Term Side Effects
Narcotics (opiates) Morphine Heroin	Injected, smoked, oral	Pain relief	Euphoria, relaxation, anxiety reduction, pain relief	Lethargy, drowsiness, nausea, impaired coordination, impaired mental functioning, constipation
Sedatives Barbiturates (e.g., Seconal) Nonbarbiturates (e.g., Quaalude)	Oral, injected	Sleeping pill, anticonvulsant	Euphoria, relaxation, anxiety reduction, reduced inhibitions	Lethargy, drowsiness, severely impaired coordination, impaired mental functioning, emotional swings, dejection
Stimulants Amphetamines Cocaine	Oral, sniffed, injected, freebased, smoked	Treatment of hyperactivity and narcolepsy, local anesthetic (cocaine only)	Elation, excitement, increased alertness, increased energy, reduced fatigue	Increased blood pressure and heart rate, increased talkativeness, restlessness, irritability, insomnia, reduced appetite, increased sweating and urination, anxiety, paranoia, increased aggressiveness, panic
Hallucinogens LSD Mescaline Psilocybin	Oral	None	Increased sensory awareness, euphoria, altered perceptions, hallucinations, insightful experiences	Dilated pupils, nausea, emotional swings, paranoia, jumbled thought processes, impaired judgment, anxiety, panic reaction
Cannabis Marijuana Hashish THC	Smoked, oral	Treatment of glaucoma and chemotherapy—induced nausea and vomiting; other uses under study	Mild euphoria, relaxation, altered perceptions, enhanced awareness	Elevated heart rate, bloodshot eyes, dry mouth, reduced short-term memory, sluggish motor coordination, sluggish mental functioning, anxiety
Alcohol	Drinking	None	Mild euphoria, relaxation, anxiety reduction, reduced inhibitions	Severely impaired coordination, impaired mental functioning, increased urination, emotional swings, depression, quarrelsomeness, hangover

how the drugs are taken, their medical uses, their effects on consciousness, and their common side effects (based on Julien, 2001; Levinthal, 2002; Lowinson et al., 2005). The six categories of psychoactive drugs that we will focus on are narcotics, sedatives, stimulants, hallucinogens, cannabis, and alcohol. We will also discuss one specific drug that is not listed in the table (because it does not fit into traditional drug categories) but that cannot be ignored in light of its escalating popularity: MDMA, better known as “ecstasy.”

Narcotics, or opiates, are drugs derived from opium that are capable of relieving pain. The main drugs in this category are heroin and morphine, although less potent opiates such as codeine, Demerol, and methadone are also abused. In sufficient dosages these drugs can produce an overwhelming sense of euphoria or well-being. This euphoric effect has a relaxing, “Who cares?” quality that makes the high an attractive escape from reality. Common side effects include lethargy, nausea, and impaired mental and motor functioning.

Sedatives are sleep-inducing drugs that tend to decrease central nervous system (CNS) activation and behavioral activity. People abusing sedatives, or “downers,” generally consume larger doses than are prescribed for medical purposes. The desired effect is a euphoria similar to that produced by drinking large amounts of alcohol. Feelings of tension or dejection are replaced by a relaxed, pleasant state of intoxication, accompanied by loosened inhibitions. Prominent side effects include drowsiness, unpredictable emotional swings, and severe impairments in motor coordination and mental functioning.

Stimulants are drugs that tend to increase central nervous system activation and behavioral activity. Stimulants range from mild, widely available

drugs, such as caffeine and nicotine, to stronger, carefully regulated ones, such as cocaine. Our focus here is on cocaine and amphetamines. Cocaine is a natural substance that comes from the coca shrub. In contrast, amphetamines are synthesized in a pharmaceutical laboratory. Cocaine and amphetamines have fairly similar effects, except that cocaine produces a briefer high. Stimulants produce a euphoria very different from that created by narcotics or sedatives. They produce a buoyant, elated, energetic “I can conquer the world!” feeling accompanied by increased alertness. In recent years, cocaine

and amphetamines have become available in much more potent (and dangerous) forms than before. “Free-basing” is a chemical treatment used to extract nearly pure cocaine from ordinary street cocaine. “Crack” is the most widely distributed by-product of this process, consisting of chips of pure cocaine that are usually smoked. Amphetamines are increasingly sold as a crystalline powder, called “crank,” or “crystal meth,” (short for “methamphetamine”) that may be snorted or injected intravenously. Side effects of stimulants vary with dosage and potency but may include restlessness, anxiety, paranoia, and insomnia.

Hallucinogens are a diverse group of drugs that have powerful effects on mental and emotional functioning, marked most prominently by distortions in sensory and perceptual experience. The principal hallucinogens are LSD, mescaline, and psilocybin. These drugs have similar effects, although they vary in potency. Hallucinogens produce euphoria, increased sensory awareness, and a distorted sense of time. In some users, they lead to profound, dream-like, “mystical” feelings that are difficult to describe. This effect is why they have been used in religious ceremonies for centuries in some cultures. Unfortunately, at the other end of the emotional spectrum hallucinogens can also produce nightmarish feelings of anxiety and paranoia, commonly called a “bad trip.” Other side effects include impaired judgment and jumbled thought processes.

Cannabis is the hemp plant from which marijuana, hashish, and THC are derived. Marijuana is a mixture of dried leaves, flowers, stems, and seeds taken from the plant. Hashish comes from the plant’s resin. Smoking is the usual route of ingestion for both marijuana and hashish. THC, the active chemical ingredient in cannabis, can be synthesized for research purposes (for example, to give to animals, who can’t very well smoke marijuana). When smoked, cannabis has an immediate impact that may last several hours. The desired effects of the drug are a mild, relaxed euphoria and enhanced sensory awareness. Unintended effects may include increased heart rate, anxiety, sluggish mental functioning, and impaired memory.

Alcohol encompasses a variety of beverages containing ethyl alcohol, such as beers, wines, and distilled spirits. The concentration of ethyl alcohol varies from about 4% in most beers to 40% in 80-proof liquor—and occasionally more in higher-proof liquors. When people drink heavily, the central effect is a relaxed euphoria that temporarily boosts self-esteem, as problems seem to melt away and inhibitions diminish. Common side effects include severe impairments in mental and motor functioning, mood swings, and quarrelsomeness. Alcohol is the most widely used recreational drug in our society. Because

Image Not Available

alcohol is legal, many people use it casually without even thinking of it as a drug.

Excessive drinking is a particularly prevalent problem on college campuses. Researchers from the Harvard School of Public Health (Wechsler et al., 2002) surveyed nearly 11,000 undergraduates at 119 schools and found that 81% of the students drank. Moreover, 49% of the men and 41% of the women reported that they engage in binge drinking with the intention of getting drunk. With their inhibitions released, some drinkers become argumentative and prone to aggression. In the Harvard survey, 29% of the students who did *not* engage in binge drinking reported that they had been insulted or humiliated by a drunken student, 19% had experienced serious arguments, 9% had been pushed, hit, or assaulted, and 19.5% had been the target of unwanted sexual advances (Wechsler et al., 2002). Worse yet, alcohol appears to contribute to about 90% of student rapes and 95% of violent crime on campus. Alcohol can also contribute to reckless sexual behavior. In the Harvard survey, 21% of students who drank reported that they had unplanned sex as a result of drinking, and 10% indicated that their drinking had led to unprotected sex.

MDMA is a compound drug related to both amphetamines and hallucinogens, especially mescaline. MDMA was originally formulated in 1912 but was not widely used in the United States until the 1990s, when as *ecstasy* it became popular in the context of raves and dance clubs. MDMA produces a high that typically lasts a few hours or more. Users report that they feel warm, friendly, euphoric, sensual, insightful, and empathetic, but alert and energetic. Problematic side effects include increased blood pressure, muscle tension, sweating, blurred vision, insomnia, and transient anxiety.

Factors Influencing Drug Effects

The drug effects summarized in **Table 5.2** are the *typical* ones. Drug effects can vary from person to person and even for the same person in different situations. The impact of any drug depends in part on the user’s age, mood, motivation, personality, previous experience with the drug, body weight, and physiology. The dose and potency of a drug, the method of administration, and the setting in which a drug is taken also influence its effects (Leavitt, 1995). Our theme of *multifactorial causation* clearly applies to the effects of drugs.

So, too, does our theme emphasizing the *subjectivity of experience*. Expectations are potentially powerful factors that can influence the user’s perceptions of a drug’s effects. You may recall from our discussion of placebo effects in Chapter 2 that some people who are misled to *think* that they are drinking alcohol show signs of intoxication (Wilson, 1982). If people *expect* a drug to make them feel giddy, serene, or profound, their expectation may contribute to the feelings they experience.

A drug’s effects can also change as the person’s body develops a tolerance for the chemical as a result of continued use. **Tolerance refers to a progressive decrease in a person’s responsiveness to a drug.** Tolerance usually leads people to consume larger and larger doses of a drug to attain the effects they desire. Most drugs produce tolerance effects, but some do so more rapidly than others. For example, tolerance to alcohol usually builds slowly, while tolerance to heroin increases much more quickly. **Table 5.3** indicates whether various categories of drugs tend to produce tolerance rapidly or gradually.

Table 5.3 Psychoactive Drugs: Tolerance, Dependence, Potential for Fatal Overdose, and Health Risks

Drugs	Tolerance	Risk of Physical Dependence	Risk of Psychological Dependence	Fatal Overdose Potential	Health Risks
Narcotics (opiates)	Rapid	High	High	High	Infectious diseases, accidents, immune suppression
Sedatives	Rapid	High	High	High	Accidents
Stimulants	Rapid	Moderate	High	Moderate to high	Sleep problems, malnutrition, nasal damage, hypertension, respiratory disease, stroke, liver disease, heart attack
Hallucinogens	Gradual	None	Very low	Very low	Accidents
Cannabis	Gradual	None	Low to moderate	Very low	Accidents, lung cancer, respiratory disease, pulmonary disease, perhaps head and neck cancer
Alcohol	Gradual	Moderate	Moderate	Low to high	Accidents, liver disease, malnutrition, brain damage, neurological disorders, heart disease, stroke, hypertension, ulcers, cancer, birth defects



Web of Addictions

From the earliest days of the World Wide Web, this page at The Well has been regularly recognized as a primary source for accurate and responsible information about alcohol and other drugs.

Mechanisms of Drug Action



Most drugs have effects that reverberate throughout the body. However, psychoactive drugs work primarily by altering neurotransmitter activity in the brain. As we discussed in Chapter 3, neurotransmitters are chemicals that transmit information between neurons at junctions called *synapses*.

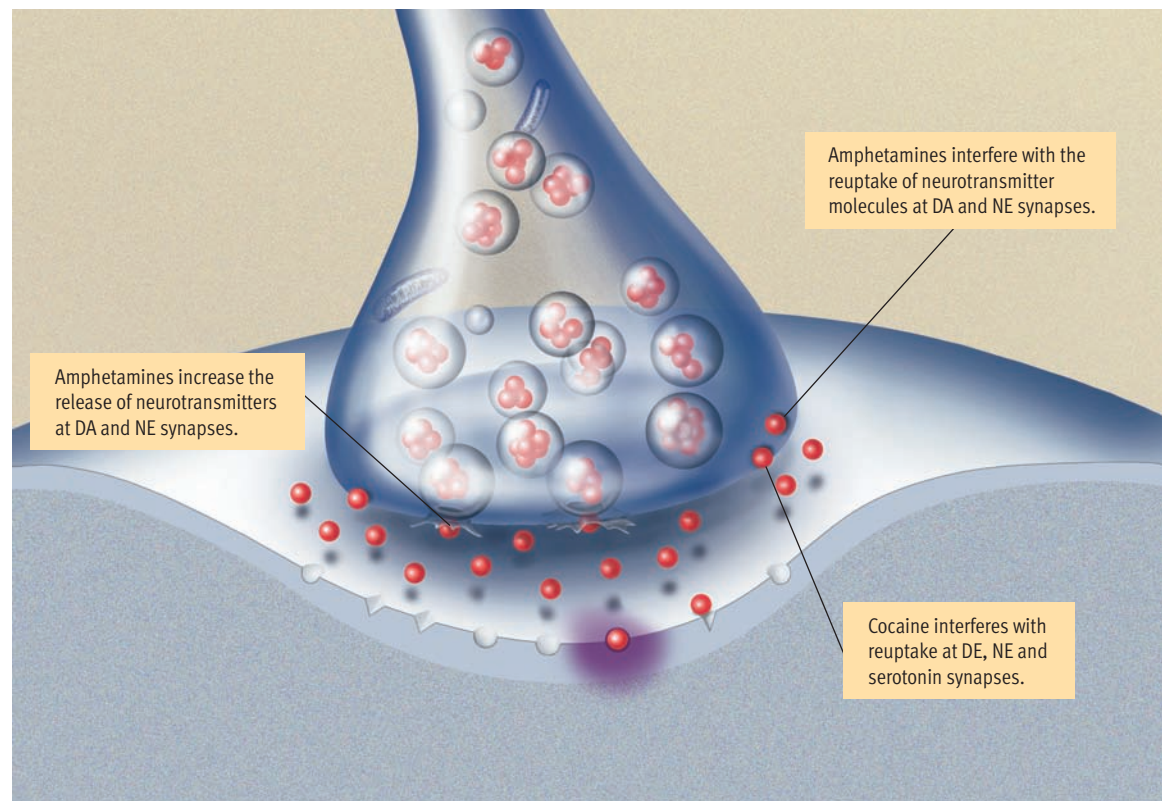
The actions of amphetamines and cocaine illustrate how drugs have selective, multiple effects on neurotransmitter activity (see **Figure 5.18**). Amphetamines exert their main effects on two of the monoamine neurotransmitters: norepinephrine (NE) and dopamine (DA). Indeed, the name *amphetamines* reflects the kinship between these drugs and the *monoamines*. Amphetamines mainly increase the release of DA and NE by presynaptic neurons. They also interfere with the reuptake of DA and NE from synaptic clefts (Cami & Farre, 2003). These actions serve to increase the levels of dopamine and norepinephrine at the affected synapses. Cocaine shares some of these actions, which is why cocaine and amphetamines produce similar stimulant effects. Cocaine mainly blocks reuptake at DA, NE, and serotonin synapses. For both amphetamines and cocaine, elevated activity in certain *dopamine circuits* is believed to be crucial to the drugs' pleasurable, rewarding effects (Volkow et al., 2004).

The cellular mechanisms underlying stimulant drugs' effects also explain why cocaine and amphetamine highs are often followed by an emotional crash, marked by depression and exhaustion. The slowing of reuptake leaves more neurotransmitter in the affected synapses to stimulate increased activity, but it also gives enzymes that metabolize the neurotransmitter more opportunity to swoop in and inactivate more of the neurotransmitter, and the neurotransmitter has more opportunity to drift away from affected synapses. As a result, the use of cocaine or amphetamines can eventually lead to a depletion of dopamine and norepinephrine. This depletion appears to be the cause of the emotional crash experienced by many users.

The discovery of endorphins (the body's internally produced opiatelike chemicals) has led to new insights about the actions of narcotic drugs (see Chapter 3). These drugs apparently bind to specific subtypes of endorphin receptors, and their actions at these receptor sites indirectly elevate dopamine activity (Cami & Farre, 2003). Scientists have recently found receptors in the brain for THC, the active chemical ingredient in marijuana, which are called *cannabinoid receptors* (Stephens, 1999). They have also found an internally produced chemical, christened *anandamide* (from a Sanskrit word for internal bliss), that activates these receptors (Wiley, 1999). Researchers

Figure 5.18

Stimulant drugs and neurotransmitter activity. Like other psychoactive drugs, amphetamines and cocaine alter neurotransmitter activity at specific synapses. Amphetamines primarily increase the release of dopamine (DA) and norepinephrine (NE) and secondarily inhibit the reuptake of these neurotransmitters. Cocaine slows the reuptake process at DA, NE, and serotonin synapses. The psychological and behavioral effects of the drugs have largely been attributed to their impact on dopamine circuits.



are still working out the details, but it appears that THC from marijuana “hijacks” the brain’s cannabinoid receptors (Piomelli, 2004).

Although specific drugs exert their initial effects in the brain on a wide variety of neurotransmitter systems, many theorists believe that virtually all abused drugs eventually increase activity in a particular neural pathway, called the *mesolimbic dopamine pathway* (Nestler & Malenka, 2004). This neural circuit, which runs from an area in the midbrain through the *nucleus accumbens* and on to the prefrontal cortex (see **Figure 5.19**), has been characterized as a “reward pathway.” Large and rapid increases in the release of dopamine along this pathway are thought to be the neural basis of the reinforcing effects of most abused drugs (Volkow, Fowler, & Wang, 2004).

Drug Dependence

People can become either physically or psychologically dependent on a drug. Physical dependence is a common problem with narcotics, sedatives, alcohol, and stimulants. **Physical dependence exists when a person must continue to take a drug to avoid withdrawal illness.** The symptoms of withdrawal illness depend on the specific drug. Withdrawal from heroin, barbiturates, and alcohol can produce fever, chills, tremors, convulsions, vomiting, cramps, diarrhea, and severe aches and pains. Withdrawal from stimulants can lead to a more subtle syndrome, marked by fatigue, apathy, irritability, depression, and feelings of disorientation.

Psychological dependence exists when a person must continue to take a drug to satisfy intense mental and emotional craving for the drug. Psychological dependence is more subtle than physical dependence, but the need it creates can be powerful. Cocaine, for instance, can produce an overwhelming psychological need for continued use. Psychological dependence is possible with all recreational drugs, although it seems rare for hallucinogens.

Both types of dependence are established gradually with repeated use of a drug. It was originally assumed that only physical dependence has a physiological basis, but theorists now believe that both types of dependence reflect alterations in synaptic transmission (Di Chara, 1999; Self, 1997). Dysregulation in the mesolimbic dopamine pathway appears to be the chief factor underlying drug craving and addiction (Nestler & Malenka, 2004). Drugs vary in their potential for creating either physical or psychological dependence. **Table 5.3** provides estimates of the risk of each kind of dependence for the six categories of recreational drugs covered in our discussion.

Drugs and Health

The use of recreational drugs can be damaging to health. The harmful effects of drugs were illustrated in a widely cited study of rats that were given unlimited access to heroin or cocaine (Bozarth & Wise, 1985). In this study, the rats “earned” drug injections delivered through tubes implanted in their bodies by pressing a lever. Even though unlimited food and water were available, rats on cocaine lost an average of 29% of their body weight. Their health deteriorated rapidly, and by the end of the 30-day study 90% of them had died! The health of the rats on heroin deteriorated less rapidly, but 36% of them also died during the course of the study. As is true for many human drug users, serious aversive effects did not deter the rats from continuing their “drug abuse.” Many of the rats on cocaine experienced severe seizures. However, they would resume their lever pressing as soon as they stopped writhing from convulsions!

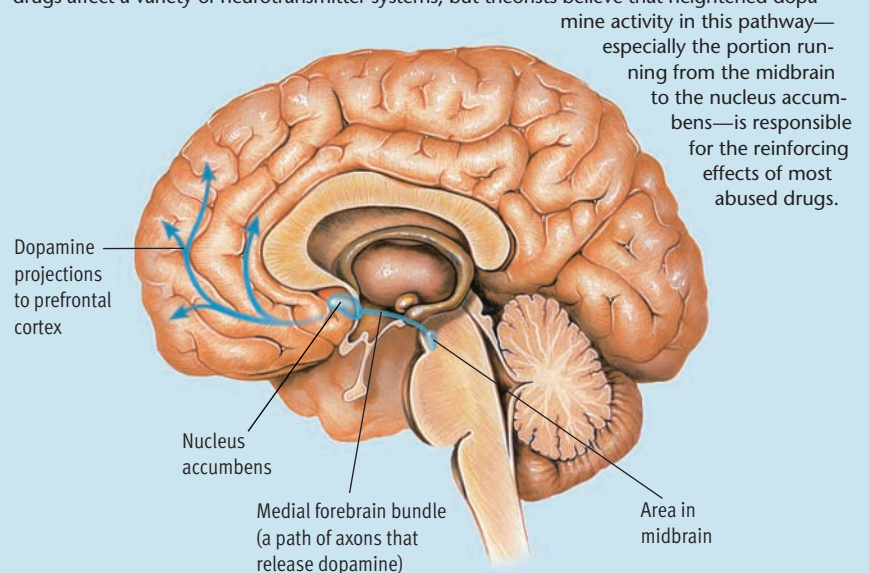
In humans, recreational drug use can affect health in a variety of ways. The three principal ways are by triggering an overdose, by producing various types of physiological damage (direct effects), and by causing health-impairing behavior (indirect effects).

Overdose

Any drug can be fatal if a person takes enough of it, but some drugs are much more dangerous than oth-

Figure 5.19

The “reward pathway” in the brain. The neural circuits shown here in blue make up the *mesolimbic dopamine pathway*. Axons in this pathway run from an area in the midbrain through the medial forebrain bundle to the *nucleus accumbens* and on to the prefrontal cortex. Recreational drugs affect a variety of neurotransmitter systems, but theorists believe that heightened dopamine activity in this pathway—



Web Link 5.8



National Institute on Alcohol Abuse and Alcoholism (NIAAA)

Just two of the many research sources here include the entire collection of the bulletin *Alcohol Alert*, issued since 1988 on specific topics related to alcoholism, and the ETOH Database, a searchable repository of more than 100,000 records on alcoholism and alcohol abuse.

ers. **Table 5.3** shows estimates of the risk of accidentally consuming a lethal overdose of each listed drug. Drugs that are CNS depressants—sedatives, narcotics, and alcohol—carry the greatest risk of overdose. It's important to remember that these drugs are additive with each other, so many overdoses involve lethal *combinations* of CNS depressants. What happens when a person overdoses on these drugs? The respiratory system grinds to a halt, producing coma, brain damage, and death within a brief period. Fatal overdoses with CNS stimulants usually involve a heart attack, stroke, or cortical seizure. Deaths due to overdoses of stimulant drugs used to be *relatively* infrequent, but overdoses have increased sharply as more people have experimented with freebasing, smoking crack, and using other, more dangerous modes of ingestion (Repetto & Gold, 2005).

Direct Effects



In some cases, drugs cause tissue damage directly. For example, chronic snorting of cocaine can damage nasal membranes. Cocaine use can also foster cardiovascular disease and crack smoking is associated with a host of respiratory problems (Gourevitch & Arnsten, 2005; Weaver & Schnoll, 1999). Long-term, excessive alcohol consumption is associated with an elevated risk for a wide range of serious health problems, including liver damage, ulcers, hypertension, stroke, heart disease, neurological disorders, and some types of cancer (Mack, Franklin, & Frances, 2003; Moak & Anton, 1999).

Indirect Effects



The negative effects of drugs on physical health are often indirect results of the drugs' impact on behavior. For instance, people using stimulants tend not to eat or sleep properly. Sedatives increase the risk of accidental injuries because they severely impair motor coordination. People who abuse downers often trip down stairs, fall off stools, and suffer other mishaps. Many drugs impair driving ability, increasing the risk of automobile accidents. Alcohol, for instance, may contribute to roughly 30% of all automobile fatalities (Yi et al., 1999). Intravenous drug users risk contracting infectious diseases that can be spread by unsterilized needles. In recent years, acquired immune deficiency syndrome (AIDS) has been transmitted at an alarming rate through the population of intravenous drug users (Des Jarlais, Hagan, & Friedman, 2005).

The major health risks (other than overdose) of various recreational drugs are listed in the sixth column of **Table 5.3**. As you can see, alcohol appears to have the most diverse negative effects on physical

health. The irony, of course, is that alcohol is the only recreational drug listed that is legal.

Controversies Concerning Marijuana

The possible health risks associated with marijuana use have generated considerable debate in recent years. The preponderance of evidence indicates that chronic marijuana use increases the risk for respiratory and pulmonary disease, including lung cancer (Tashkin et al., 2002), and some preliminary evidence suggests a possible link to head and neck cancers (Hashibe, Ford, & Zhang, 2002). Reasonably convincing evidence also indicates that smoking marijuana increases the risk of automobile accidents (Ramaekers, Robbe, & O'Hanlon, 2000). These dangers are listed in **Table 5.3**, but many other widely publicized dangers are omitted because the findings on these other risks have been exaggerated or remain debatable. Here is a brief overview of the evidence on some of these controversies.

- *Does marijuana reduce one's immune response?* Research with animals clearly demonstrates that cannabis can suppress various aspects of immune system responding (Cabral & Pettit, 1998). However, infectious diseases do not *appear* to be more common among marijuana smokers than among nonsmokers. Thus, it is unclear whether marijuana increases susceptibility to infectious diseases in humans (Bredt et al., 2002; Klein, Friedman, & Specter, 1998).

- *Does marijuana lead to impotence and sterility in men?* In animal research, cannabis temporarily decreases testosterone levels and sperm production (Brown & Dobs, 2002). Citing these findings, the popular media have frequently implied that marijuana is likely to make men sterile and impotent. However, research with humans has yielded weak, inconsistent, and reversible effects on testosterone and sperm levels (Brown & Dobs, 2002). At present, the evidence suggests that marijuana has little lasting impact on male smokers' fertility or sexual functioning (Grinspoon, Bakalar, & Russo, 2005).

- *Does marijuana have long-term negative effects on cognitive functioning?* It has long been known that marijuana has a negative impact on attention and memory while users are high, but until recently studies had failed to find any permanent cognitive deficits attributable to cannabis use. However, a spate of recent studies using more elaborate and precise assessments of cognitive functioning *have* found an association between chronic, heavy marijuana use and measurable impairments in attention and memory (see **Figure 5.20**) that show up when users are not high (Ehrenreich et al., 1999; Solowij et al., 2002). That said, the cognitive deficits that have been ob-

Web Link 5.9



National Institute on Drug Abuse (NIDA)

This government-sponsored site houses a great deal of information on the medical consequences of abusing various drugs. It is also an excellent resource for statistics on trends in drug abuse.

served are modest and certainly not disabling, and one study found that the deficits vanished after a month of marijuana abstinence (Pope, Gruber, & Yurgelun-Todd, 2001; Pope et al., 2001). Although more research is needed, the recent studies in this area provide some cause for concern.

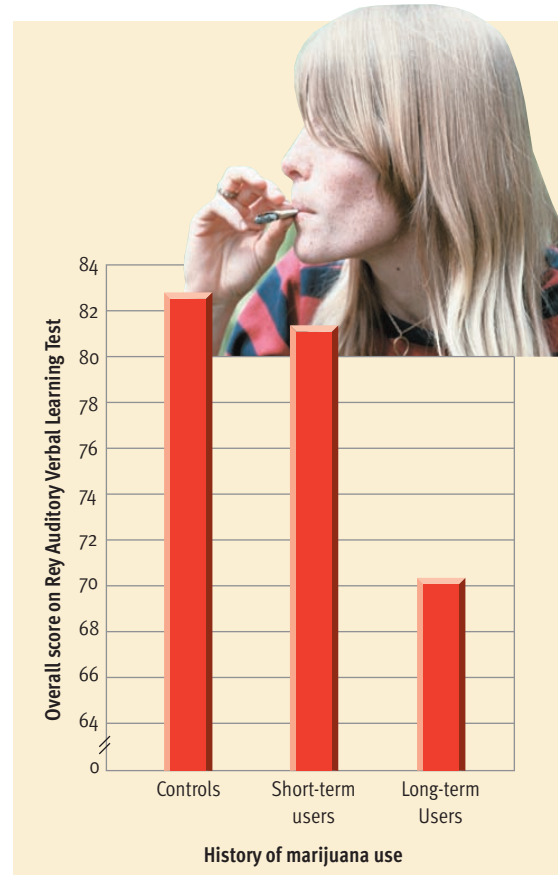
New Findings Regarding Ecstasy

Like marijuana, ecstasy is viewed as a harmless drug in some quarters, but accumulating empirical evidence is beginning to alter that perception. Research on MDMA is in its infancy, so conclusions about its risks must be tentative. MDMA does not appear to be especially addictive, but psychological dependence clearly can become a problem for some people. MDMA

Figure 5.20

Chronic cannabis use and cognitive performance.

Solowij and associates (2002) administered a battery of neuropsychological tests to 51 long-term cannabis users who had smoked marijuana regularly for an average of 24 years, 51 short-term cannabis users who had smoked marijuana regularly for an average of 10 years, and 33 control subjects who had little or no history of cannabis use. The cannabis users were required to abstain from smoking marijuana for a minimum of 12 hours prior to their testing. The study found evidence suggestive of subtle cognitive impairments among the long-term cannabis users on many of the tests. The graph depicts the results observed for overall performance on the Rey Auditory Verbal Learning Test, which measures several aspects of memory functioning.



© Lawrence Manning/Corbis

has been implicated in cases of stroke and heart attack, seizures, heat stroke, and liver damage, but its exact contribution is hard to gauge because MDMA users typically consume quite a variety of drugs and ecstasy often contains contaminants (Grob & Poland, 2005; Scholey et al., 2004). Chronic, heavy use of ecstasy appears to be associated with sleep disorders, depression, and elevated anxiety and hostility (Morgan, 2000). Moreover, studies of former MDMA users suggest that ecstasy may have subtle, long-term effects on cognitive functioning (Parrott, 2000). Quite a few studies have found memory deficits in former users (Bhattachary & Powell, 2001; Rodgers et al., 2003). Other studies have found decreased performance on laboratory tasks requiring attention and learning (Gouzoulis-Mayfrank et al., 2000). In short, the preliminary evidence suggests that MDMA may be more harmful than widely assumed.

MDMA, better known as “ecstasy,” surged in popularity in the 1990s in the context of “raves” and dance clubs. Although many people view MDMA as a relatively harmless drug, recent research suggests otherwise.

➤ REVIEW OF KEY POINTS

- The principal categories of abused drugs are narcotics, sedatives, stimulants, hallucinogens, cannabis, and alcohol. Although it's possible to describe the typical effects of various drugs, the actual effects on any individual depend on a host of factors, including subjective expectations and tolerance to the drug.
- Psychoactive drugs exert their main effects in the brain, where they alter neurotransmitter activity at synaptic sites in a variety of ways. For example, amphetamines increase the release of DA and NE, and like cocaine, they slow reuptake at DA and NE synapses. The mesolimbic dopamine pathway may mediate the reinforcing effects of most abused drugs.
- Recreational drug use can prove harmful to health by producing an overdose, by causing tissue damage, or by increasing health-impairing behavior. The chances of accidentally consuming a lethal overdose are greatest for the CNS depressants and cocaine. Direct tissue damage occurs most frequently with alcohol and cocaine.
- The health risks of marijuana have generated debate. Preliminary evidence suggests that MDMA may be more dangerous than widely assumed.

> Reflecting on the Chapter's Themes

Sociohistorical
Context



Subjectivity of
Experience



Cultural
Heritage



Theoretical
Diversity



This chapter highlights four of our unifying themes. First, we can see how psychology evolves in a socio-historical context. Psychology began as the science of consciousness in the 19th century, but consciousness proved difficult to study empirically. Research on consciousness dwindled after John B. Watson and others redefined psychology as the science of behavior. However, in the 1960s people began to turn inward, showing a new interest in altering consciousness through drug use, meditation, hypnosis, and biofeedback. Psychologists responded to these social trends by beginning to study variations in consciousness in earnest. This renewed interest in consciousness shows how social forces can have an impact on psychology's evolution.

A second theme that predominates in this chapter is the idea that people's experience of the world is highly subjective. We encountered this theme at the start of the chapter when we mentioned the difficulty that people have describing their states of consciousness. The subjective nature of consciousness was apparent elsewhere in the chapter, as well. For instance, we found that people often misjudge the quality of their sleep and that the alterations of consciousness produced by drugs depend significantly on personal expectations.

Third, we saw once again how culture molds some aspects of behavior. Although the basic physiological

process of sleep appears largely invariant from one society to another, culture influences certain aspects of sleep habits and has a dramatic impact on whether people remember their dreams and how they interpret and feel about their dreams. If not for space constraints, we might also have discussed cross-cultural differences in patterns of recreational drug use, which vary considerably from one society to the next.

Finally, the chapter illustrates psychology's theoretical diversity. We discussed conflicting theories about dreams, hypnosis, and meditation. For the most part, we did not see these opposing theories converging toward reconciliation, as we did in the areas of sensation and perception. However, it's important to emphasize that rival theories do not always merge neatly into tidy models of behavior. Many theoretical controversies go on indefinitely. This fact does not negate the value of theoretical diversity. While it's always nice to resolve a theoretical debate, the debate itself can advance knowledge by stimulating and guiding empirical research.

Indeed, our upcoming Personal Application demonstrates that theoretical debates need not be resolved in order to advance knowledge. Many theoretical controversies and enduring mysteries remain in the study of sleep and dreams. Nonetheless, researchers have accumulated a great deal of practical information on these topics, which we'll discuss in the next few pages.

PERSONAL Application

Addressing Practical Questions About Sleep and Dreams

Indicate whether the following statements are "true" or "false."

- ___ 1 Naps rarely have a refreshing effect.
- ___ 2 Some people never dream.
- ___ 3 When people cannot recall their dreams, it's because they are trying to repress them.
- ___ 4 Only an expert in symbolism, such as a psychoanalytic therapist, can interpret the real meaning of dreams.

These assertions were all drawn from the Sleep and Dreams Information Questionnaire (Palladino & Carducci, 1984), which measures practical knowledge about sleep

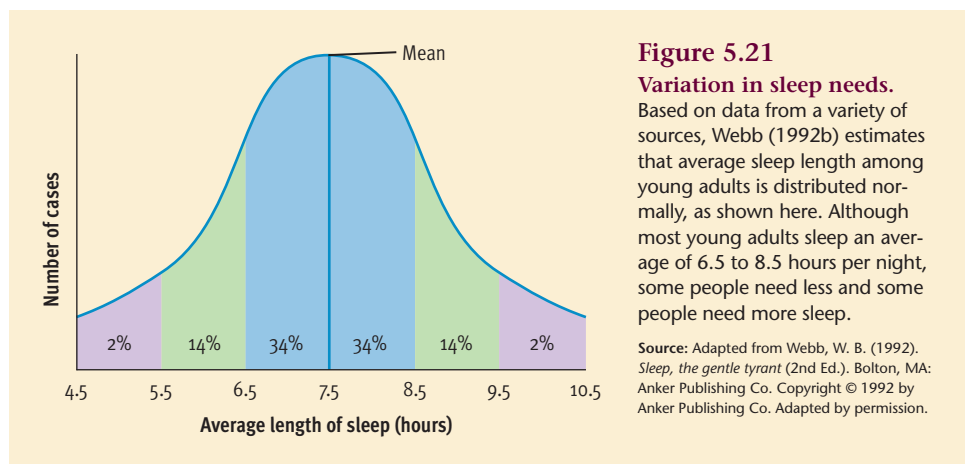
and dreams. Are they true or false? You'll see in this Application.

Common Questions About Sleep

How much sleep do people need? The average amount of daily sleep for young adults is 7.5 hours. However, there is considerable variability in how long people sleep. Based on a synthesis of data from many studies, Webb (1992b) estimates that sleep time is normally distributed as shown in **Figure 5.21**. Thus, sleep needs vary from person to per-

son. That said, many sleep experts believe that most people would function more effectively if they increased their amount of sleep (Maas, 1998).

Can short naps be refreshing? Some naps are beneficial and some are not. The effectiveness of napping varies from person to person. Also, the benefits of any specific nap depend on the time of day and the amount of sleep one has had recently (Dinges, 1993). On the negative side, naps are not very *efficient* ways to sleep because you're often just getting into the deeper stages of sleep when your nap time is up. Another potential problem is that overly long naps or naps that oc-



cur too close to bedtime can disrupt nighttime sleep (Thorpy & Yager, 2001).

Nonetheless, many highly productive people (including Thomas Edison, Winston Churchill, and John F. Kennedy) have made effective use of naps. Naps can enhance subsequent alertness and task performance and reduce sleepiness (Takahashi et al., 2004). In conclusion, naps can be refreshing for most people (so the first statement opening this Application is false), and they can pay off in the long run if they don't interfere with nighttime sleep.

How do alcohol and drugs affect sleep? Obviously, stimulants such as cocaine and amphetamines make it difficult to sleep. More surprising is the finding that most of the CNS depressants that facilitate sleep (such as alcohol, analgesics, sedatives, and tranquilizers) actually disrupt the normal sleep cycle. The principal problem is that many drugs reduce the time spent in REM sleep and slow-wave sleep (Carskadon & Dement, 2005). Unfortunately, these are the sleep stages that appear to be most important to a refreshing night's sleep.

Can people learn to awaken without an alarm clock? Some people who have consistent sleep habits find themselves awakening on their own just before their alarm clock goes off. This phenomenon is fairly common and presumably reflects the influence of circadian rhythms. A smaller number of people claim that they can reliably awaken themselves at predetermined, nonhabitual times. However, when some of these people have been tested carefully in sleep laboratories, their performance has been inconsistent (Zepelin, 1993). Thus, people who claim

that they have an adjustable internal alarm clock are probably exaggerating its reliability.

What do yawning and snoring have to do with sleep? Yawning is a universal phenomenon seen in all cultural groups—not to mention other mammals, birds, fish, and reptiles (Baenninger, 1997). Contrary to popular belief, yawning is not a response to a buildup of carbon dioxide or a shortage of oxygen. However, as reputed, yawning is correlated with sleepiness and boredom, although the association with sleepiness may not be as strong as widely assumed. Whether yawning facilitates or impedes sleep, or has no effect, is not yet known (Provine, 1993). According to one theory, the principal function of yawning is to modify cortical arousal in situations where there is little external stimulation (Baenninger, 1997). The most fascinating and perplexing facet of yawning is that it is contagious—seeing others yawn creates a powerful urge to follow suit (Platek, Mohamed, & Gallup, 2005).

Snoring is a common phenomenon seen in roughly 30%–40% of adults (Hoffstein, 2005). Snoring increases after age 35, occurs in men more than women, and is more frequent among people who are overweight (Kryger, 1993; Stoohs et al., 1998). Many factors, including colds, allergies, smoking, and some drugs, can contribute to snoring, mainly by forcing people to breathe through their mouths while sleeping. Some people who snore loudly disrupt their own sleep as well as that of their bed partners. It can be difficult to prevent snoring in some people, whereas others are able to reduce their snoring by simply losing weight or by sleeping on their side instead of their back (Lugaresi

et al., 1994). Snoring may seem like a trivial problem, but it is associated with sleep apnea and cardiovascular disease, and it may have considerably more medical significance than most people realize (Dement & Vaughn, 1999).

What can be done to avoid sleep problems? There are many ways to improve your chances of getting satisfactory sleep (see **Figure 5.22**). Most of them involve developing sensible daytime habits that won't interfere with sleep (see Maas, 1998; Stepanski & Wyatt, 2003; Thorpy & Yager, 2001; Zarcone, 2000). For example, if you've been having trouble sleeping at night, it's wise to avoid daytime naps, so you will be *tired* when bedtime arrives. Some people find that daytime exercise helps them fall asleep more readily at bedtime (King et al., 1997). Of course, the exercise should be part of a regular regimen that doesn't leave one sore or aching.

It's also a good idea to minimize consumption of stimulants such as caffeine or nicotine. Because coffee and cigarettes aren't prescription drugs, people don't appreciate how much the stimulants they contain can heighten physical arousal. Many foods (such as chocolate) and beverages (such as cola

Figure 5.22
Suggestions for better sleep. In his book *Power Sleep*, James Maas (1998) offers the following advice for people concerned about enhancing their sleep. Maas argues convincingly that good daytime habits can make all the difference in the world to the quality of one's sleep.

Source: Adapted from Maas, J. B. (1998). *Power sleep*. New York: Random House. Copyright © 1998 by James B. Mass, Ph. D. Reprinted by permission of Villard Books, a division of Random House, Inc.

1. Reduce stress as much as possible.
2. Exercise to stay fit.
3. Keep mentally stimulated during the day.
4. Eat a proper diet.
5. Stop smoking.
6. Reduce caffeine intake.
7. Avoid alcohol near bedtime.
8. Take a warm bath before bed.
9. Maintain a relaxing atmosphere in the bedroom.
10. Establish a bedtime ritual.
11. Have pleasurable sexual activity.
12. Clear your mind at bedtime.
13. Try some bedtime relaxation techniques.
14. Avoid trying too hard to get to sleep.
15. Learn to value sleep.

drinks) contain more caffeine than people realize. Also, bear in mind that ill-advised eating habits can interfere with sleep. Try to avoid going to bed hungry, uncomfortably stuffed, or soon after eating foods that disagree with you.

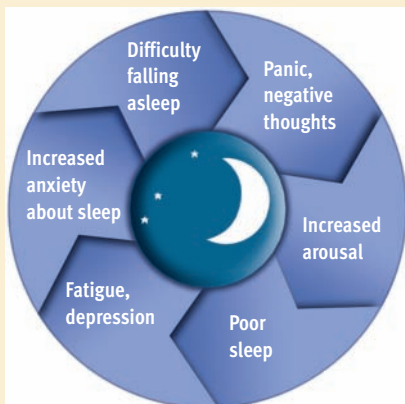
In addition to these prudent habits, two other preventive measures are worth mentioning. First, try to establish a reasonably regular bedtime. This habit will allow you to take advantage of your circadian rhythm, so you'll be trying to fall asleep when your body is primed to cooperate. Second, create a favorable environment for sleep. This advice belabors what should be obvious, but many people fail to heed it. Make sure you have a good bed that is comfortable for you. Take steps to ensure that your bedroom is quiet enough and that the humidity and temperature are to your liking.

What can be done about insomnia? First, don't panic if you run into a little trouble sleeping. An overreaction to sleep problems can begin a vicious circle of escalating problems, like that depicted in **Figure 5.23**. If you jump to the conclusion that you are becoming an insomniac, you may approach sleep with anxiety that will aggravate the problem. The harder you work at falling asleep, the less success you're likely to have. As noted earlier, temporary sleep problems are common and generally clear up on their own.

One sleep expert, Dianne Hales (1987), lists 101 suggestions for combating insomnia

Figure 5.23

The vicious circle of anxiety and sleep difficulty. Anxiety about sleep difficulties leads to poorer sleep, which increases anxiety further, which in turn leads to even greater difficulties in sleeping.



People typically get very upset when they have difficulty falling asleep. Unfortunately, the emotional distress tends to make it even harder for people to get to sleep.

in her book *How to Sleep Like a Baby*. Many involve “boring yourself to sleep” by playing alphabet games, reciting poems, or listening to your clock. Another recommended strategy is to engage in some not-so-engaging activity. For instance, you might try reading your dullest textbook. It could turn out to be a superb sedative. Whatever you think about, try to avoid ruminating about the current stresses and problems in your life. Research has shown that the tendency to ruminate is one of the key factors contributing to insomnia (Kales et al., 1984), as the data in **Figure 5.24** show.

Anything that relaxes you—whether it's music, meditation, prayer, or a warm bath—can aid you in falling asleep. Experts have also devised systematic relaxation procedures that can make these efforts more effective. You may want to learn about techniques such as *progressive relaxation* (Jacobson, 1938), *autogenic training* (Schultz & Luthe, 1959), or the *relaxation response* (Benson & Klipper, 1988).

Common Questions About Dreams

Does everyone dream? Yes. Some people just don't *remember* their dreams. However, when these people are brought into a sleep lab and

awakened from REM sleep, they report having been dreaming—much to their surprise (statement 2 at the start of this Application is false). Scientists have studied a small number of people who have sustained brain damage in the area of the *pons* that has wiped out their REM sleep, but even these people report dreams (Klosch & Kraft, 2005).

Why don't some people remember their dreams? The evaporation of dreams appears to be quite normal. Given the lowered level of awareness during sleep, it's understandable that memory of dreams is mediocre. Dream recall is best when people are awakened during or very soon after a dream (Goodenough, 1991). Most of the time, people who *do* recall dreams upon waking are remembering either their *last* dream from their final REM period or a dream that awakened them earlier in the night. Hobson's (1989) educated guess is that people probably forget 95%–99% of their dreams. This forgetting is natural and is not due to repression, so statement 3 is also false. People who never remember their dreams probably have a sleep pattern that puts too much time between their last REM/dream period and awakening, so even their last dream is forgotten.

Can people improve their recall of dreams? Yes. Most people don't have any significant reason to work at recalling their dreams, so

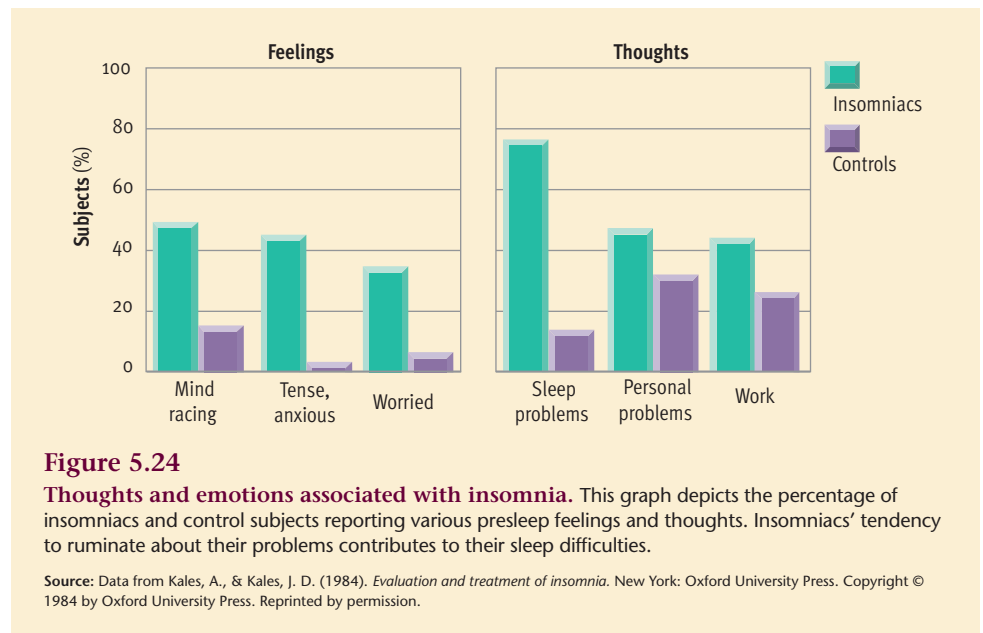
they just let them float away. However, many people have found that they can remember more dreams if they merely place that goal uppermost in their minds as they go to sleep (Goodenough, 1991). Dream recall is also aided by making a point of trying to remember dreams upon first awakening, before opening one's eyes or getting out of bed.

Are dreams instantaneous? No. It has long been speculated that dreams flash through consciousness almost instantaneously. According to this notion, complicated plots that would require 20 minutes to think through in waking life could bolt through the dreaming mind in a second or two. However, modern research shows that this isn't the case (Weinstein, Schwartz, & Arkin, 1991).

Do dreams require interpretation? Most theorists would say yes, but interpretation may not be as difficult as generally assumed. People have long believed that dreams are symbolic and that it is necessary to interpret the symbols to understand the meaning of dreams. We saw earlier in the chapter that Freud, for instance, believed that dreams have a hidden ("latent") content that represented their true meaning. Thus, a Freudian therapist might equate such dream events as walking into a tunnel or riding a horse with sexual intercourse.

Freudian theorists assert that dream interpretation is a complicated task requiring considerable knowledge of symbolism. However, many dream theorists argue that symbolism in dreams is less deceptive and mysterious than Freud thought (Faraday, 1974; Foulkes, 1985; Hall, 1979). Calvin Hall makes the point that dreams require some interpretation simply because they are more visual than verbal. That is, pictures need to be translated into ideas. According to Hall, dream symbolism is highly personal and the dreamer may be the person best equipped to decipher a dream (statement 4 is also false). Thus, it is not unreasonable for you to try to interpret your own dreams. Unfortunately, you'll never know whether you're "correct," because there is no definitive way to judge the validity of different dream interpretations.

Can people learn to influence their dreams? Quite possibly, but it is not easy. Researchers in a number of studies have instructed subjects to try to dream about a particular topic. Subjects have been successful often enough to suggest that some dream control



is possible (Nikles et al., 1998). However, there have been many failures as well, suggesting that dream control may be fairly difficult (Tart, 1990).

What is lucid dreaming? Generally, when people dream, they are not aware that they are dreaming. Occasionally, however, some people experience "lucid" dreams in which they recognize that they are dreaming. Typically, normal dreams become lucid when people puzzle over something bizarre in a dream and recognize that they must be dreaming. **In lucid dreams people can think clearly about the circumstances of waking life and the fact that they are dreaming, yet they remain asleep in the midst of a vivid dream.** Perhaps the most intriguing aspect of this dual consciousness is that people can often exert some control over the events unfolding in their lucid dreams (LaBerge, 1990; Tart, 1988).

Could a shocking dream be fatal? According to folklore, if you fall from a height in a dream, you'd better wake up on the plunge downward, for if you hit the bottom the shock to your system will be so great that you will actually die in your sleep. Think about this one for a moment. *If it were a genuine problem, who would have reported it?* You can be sure that no one has ever testified to experiencing a fatal dream. This myth presumably exists because many people do awaken during the downward plunge, thinking that they've averted a close call. A

study by Barrett (1988–1989) suggests that dreams of one's own death are relatively infrequent. However, people do have such dreams—and live to tell about them.

➤ REVIEW OF KEY POINTS

- People's sleep needs vary in a normal distribution. The value of short naps depends on many factors, including one's biological rhythm. Alcohol and many other widely used drugs have a negative effect on sleep.
- People's internal alarm clocks are not as reliable as often claimed. Yawning appears to be associated with boredom and sleepiness but is not well understood. Snoring occurs exclusively during sleep, increases after age 35, and may have more medical significance than most people realize.
- People can do many things to avoid or reduce sleep problems. Mostly, it's a matter of developing good daytime habits that do not interfere with sleep. Individuals troubled by transient insomnia should avoid panic, pursue effective relaxation, and try distracting themselves so they don't work too hard at falling asleep.
- Everyone dreams, but some people don't remember their dreams, probably because of the nature of their sleep cycle. Dream recall can be improved, and some people have even been taught to influence their dreams.
- Freud asserted that dreams are symbolic and require interpretation. Most theorists agree that dreams require some interpretation, but doing so may not be as complicated as Freud assumed.
- In lucid dreams, people consciously recognize that they are dreaming and exert some control over the events in their dreams. Dreams are not instantaneous, and there's no evidence that they can be fatal.

CRITICAL THINKING Application

Is Alcoholism a Disease? The Power of Definitions

Alcoholism is a major problem in most, perhaps all, societies. As we saw in the main body of the chapter, alcohol is a dangerous drug. Alcoholism destroys countless lives, tears families apart, and is associated with an elevated risk for a host of physical maladies (Johnson & Ait-Daoud, 2005). With roughly 15 million problem drinkers in the United States (Mack et al., 2003), it seems likely that alcoholism has touched the lives of a majority of Americans.

In almost every discussion about alcoholism someone will ask, “Is alcoholism a disease?” If alcoholism is a disease, it is a strange one, because the alcoholic is the most direct cause of his or her own sickness. If alcoholism is *not* a disease, then what else might it be? Over the course of history, alcoholism has been categorized under many labels, from a personal weakness to a crime, a sin, a mental disorder, and a physical illness (Meyer, 1996). Each of these definitions carries important personal, social, political, and economic implications.

Consider, for instance, the consequences of characterizing alcoholism as a disease. If that is the case, then alcoholics should be treated like diabetics, heart patients, or victims of other physical illnesses. That is, they should be viewed with sympathy and should be given appropriate medical and therapeutic interventions to foster recovery from their illness. These treatments should be covered by medical insurance and delivered by health care professionals. Just as important, if alcoholism is defined as a disease, it should lose much of its stigma. After all, we don’t blame people with diabetes or heart disease for their illnesses. Yes, alcoholics admittedly contribute to their own disease (by drinking too much), but so do many victims of diabetes and heart disease, who eat the wrong foods, fail to control their weight, and so forth (McLellan et al., 2000). And, as is the case with many physical illnesses, one can inherit a genetic vulnerability to alcoholism (Lin & Anthenelli, 2005), so it is difficult to

argue that alcoholism is caused solely by one’s behavior.

However, if alcoholism is defined as a personal failure or a moral weakness, alcoholics are less likely to be viewed with sympathy and compassion. They might be admonished to quit drinking, be put in prison, or be punished in some other way. These responses to their alcoholism would be administered primarily by the legal system rather than the health care system, as medical interventions are not designed to remedy moral failings. Obviously, the interventions that would be available would not be covered by health insurance, which would have enormous financial repercussions (for both health care providers and alcoholics).

The key point here is that definitions lie at the center of many complex debates, and they can have profound and far-reaching implications. People tend to think of definitions as insignificant, arbitrary, abstruse sets of words found buried in the obscurity of thick dictionaries compiled by ivory tower intellectuals. Well, much of this characterization may be accurate, but definitions are *not* insignificant. They are vested with enormous power to shape how people think about important issues. And an endless array of issues boil down to matters of definition. For example, the next time you hear people arguing over whether a particular movie is pornographic, whether the death penalty is cruel and unusual punishment, or whether spanking is child abuse, you’ll find it helps to focus the debate on clarifying the definitions of the crucial concepts.

The Power to Make Definitions

So, how can we resolve the debate about whether alcoholism is a disease? Scientists generally try to resolve their debates by conducting research to achieve a better understanding of the phenomena under scrutiny. You may have noticed already that the as-

sertion “We need more research on this issue . . .” is a frequent refrain in this text. Is more research the answer in this case? For once, the answer is “no.” There is no conclusive way to determine whether alcoholism is a disease. It is not as though there is a “right” answer to this question that we can discover through more and better research.

The question of whether alcoholism is a disease is a *matter of definition*: Does alcoholism fit the currently accepted definition of what constitutes a disease? If you consult medical texts or dictionaries, you will find that *disease is typically defined as an impairment in the normal functioning of an organism that alters its vital functions*. Given that alcoholism clearly impairs people’s normal functioning and disrupts a variety of vital functions (see Figure 5.25), it seems reasonable to characterize it as a disease, and this has been the dominant view in the United States since the middle of the 20th century (Maltzman, 1994; Meyer, 1996). This view has only been strengthened by recent evidence that addiction to alcohol (and other drugs) is the result of dysregulation in key neural circuits in the brain (Cami & Farre, 2003). Still, many critics express vigorous doubts about the wisdom of defining alcoholism as a disease (Peele, 1989, 2000). They often raise a question that comes up frequently in arguments about definitions: Who should have the power to make the definition? In this case, the power lies in the hands of the medical community, which seems sensible, given that disease is a medical concept. But some critics argue that the medical community has a strong bias in favor of defining conditions as diseases because doing so creates new markets and fuels economic growth for the health industry (Nikelly, 1994). Thus, debate about whether alcoholism is a disease seems likely to continue for the indefinite future.

To summarize, definitions generally do not emerge out of research. They are typically crafted by experts or authorities in a

specific field who try to reach a consensus about how to best define a particular concept. Thus, in analyzing the validity of a definition, you need to look not only at the definition itself but at where it came from. Who decided what the definition should be? Does the source of the definition seem legitimate and appropriate? Did the authorities who formulated the definition have any biases that should be considered?

Definitions, Labels, and Circular Reasoning

One additional point about definitions is worth discussing. Perhaps because definitions are imbued with so much power, people have an interesting tendency to incorrectly use them as *explanations* for the phenomena they describe. This logical error, which equates *naming* something with *explaining* it, is sometimes called the *nominal fallacy*. Names and labels that are used as explanations may sound reasonable at first glance, but definitions do not really have any explanatory value; they simply specify what certain terms mean. Consider an example. Let's say your friend Frank has a severe drinking problem. You are sitting around with some other friends discussing why Frank drinks so much. Rest assured, at least one of these friends will assert that "Frank drinks too much because he is an alcoholic." This is circular reasoning, which is just as useless as explaining that Frank is an alcoholic because he drinks too much. It tells us nothing about *why* Frank has a drinking problem. The diagnostic labels that are used in the classification of mental disorders—labels such as schizophrenia, depression, autism, and obsessive-compulsive disorder—seem to invite this type of circular reasoning. For example, people often say things like "That person is delusional because she is schizophrenic," or "He is afraid of small, enclosed places because he is claustrophobic." These statements are just as logical as saying "She is a redhead because she has red hair." The logical fallacy of mistaking a label for an explanation will get us as far in our understanding as a dog gets in chasing its own tail.

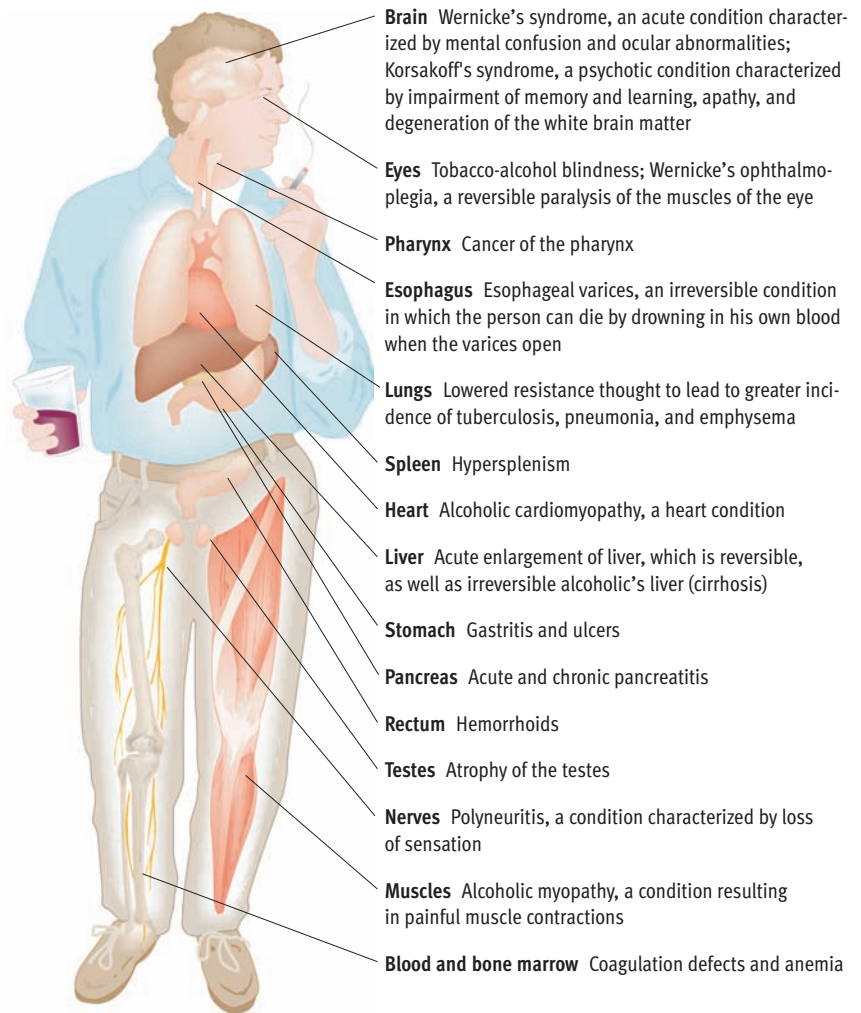


Figure 5.25

Physiological malfunctions associated with alcoholism. This chart amply demonstrates that alcoholism is associated with a diverse array of physiological maladies. In and of itself, however, this information does not settle the argument about whether alcoholism should be regarded as a disease. It all depends on one's definition of what constitutes a disease.

Source: Edlin, G., & Golanty, E. (1992). *Health and wellness: A holistic approach*. Boston: Jones & Bartlett. Copyright © 1992 by Jones & Bartlett Publishers, Inc. www.jbpub.com. Reprinted by permission.

Table 5.4 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding the way definitions shape how people think about issues	The critical thinker appreciates the enormous power of definitions and the need to clarify definitions in efforts to resolve disagreements.
Identifying the source of definitions	The critical thinker recognizes the need to determine who has the power to make specific definitions and to evaluate their credibility.
Avoiding the nominal fallacy in working with definitions and labels	The critical thinker understands that labels do not have explanatory value.

CHAPTER 5 *Recap*

Key Ideas

On the Nature of Consciousness

- Consciousness is the continually changing stream of mental activity. People have some degree of awareness during sleep and sometimes even when they are under anesthesia.
- Consciousness clearly is adaptive, but the question of exactly why it evolved is open to debate. Variations in consciousness are related to brain activity, as measured by the EEG.

Biological Rhythms and Sleep

- The cycle of sleep and wakefulness is influenced by circadian rhythms. Exposure to light resets biological clocks by affecting the activity of the suprachiasmatic nucleus and the pineal gland, which secretes melatonin.
- Being out of sync with circadian rhythms is one reason for jet lag and for the unpleasant nature of rotating shift work. Melatonin may have some value in treating jet lag. The negative effects of rotating shifts may be reduced by bright-light administration or circadian-friendly scheduling.

The Sleep and Waking Cycle

- During the night, sleepers evolve through a series of stages in cycles of approximately 90 minutes. During the REM stage they experience rapid eye movements, brain waves characteristic of waking thought, and vivid dreaming. The sleep cycle tends to be repeated four times in a night, as REM sleep gradually becomes more predominant and NREM sleep dwindles.
- The REM portion of sleep declines during childhood, leveling off at around 20%. During adulthood, total sleep tends to decline gradually. Culture appears to have little impact on the physiological experience of sleep, but it does influence sleeping arrangements and napping patterns.
- The modulation of sleep and arousal depends on a constellation of brain structures and a variety of neurotransmitters. Hypotheses about the evolutionary bases of sleep focus on energy conservation, reduced exposure to predators, and restoration of depleted resources.
- People often underestimate the impact of sleep deprivation. Going without sleep appears to contribute to many transportation accidents and mishaps at work. Research on selective sleep deprivation suggests that people need REM sleep and slow-wave sleep. These stages of sleep may contribute to the process of memory consolidation.
- Many people are troubled by sleep disorders. Foremost among these disorders is insomnia, which has a variety of causes. Other common sleep problems include narcolepsy, sleep apnea, night terrors, nightmares, and somnambulism.

The World of Dreams

- The conventional view is that dreams are mental experiences during REM sleep that have a storylike quality, include vivid imagery, are often bizarre, and are regarded as real by the dreamer, but theorists have begun to question many aspects of this view.
- The content of one's dreams may be affected by one's gender, events in one's life, and external stimuli experienced during the dream. There are variations across cultures in dream recall, content, and interpretation.
- Freud argued that the purpose of dreams is wish fulfillment. Cartwright has articulated a problem-solving view, whereas Hobson and McCarley assert that dreams are side effects of the neural activation seen during REM sleep.

Hypnosis: Altered Consciousness or Role Playing?

- Hypnosis has a long and curious history. People vary in their susceptibility to hypnosis. Among other things, hypnosis can produce anesthesia, sensory distortions, disinhibition, and posthypnotic amnesia.
- The two major theoretical approaches to hypnosis view it either as an altered state of consciousness or as a normal state of consciousness in which subjects assume a hypnotic role.

Meditation: Pure Consciousness or Relaxation?

- Evidence suggests that meditation leads to a potentially beneficial physiological state characterized by suppression of bodily arousal. However, the long-term benefits of meditation may not be unique to meditation, and critics are worried about methodological flaws in meditation research.

Altering Consciousness with Drugs

- Recreational drug use involves an effort to alter consciousness with psychoactive drugs. Psychoactive drugs exert their main effects in the brain, where they alter neurotransmitter activity in a variety of ways. The mesolimbic dopamine pathway may mediate the reinforcing effects of most abused drugs.
- Drugs vary in their potential for psychological and physical dependence. Likewise, the dangers to health vary depending on the drug. Recreational drug use can prove harmful to health by producing an overdose, by causing tissue damage, or by increasing health-impairing behavior.

Reflecting on the Chapter's Themes

- Four of our unifying themes were highlighted in this chapter. We saw that psychology evolves in a sociohistorical context, that experience is highly subjective, that culture influences many aspects of behavior, and that psychology is characterized by theoretical diversity.

PERSONAL APPLICATION • Addressing Practical Questions About Sleep and Dreams

- People's sleep needs vary, and the value of short naps depends on many factors. People's internal alarm clocks are not as reliable as often claimed. Snoring has more medical significance than most people realize.
- People can do many things to avoid or reduce sleep problems. Mostly, it's a matter of developing good daytime habits that do not interfere with sleep. Individuals troubled by transient insomnia should avoid panic, pursue relaxation, and try distracting themselves.
- Everyone dreams, but some people cannot remember their dreams, probably because of the nature of their sleep cycle. In lucid dreams, people consciously recognize that they are dreaming and exert some control over the events in their dreams. Most theorists believe that dreams require some interpretation, but doing so may not be as complicated as once assumed.

CRITICAL THINKING APPLICATION • Is Alcoholism a Disease? The Power of Definitions

- Like many questions, the issue of whether alcoholism should be regarded as a disease is a matter of definition. In evaluating the validity of a definition, one should look not only at the definition but also at where it came from. People have a tendency to use definitions as explanations for the phenomena they describe, but doing so involves circular reasoning.

Key Terms

Alcohol (p. 200)
Ascending reticular activating system (ARAS) (p. 183)
Biological rhythms (p. 175)
Cannabis (p. 200)
Circadian rhythms (p. 175)
Dissociation (p. 197)
Electroencephalograph (EEG) (p. 174)
Electromyograph (EMG) (p. 178)
Electrooculograph (EOG) (p. 178)
Hallucinogens (p. 200)
Hypnosis (p. 194)
Insomnia (p. 187)
Latent content (p. 192)
Lucid dreams (p. 209)
Manifest content (p. 192)
MDMA (p. 201)
Meditation (p. 197)
Narcolepsy (p. 188)
Narcotics (p. 200)
Night terrors (p. 189)
Nightmares (p. 189)

Non-REM (NREM) sleep (p. 180)
Opiates (p. 200)
Physical dependence (p. 203)
Psychoactive drugs (p. 199)
Psychological dependence (p. 203)
REM sleep (p. 180)
Sedatives (p. 200)
Sleep apnea (p. 188)
Slow-wave sleep (SWS) (p. 179)
Somnambulism (p. 189)
Stimulants (p. 200)
Tolerance (p. 201)

Key People

Theodore Barber (p. 196)
Rosalind Cartwright (p. 192)
William Dement (pp. 173, 179, 185)
Sigmund Freud (pp. 174, 192)
Ernest Hilgard (p. 197)
J. Alan Hobson (p. 193)
William James (p. 174)

CHAPTER 5 *Practice Test*

1. An EEG would indicate primarily _____ activity while you take this test.
 - A. alpha
 - B. beta
 - C. delta
 - D. theta
 2. Other things being equal, which of the following flights would lead to the greatest difficulty with jet lag?
 - A. northward
 - B. southward
 - C. eastward
 - D. westward
 3. Slow-wave sleep consists of stages _____ of sleep and is dominated by _____ waves.
 - A. 1 and 2; beta
 - B. 2 and 3; alpha
 - C. 3 and 4; delta
 - D. 1 and 2; delta
 4. As the sleep cycle evolves through the night, people tend to:
 - A. spend more time in REM sleep and less time in NREM sleep.
 - B. spend more time in NREM sleep and less time in REM sleep.
 - C. spend a more or less equal amount of time in REM sleep and NREM sleep.
 - D. spend more time in stage 4 sleep and less time in REM sleep.
 5. Newborn infants spend about _____% of their sleep time in REM, while adults spend about _____% of their sleep time in REM.
 - A. 20; 50
 - B. 50; 20
 - C. 20; 20
 - D. 50; 50
 6. Tamara has taken part in a three-day study in which she was awakened every time she went in to REM sleep. Now that she is home sleeping without interference, it is likely that she will:
 - A. exhibit psychotic symptoms for a few nights.
 - B. experience severe insomnia for about a week.
 - C. spend extra time in REM sleep for a few nights.
 - D. spend less time in REM sleep for a few nights.
 7. Which of the following is associated with REM sleep?
 - A. sleep apnea
 - B. somnambulism
 - C. night terrors
 - D. nightmares
 8. Which of the following is *not* true of cultural influences on dream experiences?
 - A. The ability to recall dreams is fairly consistent across cultures.
 - B. In some cultures, people are held responsible for their dream actions.
 - C. In Western cultures, dreams are not taken very seriously.
 - D. People in some cultures believe that dreams provide information about the future.
 9. The activation-synthesis theory of dreaming contends that:
 - A. dreams are simply the by-product of bursts of activity in the brain.
 - B. dreams provide an outlet for energy invested in socially undesirable impulses.
 - C. dreams represent the person's attempt to fulfill unconscious wishes.
 - D. dreams are an attempt to restore a neurotransmitter balance within the brain.
 10. A common driving experience is "highway hypnosis," in which one's consciousness seems to be divided between the driving itself and one's conscious train of thought. This phenomenon is consistent with the idea that hypnosis is:
 - A. an exercise in role playing.
 - B. a dissociated state of consciousness.
 - C. a goal-directed fantasy.
 - D. not an altered state of consciousness.
 11. Stimulant is to depressant as:
 - A. cocaine is to alcohol.
 - B. mescaline is to barbiturates.
 - C. caffeine is to amphetamines.
 - D. alcohol is to barbiturates.
 12. Amphetamines work by increasing the levels of _____ in a variety of ways.
 - A. GABA and glycine
 - B. melatonin
 - C. acetylcholine
 - D. norepinephrine and dopamine
 13. Which of the following drugs would be most likely to result in a fatal overdose?
 - A. LSD
 - B. mescaline
 - C. marijuana
 - D. sedatives
 14. Which of the following is a true statement about naps?
 - A. Daytime naps invariably lead to insomnia.
 - B. Daytime naps are invariably refreshing and an efficient way to rest.
 - C. Daytime naps are not very efficient ways to sleep, but their effects are sometimes beneficial.
 - D. Taking many naps during the day can substitute for a full night's sleep.
 15. Definitions:
 - A. generally emerge out of research.
 - B. often have great explanatory value.
 - C. generally exert little influence over how people think.
 - D. are usually constructed by experts or authorities in a specific field.

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



<http://www.thomsonedu.com>

Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/
Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



CHAPTER

6

Learning



Classical Conditioning

Pavlov's Demonstration: "Psychic Reflexes"
Terminology and Procedures
Classical Conditioning in Everyday Life
Basic Processes in Classical Conditioning

Operant Conditioning

Thorndike's Law of Effect
Skinner's Demonstration: It's All a Matter of Consequences
Terminology and Procedures
Basic Processes in Operant Conditioning
Reinforcement: Consequences That Strengthen Responses
Schedules of Reinforcement
Positive Reinforcement Versus Negative Reinforcement
Punishment: Consequences That Weaken Responses

Changing Directions in the Study of Conditioning

Recognizing Biological Constraints on Conditioning
Recognizing Cognitive Processes in Conditioning

Observational Learning

Basic Processes
Acquisition Versus Performance
Observational Learning and the Media Violence Controversy

FEATURED STUDY • The Power of Modeling: What They See Is What You Get

Illustrated Overview of Three Types of Learning

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Achieving Self-Control Through Behavior Modification

Specifying Your Target Behavior
Gathering Baseline Data
Designing Your Program
Executing and Evaluating Your Program
Ending Your Program

CRITICAL THINKING APPLICATION • Manipulating Emotions: Pavlov and Persuasion

Classical Conditioning in Advertising
Classical Conditioning in Business Negotiations
Classical Conditioning in the World of Politics
Becoming More Aware of Classical Conditioning Processes

Recap

Practice Test

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Let's see if you can guess the answer to a riddle. What do the following scenarios have in common?

- In 1953 a Japanese researcher observed a young macaque (a type of monkey) on the island of Koshima washing a sweet potato in a stream before eating it. No one had ever seen a macaque do this before. Soon other members of the monkey's troop were showing the same behavior. Several generations later, macaques on Koshima still wash their potatoes before eating them (De Waal, 2001).

- In 2005 Wade Boggs was elected to baseball's Hall of Fame. Boggs was as renowned for his superstitions as he was for his great hitting. For 20 years Boggs ate chicken every day of the year. Before games he followed a rigorous set of rituals that included stepping on the bases in reverse order, running wind sprints at precisely 17 minutes past the hour, and tossing exactly three pebbles off the field. Every time he stepped up to hit during a game, he drew the Hebrew letter *chai* in the dirt with his bat. For Boggs, the slightest deviation in this routine was profoundly upsetting (Gaddis, 1999; Vyse, 2000).

- Barn swallows in Minnesota have built nests inside a Home Depot warehouse store, safe from the weather and from predators. So how do they get in and out to bring food to their chicks when the doors are closed? They flutter near the motion sensors that operate the doors until they open!

- A firefighter in Georgia routinely braves life-threatening situations to rescue people in distress. Yet the firefighter is paralyzed with fear whenever he sees someone dressed as a clown. He has been terrified of clowns ever since the third grade (Ryckley, 2005).

What common thread runs through these diverse situations? What connects a superstitious ballplayer or a clown-phobic firefighter to potato-washing monkeys and door-opening swallows?

The answer is *learning*. That may surprise you. When most people think of learning, they picture students reading textbooks or novices gaining proficiency in a skill, such as skiing or playing the guitar. To a psychologist, however, **learning is any relatively durable change in behavior or knowledge that is due to experience**. Macaques aren't born with the habit of washing their sweet potatoes, nor do swallows begin life knowing how to operate motion sensors. Wade Boggs adopted his superstitious rituals because they seemed to be associated with his suc-

cessfully hitting a baseball. The firefighter in Georgia wasn't born with a fear of clowns, since he only began to be frightened of them in the third grade. In short, all these behaviors are the product of experience—that is, they represent learning.

When you think about it, it would be hard to name a lasting change in behavior that *isn't* the result of experience. That is why learning is one of the most fundamental concepts in all of psychology. Learning shapes our personal habits, such as nailbiting; personality traits, such as shyness; personal preferences, such as a distaste for formal clothes; and emotional responses, such as reactions to favorite songs. If all your learned responses could somehow be stripped away, there would be little of your behavior left. You would not be able to talk, read a book, or cook yourself a hamburger. You would be about as complex and interesting as a turnip.

As the examples at the start of this discussion show, learning is not an exclusively human process. Learning is pervasive in the animal world as well, a fact that won't amaze anyone who has ever owned a dog or seen a trained seal in action. Another insight, however, is considerably more startling: *The principles that explain learned responses in animals explain much of human learning, too*. Thus, the same mechanisms that explain how barn swallows learn to operate an automated door can account for a professional athlete's bizarre superstitions. Indeed, many of the most fascinating discoveries in the study of learning originated in studies of animals.

In this chapter, you will see how fruitful the research into learning has been and how wide ranging its applications are. We will focus most of our attention on a specific kind of learning: conditioning. *Conditioning* involves learning associations between events that occur in an organism's environment (eating chicken and having success hitting a baseball is one example). In investigating conditioning, psychologists study learning at a fundamental level. This strategy has paid off with insights that have laid the foundation for the study of more complex forms of learning, such as learning by observation (the kind of learning that may account for the Koshima macaques picking up one monkey's habit of washing her sweet potatoes). In the Personal Application, you'll see how you can harness the principles of conditioning to improve your self-control. The Critical Thinking Application shows how conditioning procedures can be used to manipulate emotions.

> Classical Conditioning

PREVIEW QUESTIONS

- What happens in classical conditioning?
- What are the key elements in this type of learning?
- What types of emotional responses are modulated by classical conditioning?
- What are some physiological processes governed by classical conditioning?
- How are conditioned responses acquired and weakened?
- What is higher-order conditioning?

Do you go weak in the knees at the thought of standing on the roof of a tall building? Does your heart race when you imagine encountering a harmless garter snake? If so, you can understand, at least to some degree, what it's like to have a phobia. **Phobias are irrational fears of specific objects or situations.** Mild phobias are commonplace. Over the years, students in my classes have described their phobic responses to a diverse array of stimuli, including bridges, elevators, tunnels, heights, dogs, cats, bugs, snakes, professors, doctors, strangers, thunderstorms, and germs. If you have a phobia, you may have wondered how you managed to acquire such a perplexing fear. Chances are, it was through classical conditioning (Antony & McCabe, 2003).

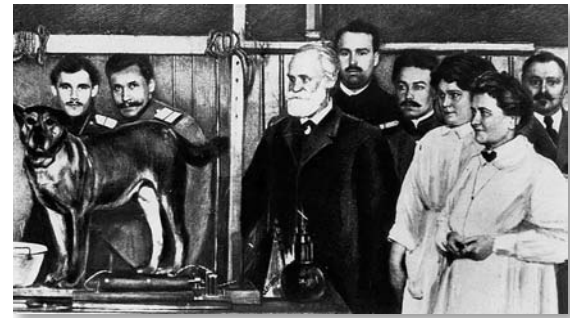
Classical conditioning is a type of learning in which a stimulus acquires the capacity to evoke a response that was originally evoked by another stimulus. The process was first described around 1900 by Ivan Pavlov, and it is sometimes called **Pavlovian conditioning** in tribute to him. The term *conditioning* comes from Pavlov's determination to discover the "conditions" that produce this kind of learning.

Pavlov's Demonstration: "Psychic Reflexes"



Ivan Pavlov was a prominent Russian physiologist who did Nobel prize-winning research on digestion. Something of a "classic" himself, he was an absent-minded but brilliant professor obsessed with his research. Legend has it that Pavlov once reprimanded an assistant who arrived late for an experiment because of trying to avoid street fighting in the midst of the Russian Revolution. The assistant defended his tardiness, saying, "But Professor, there's a revolution going on with shooting in the streets!" Pavlov supposedly replied, "What the hell difference does a revolution make when you've work to do in the laboratory? Next time there's a revolution, get up earlier!" Apparently, dodging bullets wasn't an adequate excuse for delaying the march of scientific progress (Fancher, 1979; Gantt, 1975).

Pavlov was studying the role of saliva in the digestive processes of dogs when he stumbled onto what he called "psychic reflexes" (Pavlov, 1906). Like many great discoveries, Pavlov's was partly accidental, although he had the insight to recognize its significance. His subjects were dogs restrained in harnesses in an experimental chamber (see **Figure 6.1**). Their



Surrounded by his research staff, the great Russian physiologist Ivan Pavlov (center, white beard) demonstrates his famous classical conditioning experiment with dogs.

saliva was collected by means of a surgically implanted tube in the salivary gland. Pavlov would present meat powder to a dog and then collect the resulting saliva. As his research progressed, he noticed that dogs accustomed to the procedure would start salivating *before* the meat powder was presented. For instance, they would salivate in response to a clicking sound made by the device that was used to present the meat powder.

Intrigued by this unexpected finding, Pavlov decided to investigate further. To clarify what was happening, he paired the presentation of the meat powder with various stimuli that would stand out in the laboratory situation. For instance, in some experiments he used a simple auditory stimulus—the presentation of a tone. After the tone and the meat powder had been presented together a number of times, the tone was presented alone. What happened? The dogs responded by salivating to the sound of the tone alone.

What was so significant about a dog salivating when a tone was presented? The key is that the tone started out as a *neutral* stimulus. That is, it did not originally produce the response of salivation. However, Pavlov managed to change that by pairing the tone with a stimulus (meat powder) that did produce the salivation response. Through this process, the tone acquired the capacity to trigger the response of salivation. What Pavlov had demonstrated was how learned associations—which were viewed as the basic building blocks of the entire learning process—were formed by events in an organism's environment. Based on this insight, he built a broad theory of learning that attempted to explain aspects of emotion, temperament, neuroses, and language (Windholz, 1997).



IVAN PAVLOV

"Next time there's a revolution, get up earlier!"

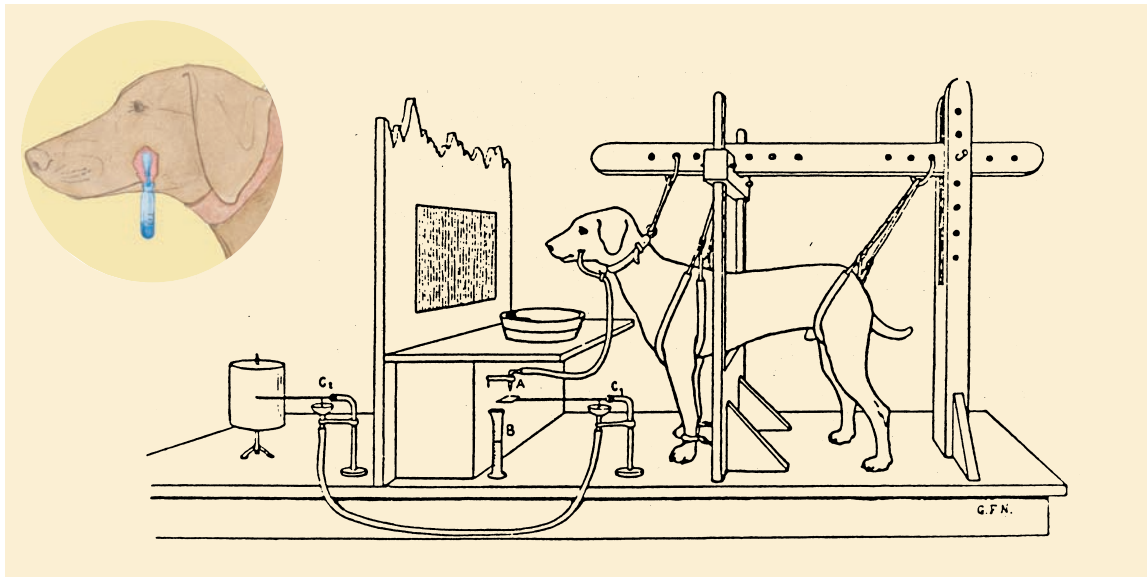


Figure 6.1
Classical conditioning apparatus. An experimental arrangement similar to the one depicted here (taken from Yerkes & Morgulis, 1909) has typically been used in demonstrations of classical conditioning, although Pavlov's original setup (see inset) was quite a bit simpler. The dog is restrained in a harness. A tone is used as the conditioned stimulus (CS), and the presentation of meat powder is used as the unconditioned stimulus (UCS). The tube inserted into the dog's salivary gland allows precise measurement of its salivary response. The pen and rotating drum of paper on the left are used to maintain a continuous record of salivary flow. (Inset) The less elaborate setup that Pavlov originally used to collect saliva on each trial is shown here (Goodwin, 1991).

Terminology and Procedures



Classical conditioning has its own special vocabulary. Although it may seem intimidating to the uninitiated, this terminology is not all that mysterious. The bond Pavlov noted between the meat powder and salivation was a natural, unlearned association. It did not have to be created through conditioning. It is therefore called an *unconditioned* association. Thus, **the unconditioned stimulus (UCS) is a stimulus that evokes an unconditioned response without previous conditioning. The unconditioned response**

(UCR) is an unlearned reaction to an unconditioned stimulus that occurs without previous conditioning.

In contrast, the link between the tone and salivation was established through conditioning. It is therefore called a *conditioned* association. Thus, **the conditioned stimulus (CS) is a previously neutral stimulus that has, through conditioning, acquired the capacity to evoke a conditioned response. The conditioned response (CR) is a learned reaction to a conditioned stimulus that occurs because of previous conditioning.** To avoid possible confusion, it is worth noting that the unconditioned response and conditioned response sometimes consist of the same behavior, although there may be subtle differences between them. In Pavlov's initial demonstration, the UCR and CR were both salivation. When evoked by the UCS (meat powder), salivation was an unconditioned response. When evoked by the CS (the tone), salivation was a conditioned response. The procedures involved in classical conditioning are outlined in **Figure 6.2** on the next page.

Pavlov's "psychic reflex" came to be called the *conditioned reflex*. Classically conditioned responses have traditionally been characterized as reflexes and are said to be **elicited (drawn forth)** because most of them are relatively automatic or involuntary. However, research in recent decades has demonstrated that classical conditioning is involved in a wider range of human and animal behavior than previously appreciated, including some types of nonreflexive responding (Allan, 1998). Finally, **a trial in classical conditioning consists of any presentation of a stimulus or pair of stimuli.** Psychologists are interested in how many trials are required to establish a particular

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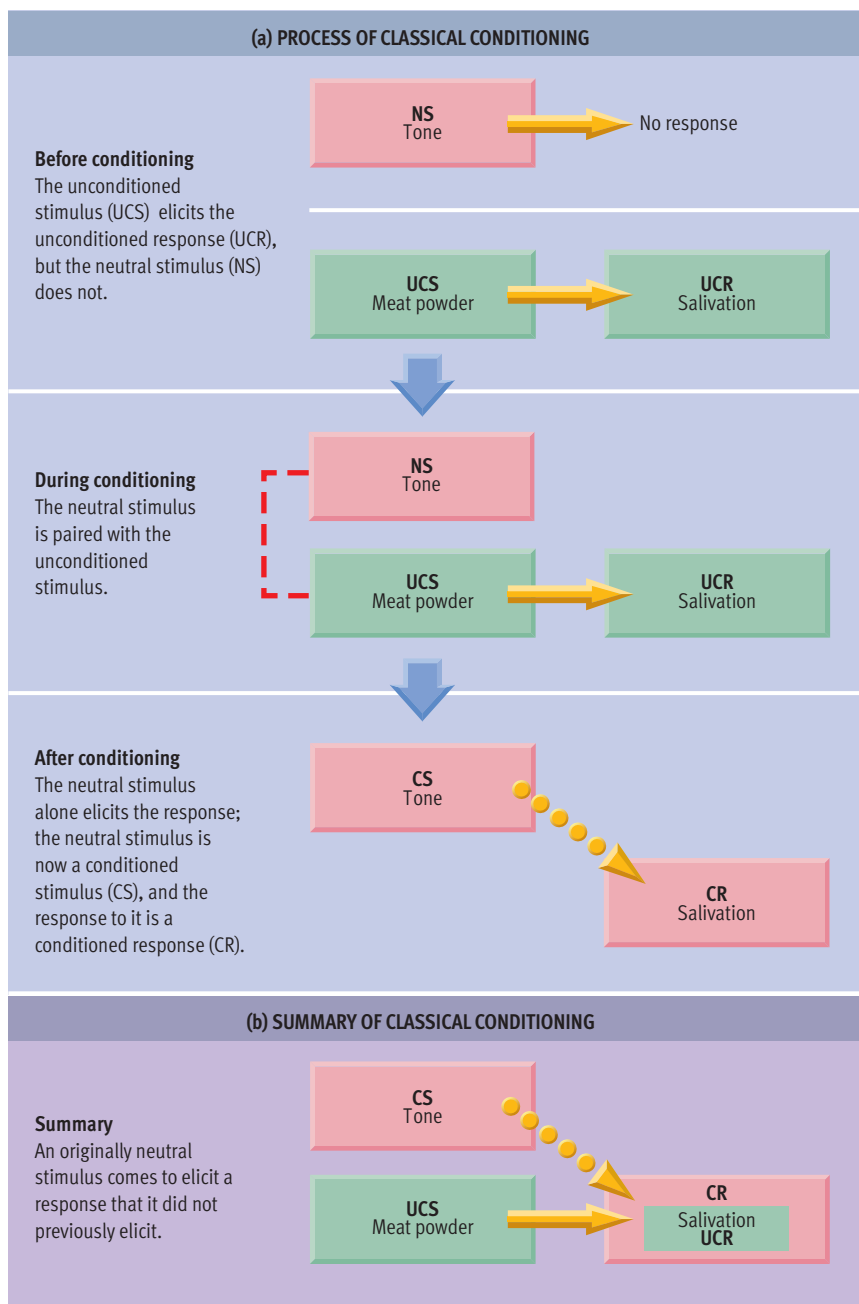


Figure 6.2
The sequence of events in classical conditioning. (a) Moving downward, this series of three panels outlines the sequence of events in classical conditioning, using Pavlov's original demonstration as an example. (b) As we encounter other examples of classical conditioning throughout the book, we will see many diagrams like the one in this panel, which will provide snapshots of specific instances of classical conditioning.

conditioned bond. The number needed to form an association varies considerably. Although classical conditioning generally proceeds gradually, it *can* occur quite rapidly, sometimes in just one pairing of the CS and UCS.

Classical Conditioning in Everyday Life

In laboratory experiments on classical conditioning, researchers have generally worked with extremely simple responses. Besides salivation, frequently studied favorites include eyelid closure, knee jerks, and

the flexing of various limbs. The study of such simple responses has proven both practical and productive. However, these responses do not even begin to convey the rich diversity of everyday behaviors regulated by classical conditioning. Let's look at some examples of classical conditioning taken from everyday life.

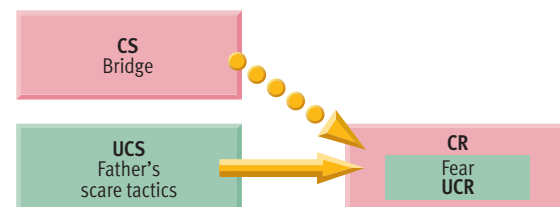
Conditioned Fears

Classical conditioning often plays a key role in shaping emotional responses such as fears. Phobias are a good example of such responses. Case studies of patients suffering from phobias suggest that many irrational fears can be traced back to experiences that involve classical conditioning (Antony & McCabe, 2002; Ayres, 1998). It is easy to imagine how such conditioning can occur outside of the laboratory. For example, a student of mine was troubled by a bridge phobia so severe that she couldn't drive on interstate highways because of all the viaducts that had to be crossed. She was able to pinpoint as the source of her phobia something that had happened during her childhood (see Figure 6.3). Whenever her family drove to visit her grandmother, they had to cross a little-used, rickety, dilapidated bridge out in the countryside. Her father, in a misguided attempt at humor, made a major production out of these crossings. He would stop short of the bridge and carry on about the enormous danger. Obviously, he thought the bridge was safe or he wouldn't have driven across it. However, the naive young girl was terrified by her father's scare tactics. Hence, the bridge became a conditioned stimulus eliciting great fear. Unfortunately, the fear spilled over to *all* bridges. Forty years later she was still carrying the burden of this phobia.

Everyday fear responses that are less severe than phobias may also be products of classical conditioning. For instance, if you cringe when you hear the sound of a dentist's drill, this response is due to classical conditioning. In this case, the pain you have experienced from dental drilling is the UCS. This pain

Figure 6.3

Classical conditioning of a fear response. Many emotional responses that would otherwise be puzzling can be explained by classical conditioning. In the case of one woman's bridge phobia, the fear originally elicited by her father's scare tactics became a conditioned response to the stimulus of bridges.



has been paired with the sound of the drill, which became a CS eliciting your cringe.

Other Conditioned Emotional Responses



Classical conditioning is not limited to producing unpleasant emotions such as fear. Many pleasant emotional responses are also acquired through classical conditioning. Consider the following example, described by a woman who wrote a letter to newspaper columnist Bob Greene about the news that a company was bringing back a discontinued product—Beemans gum. She wrote:

That was the year I met Charlie. I guess first love is always the same. . . . Charlie and I went out a lot. He chewed Beemans gum and he smoked. . . . We would go to all the passion pits—the drive-in movies and the places to park. We did a lot of necking, but we always stopped at a certain point. Charlie wanted to get married when we got out of high school. . . . [but] Charlie and I drifted apart. We both ended up getting married to different people.

And the funny thing is . . . for years the combined smell of cigarette smoke and Beemans gum made my knees weak. Those two smells were Charlie to me. When I would smell the Beemans and the cigarette smoke, I could feel the butterflies dancing all over my stomach.

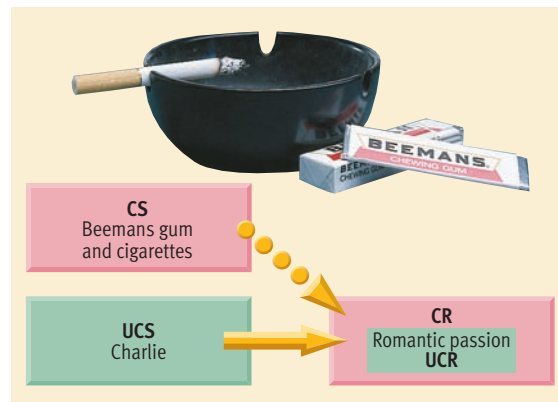
The writer clearly had a unique and long-lasting emotional response to the smell of Beemans gum and cigarettes. The credit for this *pleasant* response goes to classical conditioning (see **Figure 6.4**).

Advertising campaigns often try to take advantage of classical conditioning (see the Personal Application for this chapter). Advertisers frequently pair their products with UCSs that elicit pleasant emotions (Till & Priluck, 2000). The most common strategy is to present a product in association with an attractive person or enjoyable surroundings (see **Figure 6.5**). Advertisers hope that these pairings will make their products conditioned stimuli that evoke good feelings. For example, automobile manufacturers like to show their sports-utility vehicles in stunningly beautiful outdoor vistas that evoke pleasant feelings and nostalgic thoughts of past vacations.

Conditioning and Physiological Responses



Classical conditioning affects not only overt behaviors but physiological processes as well. Consider, for example, your body's immune functioning. When an infectious agent invades your body, your immune system attempts to repel the invasion by producing specialized proteins called *antibodies*. The critical



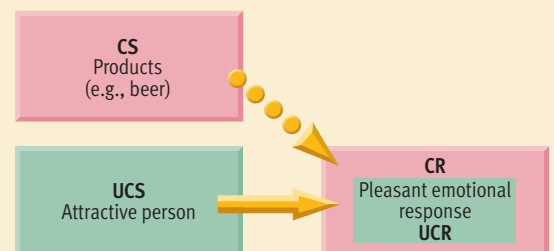
Craig McClain

Figure 6.4
Classical conditioning and romance. Pleasant emotional responses can be acquired through classical conditioning, as illustrated by one woman's unusual conditioned response to the aroma of Beemans gum and cigarette smoke.

importance of the immune response becomes evident when the immune system is disabled, as occurs with the disease AIDS (acquired immune deficiency syndrome).

Recent advances have revealed that the functioning of the immune system can be influenced by psychological factors, including conditioning (Ader, 2001). Robert Ader and Nicholas Cohen (1984, 1993) have shown that classical conditioning procedures can lead to *immunosuppression*—a decrease in the production of antibodies. In a typical study, animals are injected with a drug (the UCS) that *chemically* causes immunosuppression while they are simultaneously given an unusual-tasting liquid to drink (the CS). Days later, after the chemical immunosuppression has ended, some of the animals are reexposed to the CS by giving them the unusual-tasting solution. Mea-

Figure 6.5
Classical conditioning in advertising. Many advertisers attempt to make their products conditioned stimuli that elicit pleasant emotional responses by pairing their products with attractive or popular people or sexual imagery.



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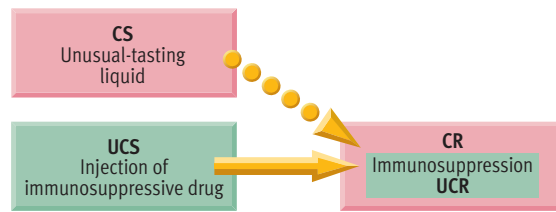


Figure 6.6

Classical conditioning of immunosuppression. When a neutral stimulus is paired with a drug that chemically causes immunosuppression, it can become a CS that elicits immunosuppression on its own. Thus, even the immune response can be influenced by classical conditioning.

Measurements of antibody production indicate that animals exposed to the CS show a reduced immune response (see **Figure 6.6**). Immune resistance is only one example of the subtle physiological processes that can be influenced by classical conditioning. Studies suggest that classical conditioning can also elicit *allergic reactions* (MacQueen et al., 1989) and that classical conditioning contributes to the growth of *drug tolerance* and the experience of *withdrawal symptoms* when drug use is halted (McDonald & Siegel, 2004; Siegel, 2001).

Studies have also demonstrated that classical conditioning can influence *sexual arousal* (Pfaus, Kippin, & Centeno, 2001). For example, research has shown that quail can be conditioned to become sexually aroused by a neutral, nonsexual stimulus—such as a red light—that has been paired with opportunities to copulate (Domjan, 1992, 1994). Conditioned stimuli can even elicit *increased sperm release* in male quail—a conditioned response that would convey an obvious evolutionary advantage (Domjan, Blesbois, & Williams, 1998). This line of research bolsters the idea that stimuli routinely paired with human sexual interactions, such as seductive nightgowns, mood music, lit candles, and the like, probably become conditioned stimuli that elicit arousal (as you might guess, this hypothesis has been difficult to investigate with human subjects). Classical conditioning may also underlie the development of *fetishes* for inanimate objects. If quail can be conditioned to find a red light arousing, it seems likely that humans may be conditioned to be aroused by objects such as shoes, boots, leather, and undergarments that may be paired with events eliciting sexual arousal.

Web Link 6.1



Behaviour Analysis and Learning

A multitude of annotated links, all focusing on learning through conditioning, can be found at the excellent Psychology Centre site at Athabasca University (Alberta, Canada).

Basic Processes in Classical Conditioning



Classical conditioning is often portrayed as a mechanical process that inevitably leads to a certain result. This view reflects the fact that most conditioned re-

sponses are reflexive and difficult to control—Pavlov's dogs would have been hard pressed to withhold their salivation. Similarly, most people with phobias have great difficulty suppressing their fear. However, this vision of classical conditioning as an “irresistible force” is misleading because it fails to consider the many factors involved in classical conditioning (Kehoe & Macrae, 1998). In this section, we'll look at basic processes in classical conditioning to expand on the rich complexity of this form of learning.

Acquisition: Forming New Responses



We have already discussed *acquisition* without attaching a formal name to the process. **Acquisition refers to the initial stage of learning something.** Pavlov theorized that the acquisition of a conditioned response depends on *stimulus contiguity*, or the occurrence of stimuli together in time and space.

Stimulus contiguity is important, but learning theorists now realize that contiguity alone doesn't automatically produce conditioning (Miller & Grace, 2003). People are bombarded daily by countless stimuli that could be perceived as being paired, yet only some of these pairings produce classical conditioning. Consider the woman who developed a conditioned emotional reaction to the smell of Beemans gum and cigarettes. There were no doubt other stimuli that shared contiguity with her boyfriend, Charlie. He smoked, so ashtrays were probably present, but she doesn't get weak in the knees at the sight of an ashtray.

If conditioning does not occur to all the stimuli present in a situation, what determines its occurrence? Evidence suggests that stimuli that are novel, unusual, or especially intense have more potential to become CSs than routine stimuli, probably because they are more likely to stand out among other stimuli (Hearst, 1988).

Extinction: Weakening Conditioned Responses



Fortunately, a newly formed stimulus-response bond does not necessarily last indefinitely. If it did, learning would be inflexible, and organisms would have difficulty adapting to new situations. Instead, the right circumstances produce **extinction, the gradual weakening and disappearance of a conditioned response tendency.**

What leads to extinction in classical conditioning? The consistent presentation of the conditioned stimulus *alone*, without the unconditioned stimulus. For example, when Pavlov consistently presented *only* the tone to a previously conditioned dog, the tone gradually lost its capacity to elicit the response

of salivation. Such a sequence of events is depicted in the tan portion of **Figure 6.7**, which graphs the amount of salivation by a dog over a series of conditioning trials. Note how the salivation response declines during extinction.

For an example of extinction from outside the laboratory, let's assume that you cringe at the sound of a dentist's drill, which has been paired with pain in the past. You take a job as a dental assistant and you start hearing the drill (the CS) day in and day out without experiencing any pain (the UCS). Your cringing response will gradually diminish and extinguish altogether.

How long does it take to extinguish a conditioned response? That depends on many factors, but particularly important is the strength of the conditioned bond when extinction begins. Some conditioned responses extinguish quickly, while others are difficult to weaken. Conditioned *fears* tend to be relatively hard to extinguish. However, a recent animal study found that rapid, massed exposures to a fear-inducing CS facilitated the process of extinction (Cain, Blouin, & Barad, 2003).

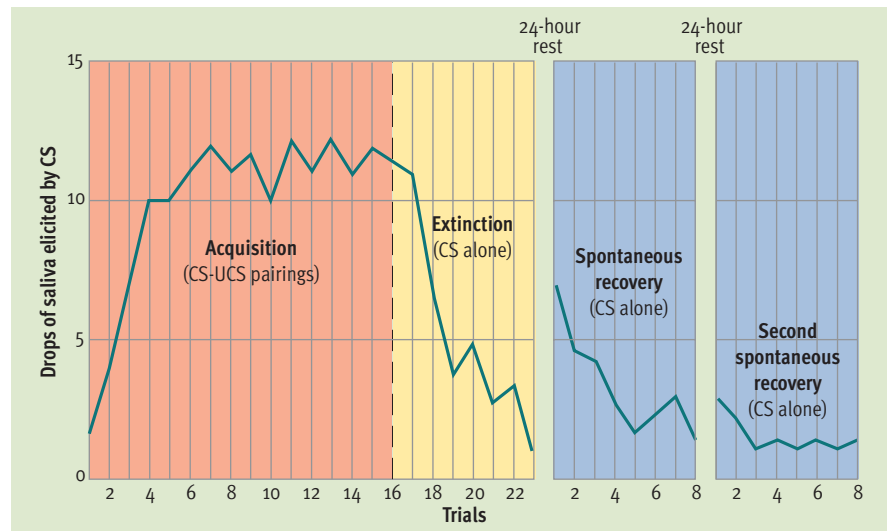


Figure 6.7

Acquisition, extinction, and spontaneous recovery. During acquisition, the strength of the dog's conditioned response (measured by the amount of salivation) increases rapidly, then levels off near its maximum. During extinction, the CR declines erratically until it's extinguished. After a "rest" period in which the dog is not exposed to the CS, a spontaneous recovery occurs, and the CS once again elicits a (weakened) CR. Repeated presentations of the CS alone reextinguish the CR, but after another "rest" interval, a weaker spontaneous recovery occurs.

Spontaneous Recovery: Resurrecting Responses



Some conditioned responses display the ultimate in tenacity by "reappearing from the dead" after having

been extinguished. Learning theorists use the term *spontaneous recovery* to describe such a resurrection from the graveyard of conditioned associations. **Spontaneous recovery is the reappearance of an extin-**

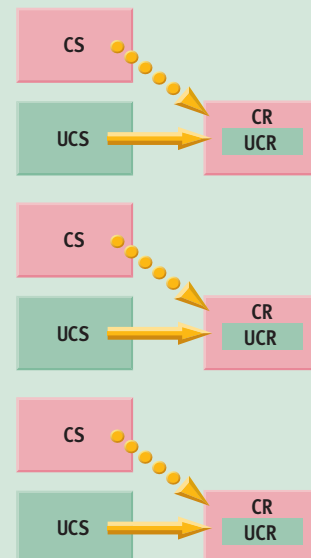
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Identifying Elements in Classical Conditioning

Check your understanding of classical conditioning by trying to identify the unconditioned stimulus (UCS), unconditioned response (UCR), conditioned stimulus (CS), and conditioned response (CR) in each of the examples below. Fill in the diagram next to each example. You'll find the answers in Appendix A in the back of the book.

- Sam is 3 years old. One night his parents build a roaring fire in the family room fireplace. The fire spits out a large ember that hits Sam in the arm, giving him a nasty burn that hurts a great deal for several hours. A week later, when Sam's parents light another fire in the fireplace, Sam becomes upset and fearful, crying and running from the room.
- Melanie is driving to work on a rainy highway when she notices that the brake lights of all the cars just ahead of her have come on. She hits her brakes but watches in horror as her car glides into a four-car pileup. She's badly shaken up in the accident. A month later she's driving in the rain again and notices that she tenses up every time she sees brake lights come on ahead of her.
- At the age of 24, Tyrone has recently developed an allergy to cats. When he's in the same room with a cat for more than 30 minutes, he starts wheezing. After a few such allergic reactions, he starts wheezing as soon as he sees a cat in a room.



guished response after a period of nonexposure to the conditioned stimulus.

Pavlov (1927) observed this phenomenon in some of his pioneering studies. He fully extinguished a dog's CR of salivation to a tone and then returned the dog to its home cage for a "rest interval" (a period of non-exposure to the CS). On a subsequent day, when the dog was brought back to the experimental chamber for retesting, the tone was sounded and the salivation response reappeared. Although it had returned, the rejuvenated response was weak. The salivation was less than when the response was at its peak strength. If Pavlov consistently presented the CS by itself again, the response reextinguished quickly. However, in some of the dogs the response made still another spontaneous recovery (typically even weaker than the first) after they had spent another period in their cages (consult **Figure 6.7** once again).

The theoretical meaning of spontaneous recovery is complex and the subject of some debate, but it suggests that extinction suppresses or interferes with a conditioned response rather than *erasing* a learned association (Bouton & Nelson, 1998). However, the practical meaning of spontaneous recovery is quite simple: Even if you manage to rid yourself of an unwanted conditioned response (such as cringing when you hear a dental drill), there is an excellent chance that it may make a surprise reappearance later. This reality may also help explain why people who manage to give up cigarettes, drugs, or poor eating habits for a while may experience a relapse and return to their unhealthy habits (Bouton, 2000).

different-sounding tone, or you might cringe at the sound of a jeweler's as well as a dentist's drill. These are examples of stimulus generalization. **Stimulus generalization occurs when an organism that has learned a response to a specific stimulus responds in the same way to new stimuli that are similar to the original stimulus.** Generalization is adaptive given that organisms rarely encounter the exact same stimulus more than once (Thomas, 1992). Stimulus generalization is also commonplace. We have already discussed a real-life example: the woman who acquired a bridge phobia during her childhood because her father scared her whenever they went over a particular old bridge. The original CS for her fear was that specific bridge, but her fear was ultimately *generalized* to all bridges.

John B. Watson, the founder of behaviorism (see Chapter 1), conducted an influential early study of generalization. Watson and a colleague, Rosalie Rayner, examined the generalization of conditioned fear in an 11-month-old boy, known in the annals of psychology as "Little Albert." Like many babies, Albert was initially unafraid of a live white rat. Then Watson and Rayner (1920) paired the presentation of the rat with a loud, startling sound (made by striking a steel gong with a hammer). Albert *did* show fear in response to the loud noise. After seven pairings of the rat and the gong, the rat was established as a CS eliciting a fear response (see **Figure 6.8**). Five days later, Watson and Rayner exposed the youngster to other stimuli that resembled the rat in being white and furry. They found that Albert's fear response generalized to a variety of stimuli, including a rabbit, a dog, a fur coat, a Santa Claus mask, and Watson's hair.

What happened to Little Albert? Did he grow up with a phobia of Santa Claus? Unfortunately, we have no idea. He was taken from the hospital where Watson and Rayner conducted their study before they got around to extinguishing the conditioned fears that they had created, and he was never heard of again. Watson and Rayner were roundly criticized in later years for failing to ensure that Albert experienced no lasting ill effects. Their failure to do so was fairly typical for their era but clearly remiss by today's much stricter code of research ethics.

The likelihood and amount of generalization to a new stimulus depend on the similarity between the new stimulus and the original CS (Balsam, 1988). The basic law governing generalization is this: *The more similar new stimuli are to the original CS, the greater the generalization.* This principle can be quantified in graphs called *generalization gradients*, such as those shown in **Figure 6.9**. These generalization gradients map out how a dog conditioned to salivate to a tone of 1200 hertz might respond to other tones. As you



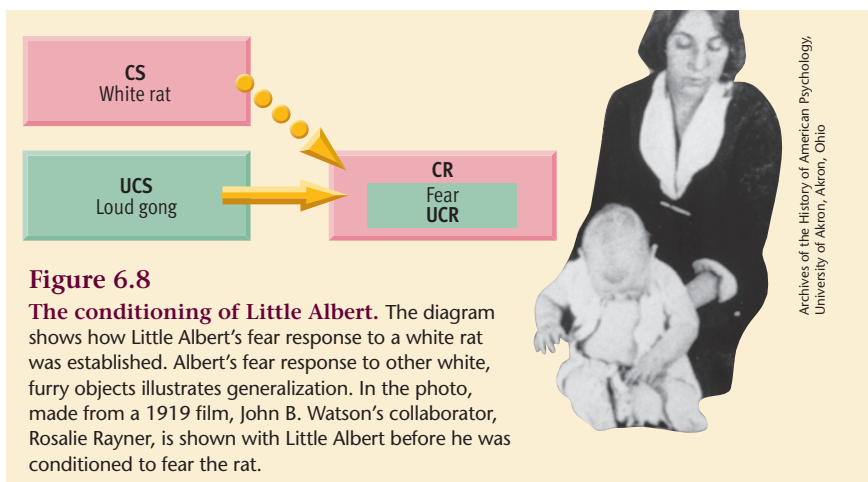
JOHN B. WATSON

"Surely this proof of the conditioned origin of a fear response puts us on natural science grounds in our study of emotional behavior."

Stimulus Generalization and the Case of Little Albert



After conditioning has occurred, organisms often show a tendency to respond not only to the exact CS used but also to other, similar stimuli. For example, Pavlov's dogs might have salivated in response to a



can see, the strength of the generalization response declines as the similarity between the new stimuli and the original CS decreases.

Stimulus Discrimination

Stimulus discrimination is just the opposite of stimulus generalization. **Stimulus discrimination occurs when an organism that has learned a response to a specific stimulus does *not* respond in the same way to new stimuli that are similar to the original stimulus.** Like generalization, discrimination is adaptive in that an animal's survival may hinge on its being able to distinguish friend from foe, or edible from poisonous food (Thomas, 1992). Organisms can gradually learn to discriminate between an original CS and similar stimuli if they have adequate experience with both. For instance, let's say your pet dog runs around, excitedly wagging its tail, whenever it hears your car pull up in the driveway. Initially it will probably respond to *all* cars that pull into the driveway (stimulus generalization). However, if there is anything distinctive about the sound of your car, your dog may gradually respond with excitement to only your car and not to other cars (stimulus discrimination).

The development of stimulus discrimination usually requires that the original CS (your car) continue to be paired with the UCS (your arrival) while similar stimuli (the other cars) not be paired with the UCS. As with generalization, a basic law governs discrimination: *The less similar new stimuli are to the original CS, the greater the likelihood (and ease) of discrimination.* Conversely, if a new stimulus is quite similar to the original CS, discrimination will be relatively difficult to learn. What happens to a generalization gradient when an organism learns a discrimination? The generalization gradient gradually narrows around the original CS, which means that the organism is generalizing to a smaller and smaller range of similar stimuli (consult **Figure 6.9** again).

Higher-Order Conditioning

Imagine that you were to conduct the following experiment. First, you condition a dog to salivate in response to the sound of a tone by pairing the tone with

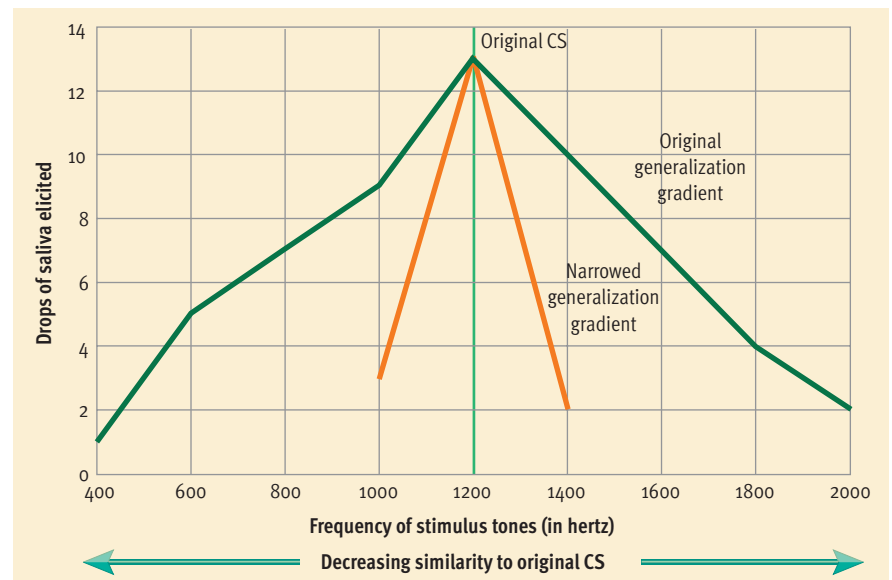
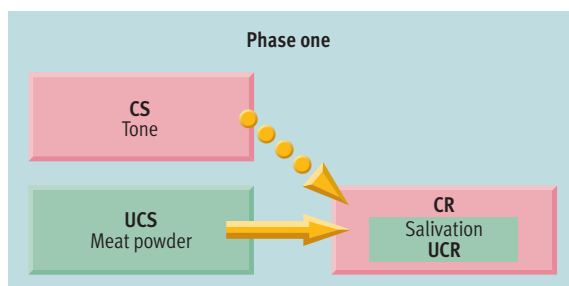


Figure 6.9

Generalization gradients. In a study of stimulus generalization, an organism is typically conditioned to respond to a specific CS, such as a 1200-hertz tone, and then is tested with similar stimuli, such as other tones between 400 and 2000 hertz. Graphs of the organism's responding are called *generalization gradients*. The graphs normally show, as depicted here, that generalization declines as the similarity between the original CS and the new stimuli decreases. When an organism gradually learns to *discriminate* between a CS and similar stimuli, the generalization gradient tends to narrow around the original CS (as shown in orange).

meat powder. Once the tone is firmly established as a CS, you pair the tone with a new stimulus, let's say a red light, for 15 trials. You then present the red light alone, without the tone. Will the dog salivate in response to the red light?

The answer is "yes." Even though the red light has never been paired with the meat powder, the light will acquire the capacity to elicit salivation by virtue of being paired with the tone (see **Figure 6.10**). This is a demonstration of **higher-order conditioning, in which a conditioned stimulus functions as if it were an unconditioned stimulus**. Higher-order conditioning shows that classical conditioning does not depend on the presence of a genuine, natural UCS. An already established CS can do just fine. In higher-order conditioning, new conditioned responses are built on the foundation of already established conditioned responses. Many human conditioned responses are the product of higher-order conditioning

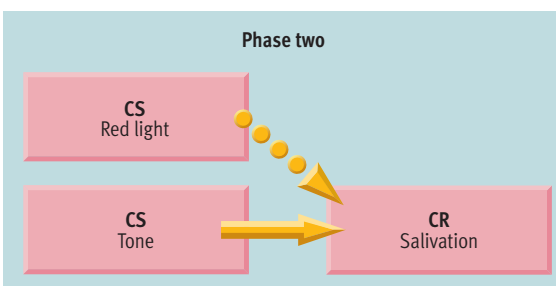


Figure 6.10

Higher-order conditioning. Higher-order conditioning involves a two-phase process. In the first phase, a neutral stimulus (such as a tone) is paired with an unconditioned stimulus (such as meat powder) until it becomes a conditioned stimulus that elicits the response originally evoked by the UCS (such as salivation). In the second phase, another neutral stimulus (such as a red light) is paired with the previously established CS, so that it also acquires the capacity to elicit the response originally evoked by the UCS.

(Rescorla, 1980). For example, while driving, many people react to the sight of a police car with a surge of anxiety, even if they are under the speed limit. This reflexive response is an example of higher-order conditioning (the visual stimulus of a police car has probably been paired with a traffic ticket in the past, which is a previously established CS).

➤ REVIEW OF KEY POINTS

- Learning is defined as a relatively durable change in behavior or knowledge as a result of experience. Classical conditioning explains how a neutral stimulus can acquire the capacity to elicit a response originally elicited by another stimulus. This kind of conditioning was originally described by Ivan Pavlov, who conditioned dogs to salivate in response to the sound of a tone.
- In classical conditioning, the unconditioned stimulus (UCS) is a stimulus that elicits an unconditioned response without previous conditioning. The unconditioned response (UCR) is an unlearned reaction to an unconditioned stimulus that occurs without previous conditioning. The conditioned stimulus (CS) is a previously neutral stimulus that has acquired the capacity to elicit a conditioned response. The conditioned response (CR) is a learned reaction to a conditioned stimulus.
- Classically conditioned responses are said to be elicited. Many kinds of everyday responses are regulated through classical conditioning, including phobias, mild fears, and pleasant emotional responses. Even subtle physiological responses such as immune system functioning respond to classical conditioning.
- Stimulus contiguity plays a key role in the acquisition of new conditioned responses. A conditioned response may be weakened and extinguished entirely when the CS is no longer paired with the UCS. In some cases, spontaneous recovery occurs, and an extinguished response reappears after a period of nonexposure to the CS.
- Conditioning may generalize to additional stimuli that are similar to the original CS. Watson and Rayner conducted an influential early study of generalization with a subject known as Little Albert, whose fear response to a rat generalized to a variety of other white, furry objects.
- The opposite of generalization is discrimination, which involves not responding to stimuli that resemble the original CS. When an organism learns a discrimination, the generalization gradient narrows around the original CS. Higher-order conditioning occurs when a CS functions as if it were a UCS.

➤ Operant Conditioning

PREVIEW QUESTIONS

- How did Thorndike's law of effect anticipate Skinner's findings?
- What are the key elements in operant conditioning?
- How do organisms acquire new responses through operant conditioning?
- What is resistance to extinction, and why does it matter?
- How does stimulus control fit into operant responding?
- How do primary and secondary reinforcers differ?

Even Pavlov recognized that classical conditioning is not the only form of conditioning. Classical conditioning best explains reflexive responding that is largely controlled by stimuli that *precede* the response. However, humans and other animals make a great many responses that don't fit this description. Consider the response that you are engaging in right now: studying. It is definitely not a reflex (life might be easier if it were). The stimuli that govern it (exams and grades) do not precede it. Instead, your studying is mainly influenced by stimulus events that *follow* the response—specifically, its *consequences*.

In the 1930s, this kind of learning was christened *operant conditioning* by B. F. Skinner. The term was derived from his belief that in this type of responding, an organism “operates” on the environment instead of simply reacting to stimuli. Learning occurs because responses come to be influenced by the outcomes that follow them. Thus, **operant conditioning is a form of learning in which responses come to be controlled by their consequences**. Learning theorists originally distinguished between classical and operant conditioning on the grounds that *classical conditioning regulated reflexive, involuntary responses, whereas operant conditioning governed voluntary responses*. This distinction holds up much of the time, but it is not absolute. Research in recent decades has shown that classical conditioning sometimes contributes to the

regulation of voluntary behavior, that operant conditioning can influence involuntary, visceral responses, and that the two types of conditioning jointly and interactively govern some aspects of behavior (Allan, 1998; Turkkan, 1989). Indeed, some theorists have argued that classical and operant conditioning should be viewed as just two different aspects of a single learning process (Donahoe & Vegas, 2004).

Thorndike's Law of Effect

Another name for operant conditioning is **instrumental learning**, a term introduced earlier by Edward L. Thorndike (1913). Thorndike wanted to emphasize that this kind of responding is often *instrumental* in obtaining some desired outcome. His pioneering work provided the foundation for many of the ideas proposed later by Skinner (Chance, 1999). Thorndike began studying animal learning around the turn of the century. Setting out to determine whether animals could think, he conducted some classic studies of problem solving in cats. In these studies, a hungry cat was placed in a small cage or “puzzle box” with food available just outside. The cat could escape to obtain the food by performing a specific response, such as pulling a wire or depressing a lever (see **Figure 6.11**). After each escape, the cat was rewarded with a small amount of food and then returned to

the cage for another trial. Thorndike monitored how long it took the cat to get out of the box over a series of trials. If the cat could think, Thorndike reasoned, a sudden drop would be seen in the time required to escape when the cat recognized the solution to the problem.

Instead of a sudden drop, Thorndike observed a gradual, uneven decline in the time it took cats to escape from his puzzle boxes (see the graph in **Figure 6.11**). The decline in solution time showed that the cats *were learning*. But the gradual nature of this decline suggested that this learning did *not* depend on thinking and understanding. Instead, Thorndike attributed this learning to a principle he called the *law of effect*. According to the *law of effect*, **if a response in the presence of a stimulus leads to satisfying effects, the association between the stimulus and the response is strengthened**. Thorndike viewed instrumental learning as a mechanical process in which successful responses are gradually “stamped in” by their favorable effects. His law of effect became the cornerstone of Skinner’s theory of operant conditioning, although Skinner used different terminology.

Skinner’s Demonstration: It’s All a Matter of Consequences

B. F. Skinner had great admiration for Pavlov’s work (Catania & Laties, 1999) and used it as the foundation for his own theory, even borrowing some of Pavlov’s terminology (Dinsmoor, 2004). And, like Pavlov, Skinner (1953, 1969, 1984) conducted some deceptively simple research that became enormously influential (Lattal, 1992). Ironically, he got off to an inauspicious start. His first book, *The Behavior of Organisms* (1938), sold only 80 copies in its first four

years in print. Nonetheless, he went on to become, in the words of historian Albert Gilgen (1982), “without question the most famous American psychologist in the world” (p. 97).

The fundamental principle of operant conditioning is uncommonly simple and was anticipated by Thorndike’s law of effect. *Skinner demonstrated that organisms tend to repeat those responses that are followed by favorable consequences*. This fundamental principle is embodied in Skinner’s concept of reinforcement. **Reinforcement occurs when an event following a response increases an organism’s tendency to make that response**. In other words, a response is strengthened because it leads to rewarding consequences (see **Figure 6.12** on the next page).

The principle of reinforcement may be simple, but it is immensely powerful. Skinner and his followers have shown that much of everyday behavior is regulated by reinforcement. For example, you put money in a soda vending machine and you get a soft drink back as a result. You go to work because this behavior leads to your receiving paychecks. Perhaps you work extra hard because promotions and raises tend to follow such behavior. You tell jokes, and your friends laugh—so you tell some more. The principle of reinforcement clearly governs complex aspects of human behavior. Paradoxically, though, this principle emerged out of Skinner’s research on the behavior of rats and pigeons in exceptionally simple situations. Let’s look at that research.

Terminology and Procedures

Like Pavlov, Skinner created a prototype experimental procedure that has been repeated (with variations) thousands of times. In this procedure, an animal,

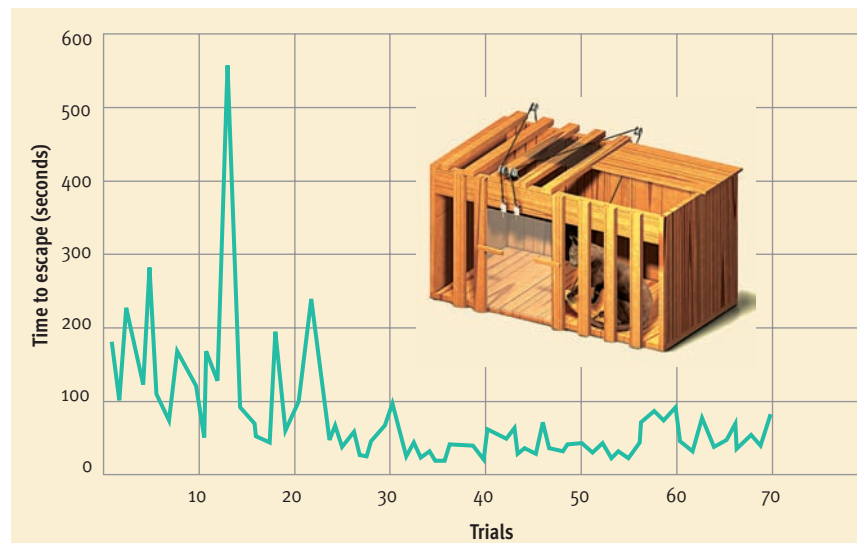


Figure 6.11
The learning curve of one of Thorndike’s cats. The inset shows one of Thorndike’s puzzle boxes. The cat had to perform three separate acts to escape the box, including pressing the pedal on the right. The learning curve shows how the cat’s escape time declined gradually over a number of trials. Thorndike concluded that successful responses are gradually “stamped in” by their favorable consequences; he called this principle the *law of effect*.



EDWARD LEE THORNDIKE
“We may, subject to similar limitations, get any response of which a learner is capable associated with any situation to which he is sensitive.”



B. F. SKINNER
“Operant conditioning shapes behavior as a sculptor shapes a lump of clay.”

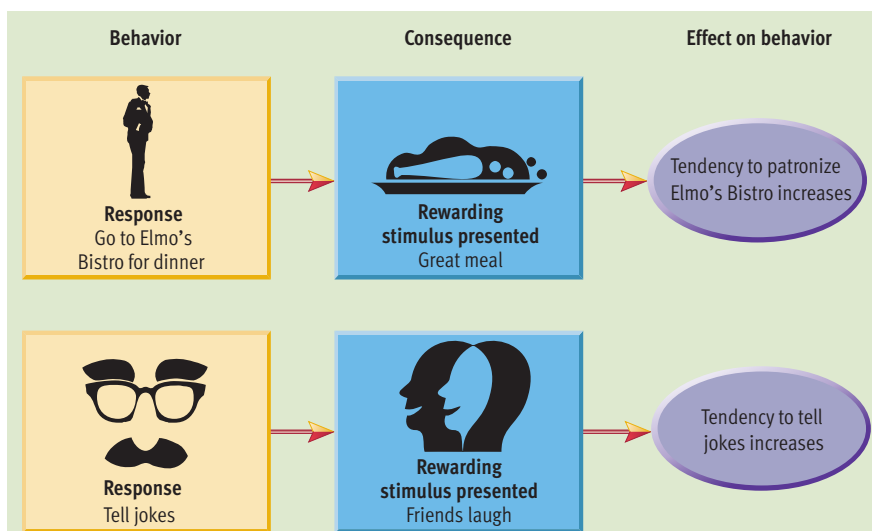


Figure 6.12

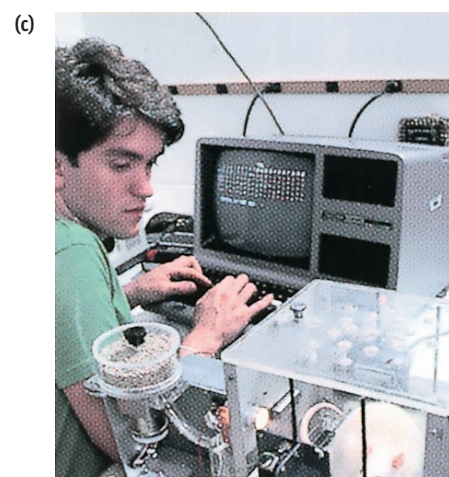
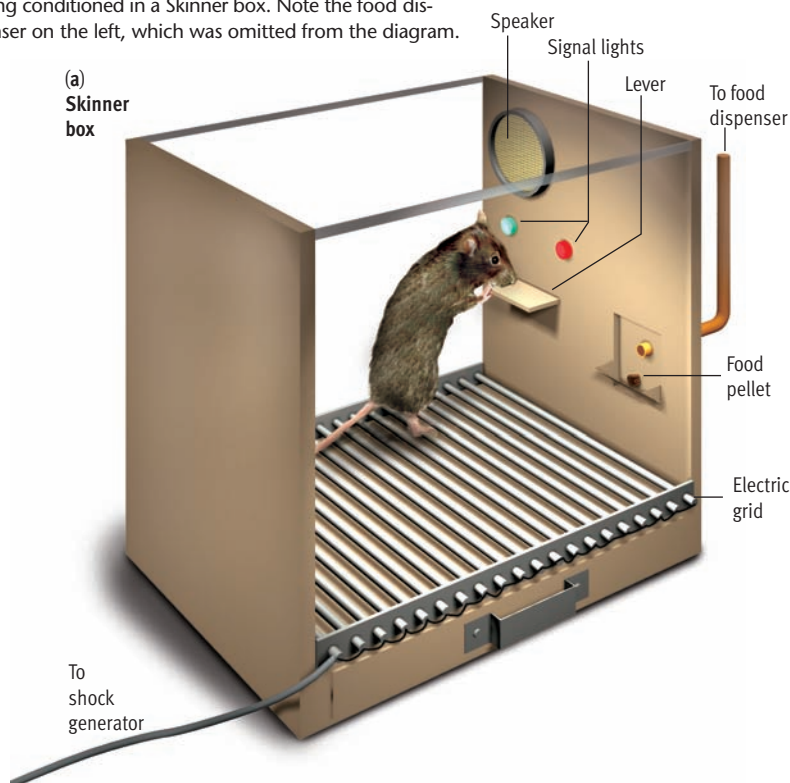
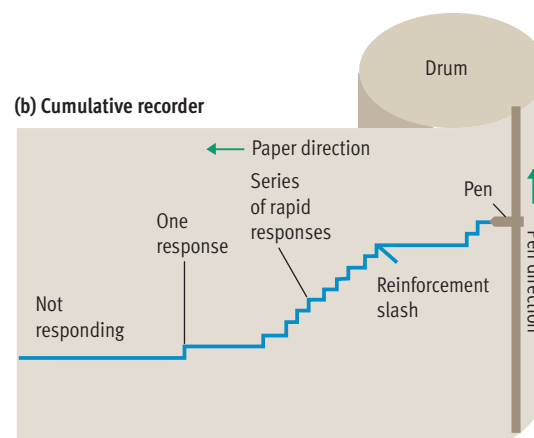
Reinforcement in operant conditioning. According to Skinner, reinforcement occurs when a response is followed by rewarding consequences and the organism's tendency to make the response increases. The two examples diagrammed here illustrate the basic premise of operant conditioning—that voluntary behavior is controlled by its consequences. These examples involve positive reinforcement (for a comparison of positive and negative reinforcement, see Figure 6.18).

typically a rat or a pigeon, is placed in an *operant chamber* that has come to be better known as a “Skinner box” (much to Skinner’s chagrin). An *operant chamber*, or *Skinner box*, is a small enclosure in which an animal can make a specific response that is recorded while the consequences of the response are systematically controlled. In the boxes designed for rats, the main response made available is pressing a small lever mounted on one side wall (see **Figure 6.13**). In the boxes made for pigeons, the designated response is pecking a small disk mounted on a side wall. Because operant responses *tend* to be voluntary, they are said to be *emitted* rather than *elicited*. To *emit* means to send forth.

The Skinner box permits the experimenter to control the reinforcement contingencies that are in effect for the animal. **Reinforcement contingencies are the circumstances or rules that determine whether responses lead to the presentation of reinforcers.** Typically, the experimenter manipulates whether positive consequences occur when the animal makes the designated response. The main positive conse-

Figure 6.13

Skinner box and cumulative recorder. (a) This diagram highlights some of the key features of an operant chamber, or Skinner box. In this apparatus designed for rats, the response under study is lever pressing. Food pellets, which may serve as reinforcers, are delivered into the food cup on the right. The speaker and light permit manipulations of auditory and visual stimuli, and the electric grid gives the experimenter control over aversive consequences (shock) in the box. (b) A cumulative recorder connected to the box keeps a continuous record of responses and reinforcements. A small segment of a cumulative record is shown here. The entire process is automatic as the paper moves with the passage of time; each lever press moves the pen up a step, and each reinforcement is marked with a slash. (c) This photo shows the real thing—a rat being conditioned in a Skinner box. Note the food dispenser on the left, which was omitted from the diagram.



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quence is usually delivery of a small bit of food into a food cup mounted in the chamber. Because the animals are deprived of food for a while prior to the experimental session, their hunger virtually ensures that the food serves as a reinforcer.

The key dependent variable in most research on operant conditioning is the subjects' *response rate* over time. An animal's rate of lever pressing or disk pecking in the Skinner box is monitored continuously by a device known as a cumulative recorder (see **Figure 6.13**). **The cumulative recorder creates a graphic record of responding and reinforcement in a Skinner box as a function of time.** The recorder works by means of a roll of paper that moves at a steady rate underneath a movable pen. When there is no responding, the pen stays still and draws a straight horizontal line, reflecting the passage of time. Whenever the designated response occurs, however, the pen moves upward a notch. The pen's movements produce a graphic summary of the animal's responding over time. The pen also makes slash marks to record the delivery of each reinforcer.

The results of operant-conditioning studies are usually portrayed in graphs. In these graphs, the horizontal axis is used to mark the passage of time, while the vertical axis is used to plot the accumulation of responses, as shown in **Figure 6.14**. In interpreting these graphs, the key consideration is the *slope* of the line that represents the record of responding. *A rapid response rate produces a steep slope, whereas a slow response rate produces a shallow slope.* Because the response record is cumulative, the line never goes down. It can only go up as more responses are made or flatten out if the response rate slows to zero. The magnifications shown in **Figure 6.14** show how slope and response rate are related.

Basic Processes in Operant Conditioning



Although the principle of reinforcement is strikingly simple, many other processes involved in operant conditioning make this form of learning just as complex as classical conditioning. In fact, some of the *same* processes are involved in both types of conditioning. In this section, we'll discuss how the processes of acquisition, extinction, generalization, and discrimination occur in operant conditioning.

Acquisition and Shaping



As in classical conditioning, *acquisition* in operant conditioning refers to the initial stage of learning some new pattern of responding. However, the procedures used to establish an operant response are

different from those used to create the typical conditioned response. Operant responses are usually established through a gradual process called **shaping, which consists of the reinforcement of closer and closer approximations of a desired response.**

Shaping is necessary when an organism does not, on its own, emit the desired response. For example, when a rat is first placed in a Skinner box, it may not press the lever at all. In this case an experimenter begins shaping by releasing food pellets whenever the rat moves toward the lever. As this response becomes more frequent, the experimenter starts requiring a closer approximation of the desired response, possibly releasing food only when the rat actually touches the lever. As reinforcement increases the rat's tendency to touch the lever, the rat will spontaneously press the lever on occasion, finally providing the experimenter with an opportunity to reinforce the designated response. These reinforcements will gradually increase the rate of lever pressing.

The mechanism of shaping is the key to training animals to perform impressive tricks. When you go to a zoo, circus, or marine park and see bears riding bicycles, monkeys playing the piano, and whales leaping through hoops, you are witnessing the results of shaping. To demonstrate the power of shaping tech-

Web Link 6.2



The B. F. Skinner Foundation

This site is a fine place to become better acquainted with the psychologist who pioneered the study of operant conditioning. The site features Skinner's short autobiography, a complete bibliography of his publications, and annotated introductions to all of his books.

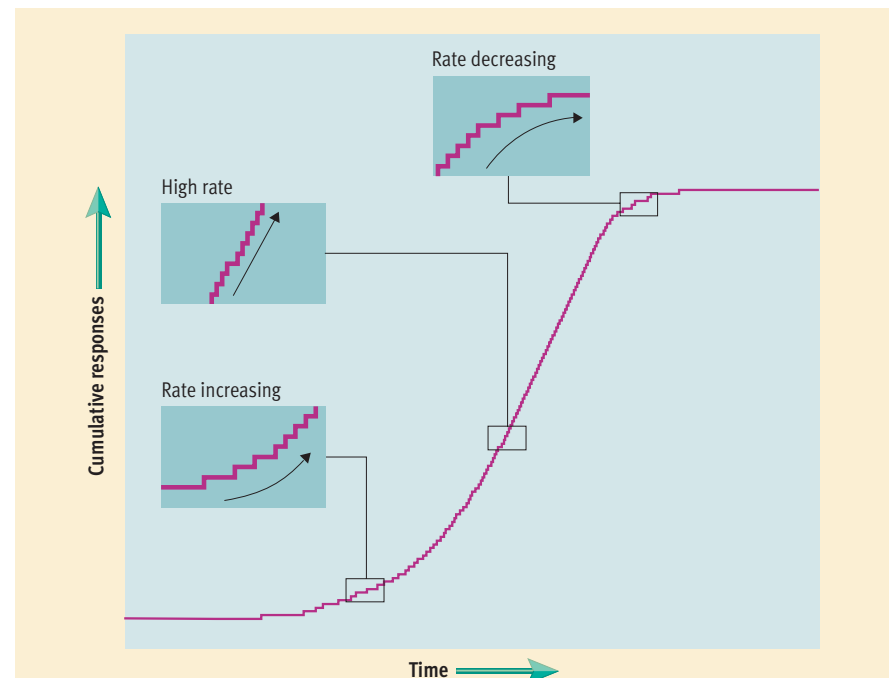


Figure 6.14

A graphic portrayal of operant responding. The results of operant conditioning are often summarized in a graph of cumulative responses over time. The insets magnify small segments of the curve to show how an increasing response rate yields a progressively steeper slope (bottom); a high, steady response rate yields a steep, stable slope (middle); and a decreasing response rate yields a progressively flatter slope (top).



© Courtesy of Animal Behavior Enterprises, Inc.

Image Not Available



© Simon Kwong/Reuters/Corbis

Shaping—an operant technique in which an organism is rewarded for closer and closer approximations of the desired response—is used in teaching both animals and humans. It is the main means of training animals to perform unnatural tricks. Breland and Breland's (1961) famous subject, "Priscilla, the Fastidious Pig," is shown on the left.

Web Link 6.3



Animal Training at Sea World

The practical applications of shaping and other principles of operant conditioning are demonstrated at this interesting site, which explains how training is accomplished at this famous marine park.

niques, Skinner once trained some pigeons so that they appeared to play Ping-Pong. They would run about on opposite ends of a Ping-Pong table and peck the ball back and forth. Keller and Marian Breland, a couple of psychologists influenced by Skinner, went into the business of training animals for advertising and entertainment purposes. One of their better known feats was shaping "Priscilla, the Fastidious Pig" to turn on a radio, eat at a kitchen table, put dirty clothes in a hamper, run a vacuum, and then "go shopping" with a shopping cart. Of course, Priscilla picked the sponsor's product off the shelf in her shopping expedition (Breland & Breland, 1961).

Extinction



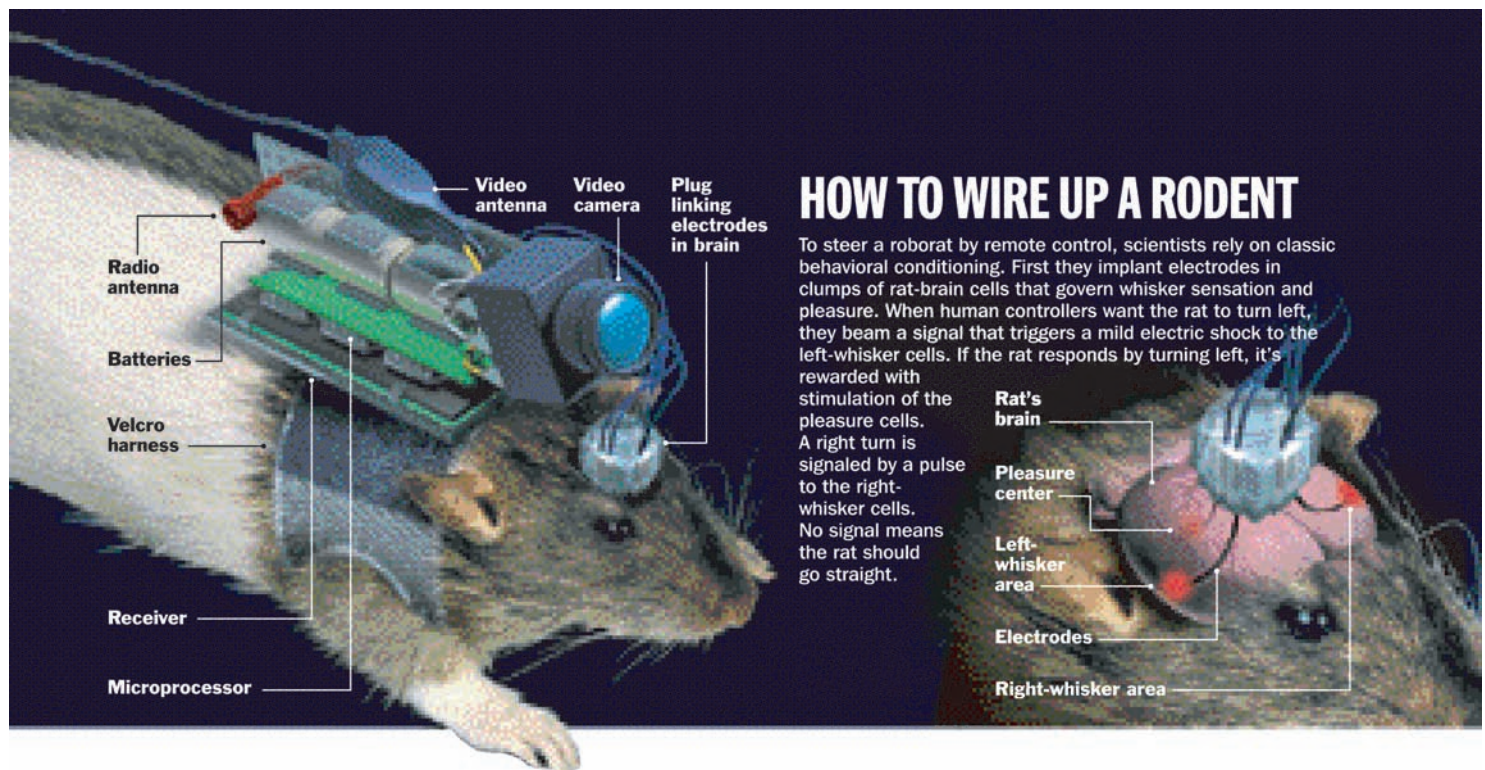
In operant conditioning, *extinction* refers to the gradual weakening and disappearance of a response tendency because the response is no longer followed by a reinforcer. Extinction begins in operant conditioning whenever previously available reinforcement is stopped. In laboratory studies with rats, this usually means that the experimenter stops delivering food when the rat presses the lever. When the extinction process is begun, a brief surge often occurs in the rat's responding, followed by a gradual decline in response rate until it approaches zero.

The same effects are generally seen in the extinction of human behaviors. Let's say that a child routinely cries at bedtime and that this response is rein-

forced by attention from mom and dad. If the parents decided to cut off further reinforcement by ignoring the crying, they would be attempting to extinguish this undesirable response. Typically, the child increases its crying behavior for a few days, and then the crying tapers off fairly quickly (Williams, 1959).

A key issue in operant conditioning is how much *resistance to extinction* an organism will display when reinforcement is halted. **Resistance to extinction occurs when an organism continues to make a response after delivery of the reinforcer has been terminated.** The greater the resistance to extinction, the longer the responding will continue. Thus, if a researcher stops giving reinforcement for lever pressing and the response tapers off slowly, the response shows high resistance to extinction. However, if the response tapers off quickly, it shows relatively little resistance to extinction.

Resistance to extinction may sound like a matter of purely theoretical interest, but it's actually quite practical. People often want to strengthen a response in such a way that it will be relatively resistant to extinction. For instance, most parents want to see their child's studying response survive even if the child hits a rocky stretch when studying doesn't lead to reinforcement (good grades). In a similar fashion, a casino wants to see patrons continue to gamble, even if they encounter a lengthy losing streak. Thus, resistance to extinction can have practical significance in



HOW TO WIRE UP A RODENT

To steer a roborat by remote control, scientists rely on classic behavioral conditioning. First they implant electrodes in clumps of rat-brain cells that govern whisker sensation and pleasure. When human controllers want the rat to turn left, they beam a signal that triggers a mild electric shock to the left-whisker cells. If the rat responds by turning left, it's rewarded with stimulation of the pleasure cells. A right turn is signaled by a pulse to the right-whisker cells. No signal means the rat should go straight.

many situations. Resistance to extinction depends on a variety of factors. Chief among them is the *schedule of reinforcement* used during acquisition, a matter that we will discuss a little later in this chapter.

Stimulus Control: Generalization and Discrimination

Operant responding is ultimately controlled by its consequences, as organisms learn response-outcome (R-O) associations (Colwill, 1993). However, stimuli that *precede* a response can also exert considerable influence over operant behavior. When a response is consistently followed by a reinforcer *in the presence of a particular stimulus*, that stimulus comes to serve as a “signal” indicating that the response is likely to lead to a reinforcer. Once an organism learns the signal, it tends to respond accordingly (Honig & Alsup, 1992). For example, a pigeon’s disk pecking may be reinforced only when a small light behind the disk is lit. When the light is out, pecking does not lead to the reward. Pigeons quickly learn to peck the disk only when it is lit. The light that signals the availability of reinforcement is called a *discriminative stimulus*. **Discriminative stimuli are cues that influence operant behavior by indicating the probable consequences (reinforcement or nonreinforcement) of a response.**

Discriminative stimuli play a key role in the regulation of operant behavior. For example, birds learn

that hunting for worms is likely to be reinforced after a rain. Children learn to ask for sweets when their parents are in a good mood. Drivers learn to slow down when the highway is wet. Human social behavior is also regulated extensively by discriminative stimuli. Consider the behavior of asking someone out for a date. Many people emit this response only cautiously, after receiving many signals (such as eye contact, smiles, encouraging conversational exchanges) that reinforcement (a favorable answer) is fairly likely. The potential power of discriminative stimuli to govern behavior has recently been demonstrated in dramatic fashion by research (Talwar et al., 2002) showing that it is possible to use operant procedures to train what *Time* magazine called “roborats,” radio-controlled rodents that can be precisely directed through complex environments (see **Figure 6.15**).

Reactions to a discriminative stimulus are governed by the processes of *stimulus generalization* and *stimulus discrimination*, just like reactions to a CS in classical conditioning. For instance, envision a cat that comes running into the kitchen whenever it hears the sound of a can opener because that sound has become a discriminative stimulus signaling a good chance of its getting fed. If the cat also responded to the sound of a new kitchen appliance (say a blender), this response would represent *generalization*—responding to a new stimulus as if it were the original. *Discrimination* would occur if the cat learned to respond only to the can opener and not to the blender.

Figure 6.15
Remote-controlled rodents: An example of operant conditioning in action. In a study that almost reads like science fiction, Sanjiv Talwar and colleagues (2002) used operant conditioning procedures to train radio-controlled “roborats” that could have a variety of valuable applications, such as searching for survivors in a collapsed building. As this *Time* magazine graphic explains, radio signals can be used to direct the rat to go forward or turn right or left, while a video feed is sent back to a control center. The *reinforcer* in this setup is brief electrical stimulation of a pleasure center in the rat’s brain (see Chapter 3), which can be delivered by remote control. The brief shocks sent to the right or left whiskers are *discriminative stimuli* that indicate which types of responses will be reinforced. The entire procedure depended on extensive *shaping*.

Source: Graphic from Lemonick, M. D. (2002, May 13). Send in the roborats. *Time*, 159 (19), p. 61. © 2002 Time, Inc. Reprinted by permission.

Table 6.1 Comparison of Basic Processes in Classical and Operant Conditioning

Process and Definition	Description in Classical Conditioning	Description in Operant Conditioning
Acquisition: The initial stage of learning	CS and UCS are paired, gradually resulting in CR.	Responding gradually increases because of reinforcement, possibly through shaping.
Extinction: The gradual weakening and disappearance of a conditioned response tendency	CS is presented alone until it no longer elicits CR.	Responding gradually slows and stops after reinforcement is terminated.
Stimulus generalization: An organism's responding to stimuli other than the original stimulus used in conditioning	CR is elicited by new stimulus that resembles original CS.	Responding increases in the presence of new stimulus that resembles original discriminative stimulus.
Stimulus discrimination: An organism's lack of response to stimuli that are similar to the original stimulus used in conditioning	CR is not elicited by new stimulus that resembles original CS.	Responding does not increase in the presence of new stimulus that resembles original discriminative stimulus.

As you have learned in this section, the processes of acquisition, extinction, generalization, and discrimination in operant conditioning parallel these same processes in classical conditioning. **Table 6.1** compares these processes in the two kinds of conditioning.

Reinforcement: Consequences That Strengthen Responses



Although it is convenient to equate reinforcement with reward and the experience of pleasure, strict behaviorists object to this practice. Why? Because the experience of pleasure is an unobservable event that takes place within an organism. As explained in Chapter 1, most behaviorists believe that scientific assertions must be limited to what can be observed.

In keeping with this orientation, Skinner said that reinforcement occurs whenever an outcome strength-

ens a response, as measured by an increase in the rate of responding. This definition avoids the issue of what the organism is feeling and focuses on observable events. Thus, the central process in reinforcement is the *strengthening of a response tendency*. To know whether an event is reinforcing, researchers must make it contingent on a response and observe whether the rate of this response increases after the supposed reinforcer has been presented.

Thus, reinforcement is defined *after the fact*, in terms of its *effect* on behavior. Something that is clearly reinforcing for an organism at one time may not function as a reinforcer later (Catania, 1992). Food will reinforce lever pressing by a rat only if the rat is hungry. Similarly, something that serves as a reinforcer for one person may not function as a reinforcer for another person. For example, parental approval is a potent reinforcer for most children, but not all.

Operant theorists make a distinction between unlearned, or primary, reinforcers as opposed to conditioned, or secondary, reinforcers. **Primary reinforcers are events that are inherently reinforcing because they satisfy biological needs.** A given species has a limited number of primary reinforcers because they are closely tied to physiological needs. In humans, primary reinforcers include food, water, warmth, sex, and perhaps affection expressed through hugging and close bodily contact.

Secondary, or conditioned, reinforcers are events that acquire reinforcing qualities by being associated with primary reinforcers. The events that function as secondary reinforcers vary among members of a species because they depend on learning. Examples of common secondary reinforcers in humans include money, good grades, attention, flattery, praise, and applause. Most of the material things that people work hard to earn are secondary reinforcers. For example, people learn to find stylish clothes,

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sports cars, fine jewelry, elegant china, and state-of-the-art stereos reinforcing.

➤ REVIEW OF KEY POINTS

- Operant conditioning involves largely voluntary responses that are governed by their consequences. Thorndike paved the way for Skinner's work by investigating instrumental conditioning and describing the law of effect.
- Skinner pioneered the study of operant conditioning, working mainly with rats and pigeons in Skinner boxes. He demonstrated that organisms tend to repeat those responses that are followed by reinforcers. Operant responses are said to be emitted.
- The key dependent variable in operant conditioning is the rate of response over time, which is tracked by a device called a cumulative recorder. When responding over time is shown graphically, steep slopes indicate rapid responding.
- New operant responses can be shaped by gradually reinforcing closer and closer approximations of the desired response. Shaping is the key to training animals to perform impressive tricks. In operant conditioning, extinction occurs when reinforcement for a response is terminated and the rate of that response declines. There are variations in resistance to extinction.
- Operant responses are regulated by discriminative stimuli that are cues for the likelihood of obtaining reinforcers. These stimuli are subject to the same processes of generalization and discrimination that occur in classical conditioning.
- The central process in reinforcement is the strengthening of a response. Primary reinforcers are unlearned; they are closely tied to the satisfaction of physiological needs. In contrast, secondary reinforcers acquire their reinforcing quality through conditioning.

Schedules of Reinforcement

Organisms make innumerable responses that do not lead to favorable consequences. It would be nice if people were reinforced every time they took an exam, watched a movie, hit a golf shot, asked for a date, or made a sales call. However, in the real world most responses are reinforced only some of the time. How does this fact affect the potency of reinforcers? To find out, operant psychologists have devoted an enormous amount of attention to how *schedules of reinforcement* influence operant behavior (Ferster & Skinner, 1957; Skinner, 1938, 1953).

A schedule of reinforcement determines which occurrences of a specific response result in the presentation of a reinforcer. The simplest pattern is continuous reinforcement. **Continuous reinforcement occurs when every instance of a designated response is reinforced.** In the laboratory, experimenters often use continuous reinforcement to shape and establish a new response before moving on to more realistic schedules involving intermittent reinforcement. **Intermittent, or partial, reinforcement occurs when a designated response is reinforced only some of the time** (see Figure 6.16).

Which do you suppose leads to longer-lasting effects—being reinforced every time you emit a response, or being reinforced only some of the time? Studies show that, given an equal number of reinforcements, *intermittent* reinforcement makes

PREVIEW QUESTIONS

- What are the typical effects of various schedules of reinforcement?
- How do positive and negative reinforcement differ?
- What happens in escape learning and avoidance learning?
- What is the difference between negative reinforcement and punishment?
- What are some side effects of physical punishment?
- How can disciplinary efforts using punishment be made more effective?



Figure 6.16
Intermittent reinforcement schedules in everyday life. Complex human behaviors are regulated by schedules of intermittent reinforcement (see pages 232–233). Piecework in factories is reinforced on a fixed-ratio schedule. Playing slot machines is based on variable-ratio reinforcement. Watching the clock at work is rewarded on a fixed-interval basis (the arrival of quitting time is the reinforcer). Surfers waiting for a big wave are rewarded on a variable-interval basis.

a response more resistant to extinction than continuous reinforcement does (Falls, 1998). In other words, organisms continue responding longer after removal of reinforcers when a response has been reinforced only *some* of the time. In fact, schedules of reinforcement that provide only sporadic delivery of reinforcers can yield great resistance to extinction. This finding explains why behaviors that are reinforced only occasionally—such as youngsters' temper tantrums—can be very durable and difficult to eliminate.

Reinforcement schedules come in many varieties, but four particular types of intermittent schedules have attracted the most interest. These schedules are described here along with examples drawn from the laboratory and everyday life (see Figure 6.16 for additional examples).

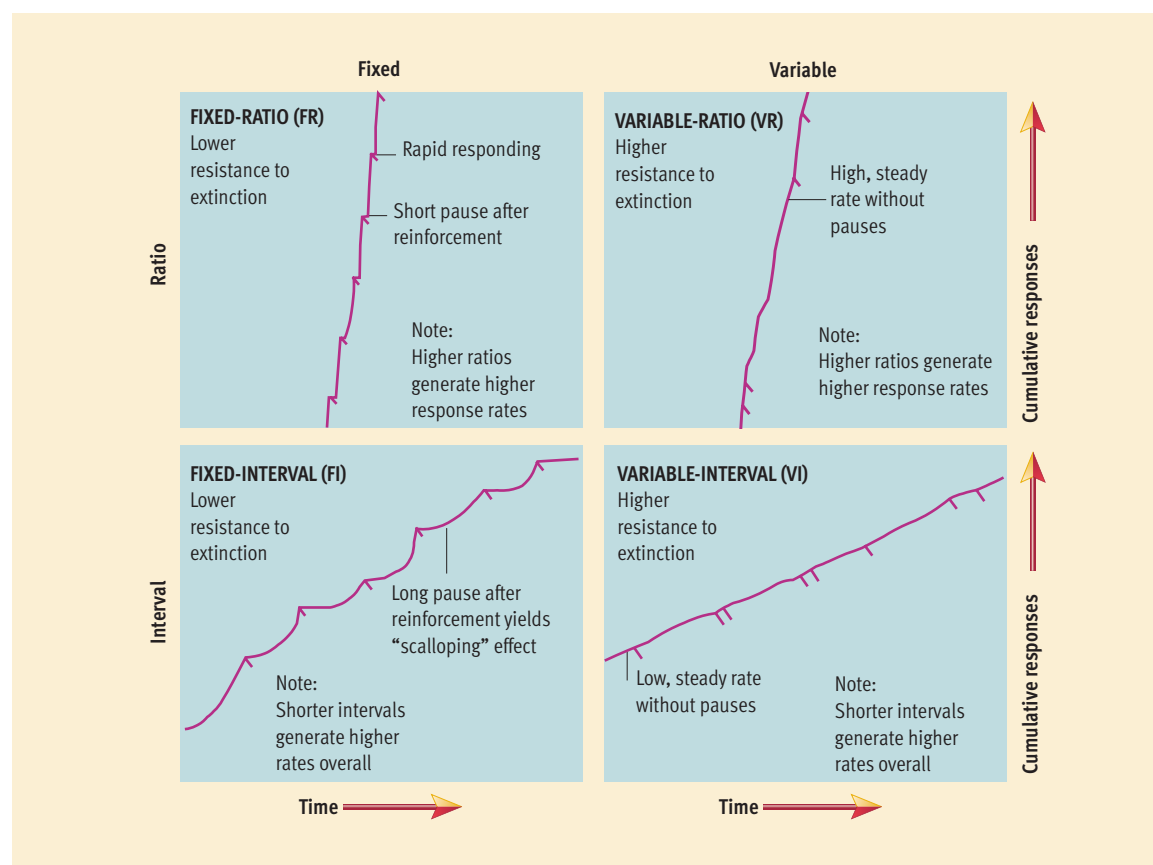
Ratio schedules require the organism to make the designated response a certain number of times to gain each reinforcer. **With a fixed-ratio (FR) schedule, the reinforcer is given after a fixed number of nonreinforced responses.** Examples: (1) A rat is reinforced for every tenth lever press. (2) A salesperson receives a bonus for every fourth set of encyclopedias sold. **With a variable-ratio (VR) schedule, the reinforcer is given after a variable number of nonreinforced responses.** The number of nonreinforced

responses varies around a predetermined average. Examples: (1) A rat is reinforced for every tenth lever press on the average. The exact number of responses required for reinforcement varies from one time to the next. (2) A slot machine in a casino pays off once every six tries on the average. The number of non-winning responses between payoffs varies greatly from one time to the next.

Interval schedules require a time period to pass between the presentation of reinforcers. **With a fixed-interval (FI) schedule, the reinforcer is given for the first response that occurs after a fixed time interval has elapsed.** Examples: (1) A rat is reinforced for the first lever press after a 2-minute interval has elapsed and then must wait 2 minutes before being able to earn the next reinforcement. (2) A man washing his clothes periodically checks to see whether each load is finished. The reward (clean clothes) is available only after a fixed time interval (corresponding to how long the washer takes to complete a cycle) has elapsed, and checking responses during the interval are not reinforced. **With a variable-interval (VI) schedule, the reinforcer is given for the first response after a variable time interval has elapsed.** The interval length varies around a predetermined average. Examples: (1) A rat is reinforced for the first lever press after a 1-minute interval has elapsed, but

Figure 6.17

Schedules of reinforcement and patterns of response. In graphs of operant responding, such as these, a steeper slope indicates a faster rate of response and the slash marks reflect the delivery of reinforcers. Each type of reinforcement schedule tends to generate a characteristic pattern of responding. In general, ratio schedules tend to produce more rapid responding than interval schedules (note the steep slopes of the FR and VR curves). In comparison to fixed schedules, variable schedules tend to yield steadier responding (note the smoother lines for the VR and VI schedules on the right) and greater resistance to extinction.



the following intervals are 3 minutes, 2 minutes, 4 minutes, and so on—with an average length of 2 minutes. (2) A person repeatedly dials a busy phone number (getting through is the reinforcer).

More than 50 years of research has yielded an enormous volume of data on how these schedules of reinforcement are related to patterns of responding (Williams, 1988; Zeiler, 1977). Some of the more prominent findings are summarized in **Figure 6.17**, which depicts typical response patterns generated by each schedule. For example, with fixed-interval schedules, a pause in responding usually occurs after each reinforcer is delivered, and then responding gradually increases to a rapid rate at the end of the interval. This pattern of behavior yields a “scalped” response curve. In general, ratio schedules tend to produce more rapid responding than interval schedules. Why? Because faster responding leads to reinforcement sooner when a ratio schedule is in effect. Variable schedules tend to generate steadier response rates and greater resistance to extinction than their fixed counterparts.

Most of the research on reinforcement schedules was conducted on rats and pigeons in Skinner boxes. However, the available evidence suggests that humans react to schedules of reinforcement in much the same way as animals (De Villiers, 1977; Perone, Galizio, & Baron, 1988). For example, when animals are placed on ratio schedules, shifting to a higher ratio (that is, requiring more responses per reinforcement) tends to generate faster responding. Managers of factories that pay on a piecework basis (a fixed-ratio schedule) have seen the same reaction in humans. Shifting to a higher ratio (more pieces for the same

pay) usually stimulates harder work and greater productivity (although workers often complain). There are many other parallels between animals’ and humans’ reactions to various schedules of reinforcement. For instance, with rats and pigeons, variable-ratio schedules yield steady responding and great resistance to extinction. Similar effects are routinely observed among people who gamble. Most gambling is reinforced according to variable-ratio schedules, which tend to produce rapid, steady responding and great resistance to extinction—exactly what casino operators want.

Positive Reinforcement Versus Negative Reinforcement

According to Skinner, reinforcement can take two forms, which he called *positive reinforcement* and *negative reinforcement* (see **Figure 6.18**). **Positive reinforcement occurs when a response is strengthened because it is followed by the presentation of a rewarding stimulus.** Thus far, for purposes of simplicity, our examples of reinforcement have involved positive reinforcement. Good grades, tasty meals, paychecks, scholarships, promotions, nice clothes, nifty cars, attention, and flattery are all positive reinforcers.

In contrast, **negative reinforcement occurs when a response is strengthened because it is followed by the removal of an aversive (unpleasant) stimulus.** Don’t let the word “negative” confuse you. Negative reinforcement *is* reinforcement. Like all reinforcement it involves a favorable outcome that *strengthens* a response tendency. However, this strengthening

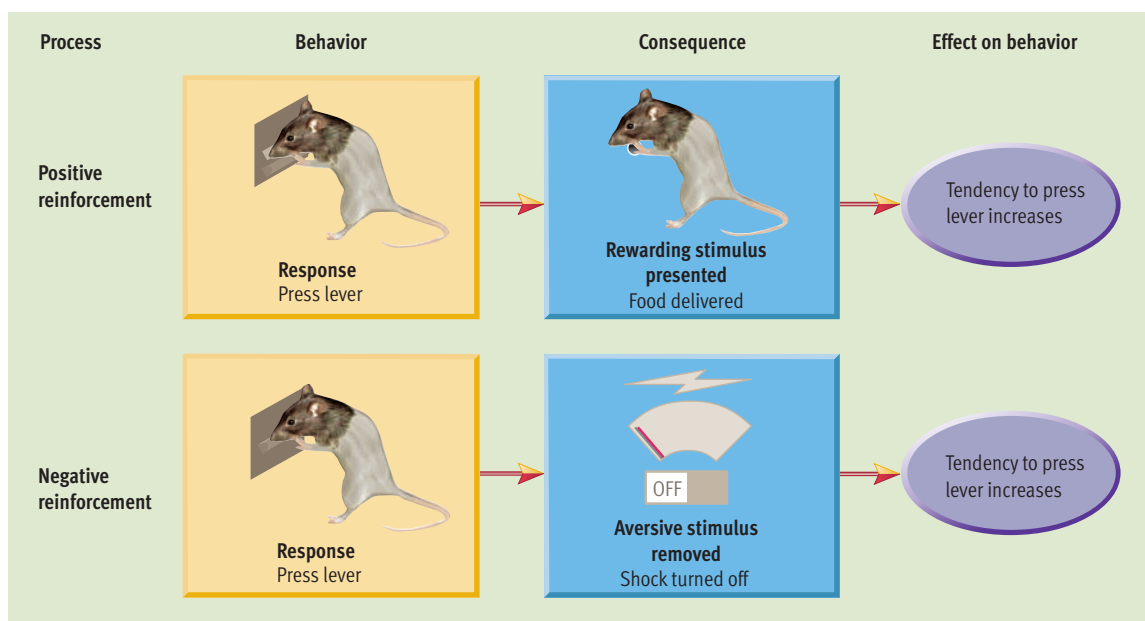


Figure 6.18
Positive reinforcement versus negative reinforcement. In positive reinforcement, a response leads to the presentation of a rewarding stimulus. In negative reinforcement, a response leads to the removal of an aversive stimulus. Both types of reinforcement involve favorable consequences and both have the same effect on behavior: The organism’s tendency to emit the reinforced response is strengthened.



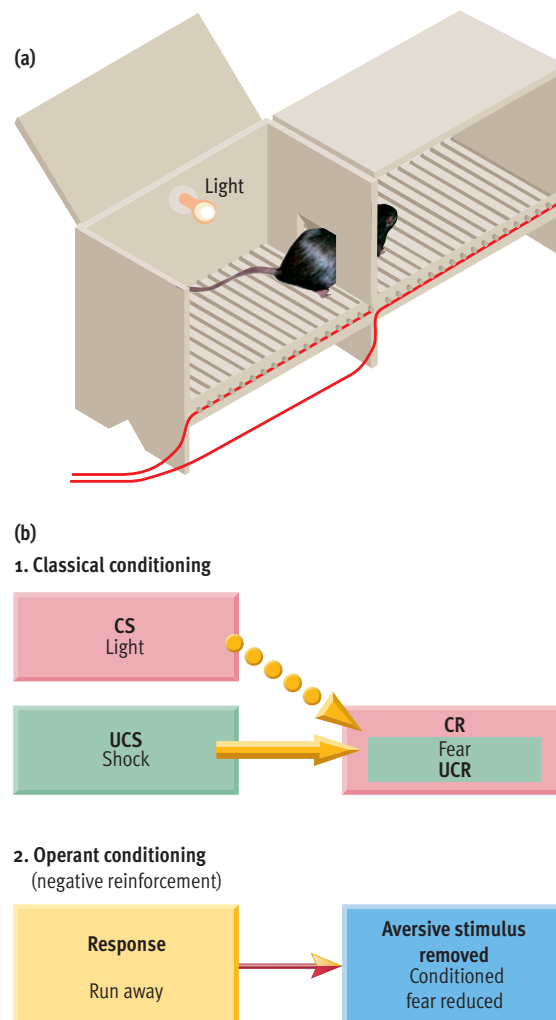
Recognizing Schedules of Reinforcement

Check your understanding of schedules of reinforcement in operant conditioning by indicating the type of schedule that would be in effect in each of the examples below. In the spaces on the left, fill in CR for continuous reinforcement, FR for fixed-ratio, VR for variable-ratio, FI for fixed-interval, and VI for variable-interval. The answers can be found in Appendix A in the back of the book.

- _____ 1. Sarah is paid on a commission basis for selling computer systems. She gets a bonus for every third sale.
- _____ 2. Juan's parents let him earn some pocket money by doing yard work approximately once a week.
- _____ 3. Martha is fly-fishing. Think of each time that she casts her line as the response that may be rewarded.
- _____ 4. Jamal, who is in the fourth grade, gets a gold star from his teacher for every book he reads.
- _____ 5. Skip, a professional baseball player, signs an agreement that his salary increases will be renegotiated every third year.

Figure 6.19

Escape and avoidance learning. (a) Escape and avoidance learning are often studied with a shuttle box like that shown here. Warning signals, shock, and the animal's ability to flee from one compartment to another can be controlled by the experimenter. (b) Avoidance begins because classical conditioning creates a conditioned fear that is elicited by the warning signal (panel 1). Avoidance continues because it is maintained by operant conditioning (panel 2). Specifically, the avoidance response is strengthened through negative reinforcement, since it leads to removal of the conditioned fear.



takes place because a response leads to the *removal of an aversive stimulus* rather than the arrival of a pleasant stimulus (see **Figure 6.18**).

In laboratory studies, negative reinforcement is usually accomplished as follows: While a rat is in a Skinner box, a moderate electric shock is delivered to the animal through the floor of the box. When the rat presses the lever, the shock is turned off for a period of time. Thus, lever pressing leads to removal of an aversive stimulus (shock). Although this sequence of events is different from those for positive reinforcement, it reliably strengthens the rat's lever-pressing response.

Everyday human behavior is regulated extensively by negative reinforcement. Consider a handful of examples: You rush home in the winter to get out of the cold. You clean house to get rid of a mess. You give in to your child's begging to halt the whining. You give in to a roommate or spouse to bring an unpleasant argument to an end.

Negative reinforcement plays a key role in both escape learning and avoidance learning. **In escape learning, an organism acquires a response that decreases or ends some aversive stimulation.** Psychologists often study escape learning in the laboratory with rats that are conditioned in a *shuttle box*. The shuttle box has two compartments connected by a doorway, which can be opened and closed by the experimenter, as depicted in **Figure 6.19(a)**. In a typical study, an animal is placed in one compartment and the shock in the floor of that chamber is turned on, with the doorway open. The animal learns to escape the shock by running to the other compartment. This escape response leads to the removal of an aversive stimulus (shock), so it is strengthened through negative reinforcement. If you were to leave a party where you were getting picked on by peers, you would be engaging in an escape response.

Escape learning often leads to avoidance learning. **In avoidance learning an organism acquires a response that prevents some aversive stimulation from occurring.** In shuttle box studies of avoidance learning, the experimenter simply gives the animal a signal that shock is forthcoming. The typical signal is a light that goes on a few seconds prior to the shock. At first the rat runs only when shocked (escape learning). Gradually, however, the animal learns to run to the safe compartment as soon as the light comes on, showing avoidance learning. Similarly, if you were to quit going to parties because of your concern about being picked on, you would be demonstrating avoidance learning.

Avoidance learning presents an interesting example of how classical conditioning and operant

conditioning can work together to regulate behavior (Levis, 1989; Mowrer, 1947). In avoidance learning, the warning light that goes on before the shock becomes a CS (through classical conditioning) eliciting reflexive, conditioned fear in the animal. However, the response of fleeing to the other side of the box is operant behavior. This response is strengthened through *negative reinforcement* because it reduces the animal's conditioned fear (see **Figure 6.19b**). Thus, in avoidance learning a fear response is acquired through classical conditioning and an avoidance response is maintained by operant conditioning.

The principles of avoidance learning shed some light on why phobias are so resistant to extinction (Levis, 1989). Suppose you have a phobia of elevators. Chances are, you acquired your phobia through classical conditioning. At some point in your past, elevators became paired with a frightening event. Now whenever you need to use an elevator, you experience conditioned fear. If your phobia is severe, you probably take the stairs instead. Taking the stairs is an avoidance response that should lead to consistent negative reinforcement by relieving your conditioned fear. Thus, it's hard to get rid of phobias for two reasons. First, responses that allow you to avoid a phobic stimulus earn negative reinforcement each time they are made—so the avoidance behavior is strengthened and continues. Second, these avoidance responses prevent any opportunity to extinguish the phobic conditioned response because you're never exposed to the conditioned stimulus (in this case, riding in an elevator).

Punishment: Consequences That Weaken Responses



Reinforcement is defined in terms of its consequences. It *increases* an organism's tendency to make a certain response. Are there also consequences that *decrease* an organism's tendency to make a particular response? Yes. In Skinner's model of operant behavior, such consequences are called *punishment*.

Punishment occurs when an event following a response weakens the tendency to make that response. In a Skinner box, the administration of punishment is very simple. When a rat presses the lever or a pigeon pecks the disk, it receives a brief shock. This procedure usually leads to a rapid decline in the animal's response rate (Dinsmoor, 1998). Punishment typically involves presentation of an aversive stimulus (for instance, spanking a child). However, punishment may also involve the removal of a rewarding stimulus (for instance, taking away a child's TV-watching privileges).

The concept of punishment in operant conditioning is confusing to many students on two counts. First, they often confuse it with negative reinforcement, which is entirely different. Negative reinforcement involves the *removal* of an aversive stimulus, thereby *strengthening* a response. Punishment, on the other hand, involves the *presentation* of an aversive stimulus, thereby *weakening* a response. Thus, punishment and negative reinforcement are opposite procedures that yield opposite effects on behavior (see **Figure 6.20**).

Web Link 6.4



Cambridge Center for Behavioral Studies
A team of behavioral analysts and researchers affiliated with this non-profit organization have crafted a rich site devoted to scientific applications of the behavioral approach. Some of the practical topics covered here include behavioral approaches to parenting, education, organizational management, and pet training.

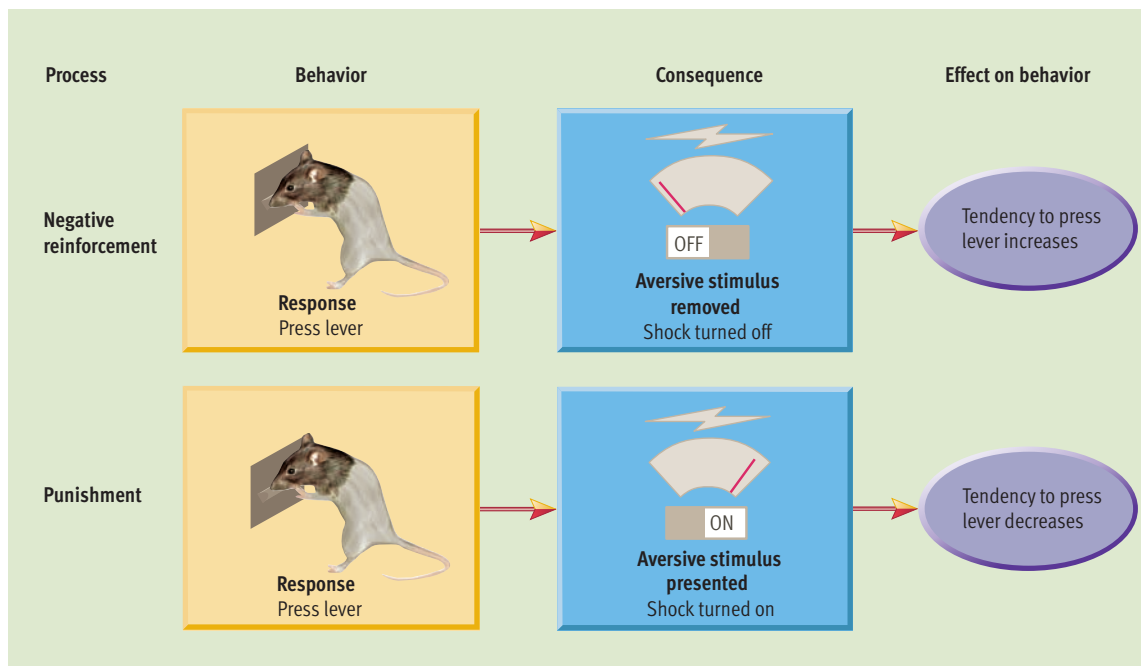


Figure 6.20
Comparison of negative reinforcement and punishment. Although punishment can occur when a response leads to the removal of a rewarding stimulus, it more typically involves the presentation of an aversive stimulus. Students often confuse punishment with negative reinforcement because they associate both with aversive stimuli. However, as this diagram shows, punishment and negative reinforcement represent opposite procedures that have opposite effects on behavior.

The second source of confusion involves the tendency to equate punishment with *disciplinary procedures* used by parents, teachers, and other authority figures. In the operant model, punishment occurs any time undesirable consequences weaken a response tendency. Defined in this way, the concept of punishment goes far beyond things like parents spanking children and teachers handing out detentions. For example, if you wear a new outfit and your classmates make fun of it, your behavior will have been punished and your tendency to emit this response (wear the same clothing) will probably decline. Similarly, if you go to a restaurant and have a horrible meal, your response will have been punished, and your tendency to go to that restaurant will probably decline. Although punishment in operant conditioning encompasses far more than disciplinary acts, it is used frequently for disciplinary purposes. In light of this reality, it is worth looking at the research on punishment as a disciplinary measure.

Side Effects of Physical Punishment

About three-quarters of parents report that they sometimes spank their children (Straus & Stewart, 1999), but quite a bit of controversy exists about the wisdom of using physical punishment. Opponents of corporal punishment argue that it produces many unintended and undesirable side effects (Hyman, 1996; Lytton, 1997; Straus, 2000). For example, they worry that physical punishment may trigger *strong emotional responses*, including anxiety, anger, and resentment, and that it can generate hostility toward the source of the punishment, such as a parent. Some



© Spencer Grant/PhotoEdit

Although physical punishment is frequently administered to suppress aggressive behavior, in the long run it actually is associated with an increase in aggressive behavior.

theorists also argue that children who are subjected to a lot of physical punishment tend to become more aggressive than average. These views were bolstered by a recent, comprehensive review of the empirical research on physical punishment with children. Summarizing the results of 88 studies, Elizabeth Thompson Gershoff (2002) concluded that physical punishment is associated with poor-quality parent-child relations, elevated aggression, delinquency, and behavioral problems in youngsters, and is associated with an increased likelihood of children being abused. Moreover, she concluded that these effects can carry over into adulthood, as studies find increased aggression, criminal behavior, mental health problems, and child abuse among adults who were physically punished as children.

In the wake of Gershoff's (2002) stinging indictment of physical punishment, critics have raised some doubts about her conclusions. They argue that her review failed to distinguish between the effects of frequent, harsh, heavy-handed physical punishment and the effects of occasional, mild spankings, used as a backup when other disciplinary strategies fail (Baumrind, Larzelere, & Cowan, 2002). Critics also point out that the evidence linking spanking to negative effects is correlational, and correlation is no assurance of causation (Kazdin & Benjet, 2003). Perhaps spanking causes children to be more aggressive, but it is also plausible that aggressive children cause

concept check 6.3



Recognizing Outcomes in Operant Conditioning

Check your understanding of the various types of consequences that can occur in operant conditioning by indicating whether the examples below involve positive reinforcement (PR), negative reinforcement (NR), punishment (P), or extinction (E). The answers can be found in Appendix A.

- _____ 1. Antonio gets a speeding ticket.
- _____ 2. Diane's supervisor compliments her on her hard work.
- _____ 3. Leon goes to the health club for a rare workout and pushes himself so hard that his entire body aches and he throws up.
- _____ 4. Audrey lets her dog out so she won't have to listen to its whimpering.
- _____ 5. Richard shoots up heroin to ward off tremors and chills associated with heroin withdrawal.
- _____ 6. Sharma constantly complains about minor aches and pains to obtain sympathy from colleagues at work. Three co-workers who share an office with her decide to ignore her complaints instead of responding with sympathy.

their parents to rely more on physical punishment (see **Figure 6.21**). Based on objections such as these, Baumrind et al. (2002) assert that the empirical evidence “does not justify a blanket injunction against mild to moderate disciplinary spanking” (p. 586).

So, what can we conclude about the corporal punishment controversy? It is important to note that the critics of Gershoff’s conclusions are not exactly *advocates* of physical punishment. As Holden (2002, p. 590) notes, “There is unanimous accord among experts that harsh, abusive punishment is detrimental for children.” The critics think, however, that it is premature to condemn the judicious use of mild spankings, especially when children are too young to understand a verbal reprimand or the withdrawal of privileges. But even the critics would mostly agree that parents should minimize their dependence on physical punishment.

Making Punishment More Effective

Although many experts believe that punishment is overused in disciplinary efforts, it does have a role to play. The following guidelines summarize evidence on how to make punishment more effective while reducing its side effects.

1. *Apply punishment swiftly.* A delay in delivering punishment tends to undermine its impact (Abramowitz & O’Leary, 1990). When a mother says, “Wait until your father gets home . . .” she is making a fundamental mistake in the use of punishment. This problem with delayed punishment also explains the ineffectiveness of punishing a pet hours after it has misbehaved, when the owner finally returns home. For instance, it won’t do any good to hit your dog with a newspaper while shoving its face in the feces it previously left on your carpet. This common punishment doesn’t teach your dog to stop defecating on your carpet—it teaches the dog to keep its face out of its feces.

2. *Use punishment just severe enough to be effective.* The intensity of punishment is a two-edged sword. Severe punishments usually are more effective in weakening unwanted responses. However, they also increase the likelihood of undesirable side effects. Thus, it’s best to use the least severe punishment that seems likely to have the necessary impact (Powell, Symboluk, & MacDonald, 2002).

3. *Make punishment consistent.* If you want to eliminate a response, you should punish the response every time it occurs. When parents are inconsistent about punishing a particular behavior, they create more confusion than learning (Acker & O’Leary, 1996).

4. *Explain the punishment.* When children are punished, the reason for their punishment should be ex-

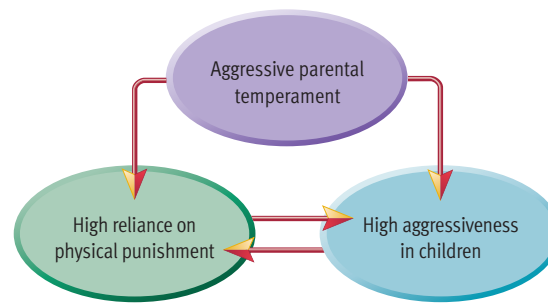


Figure 6.21

The correlation between physical punishment and aggressiveness. As we have discussed before, a correlation does not establish causation. It seems plausible that extensive reliance on physical punishment causes children to be more aggressive, as many experts suspect. However, it is also possible that highly aggressive children cause their parents to depend heavily on physical punishment. Or, perhaps parents with an aggressive, hostile temperament pass on genes for aggressiveness to their children and prefer to rely on heavy use of physical punishment.

plained as fully as possible, given the constraints of their age. Punishment combined with reasoning is more effective than either alone (Larzelere et al., 1996; Parke, 2002). The more that children understand why they were punished, the more effective the punishment tends to be.

5. *Use noncorporal punishments, such as withdrawal of privileges.* Given the concerns about physical punishment, many experts argue that noncorporal punishments are a more prudent means to achieve disciplinary goals. For example, Kazdin and Benjet (2003, p. 103) assert that “mild noncorporal punishments such as a brief time out from reinforcement or short-term loss of privileges in the context of praise and rewards can accomplish the goals for which spanking is usually employed.” Although more research is needed, physical punishment often may not be as effective as most people assume (Holden, 2002). Even a vigorous spanking isn’t felt by a child an hour later. In contrast, withdrawing valued privileges can give children hours to contemplate the behavior that got them in trouble.

➤ REVIEW OF KEY POINTS

- Schedules of reinforcement influence patterns of operant responding. Continuous reinforcement occurs when every designated response is reinforced. Intermittent schedules of reinforcement include fixed-ratio, variable-ratio, fixed-interval, and variable-interval schedules.
- Intermittent schedules produce greater resistance to extinction than similar continuous schedules. Ratio schedules tend to yield higher rates of response than interval schedules. Shorter intervals and higher ratios are associated with faster responding.
- Responses can be strengthened either through the presentation of positive reinforcers or through the removal of negative reinforcers. Negative reinforcement regulates escape and avoidance learning. The process of avoidance learning may shed light on why phobias are so difficult to eliminate.
- Punishment involves unfavorable consequences that lead to a decline in response strength. Problems associated with the application of physical punishment as a disciplinary procedure include emotional side effects, increased aggressive behavior, and behavioral problems. To be effective, punishment should be swift, consistent, explained, non-physical, and just severe enough to have an impact.

> Changing Directions in the Study of Conditioning

PREVIEW QUESTIONS

- What is instinctive drift?
- Why are conditioned taste aversions so easy to acquire?
- To what degree are the laws of learning universal across species?
- What is latent learning, and what was its theoretical significance?
- How does the predictive value of a CS affect conditioning?
- Are responses that are followed by favorable consequences always strengthened?

As you learned in Chapter 1, science is constantly evolving and changing in response to new research and new thinking. Such change has certainly occurred in the study of conditioning. In this section, we will examine two major changes in thinking about conditioning. First, we'll consider the recent recognition that an organism's biological heritage can limit or channel conditioning. Second, we'll discuss the increased appreciation of the role of cognitive processes in conditioning.

Recognizing Biological Constraints on Conditioning

Learning theorists have traditionally assumed that the fundamental laws of conditioning have great generality—that they apply to a wide range of species. Although no one ever suggested that hamsters could learn physics, until the 1960s most psychologists assumed that associations could be conditioned between any stimulus an organism could register and any response it could make. However, findings in recent decades have demonstrated that there are limits to the generality of conditioning principles—limits imposed by an organism's biological heritage.

Instinctive Drift: The Case of the Miserly Raccoons

One biological constraint on learning is instinctive drift. **Instinctive drift occurs when an animal's innate response tendencies interfere with conditioning processes.** Instinctive drift was first described by the Brelands, the operant psychologists who went into the business of training animals for commercial purposes (Breland & Breland, 1966). They have described many amusing examples of their “failures” to control behavior through conditioning. For instance, they once were training some raccoons to deposit coins in a piggy bank. They were successful in shaping the raccoons to pick up a coin and put it into a small box, using food as the reinforcer. However, when they gave the raccoons a couple of coins, an unexpected problem arose: The raccoons wouldn't give the coins up! In spite of the reinforcers available for depositing the coins, they would sit and rub the coins together like so many little misers.

What had happened to disrupt the conditioning program? Apparently, associating the coins with food

had brought out the raccoons' innate food-washing behavior. Raccoons often rub things together to clean them. The Brelands report that they have run into this sort of instinct-related interference on many occasions with a wide variety of species.

Conditioned Taste Aversion: The “Sauce Béarnaise Syndrome”

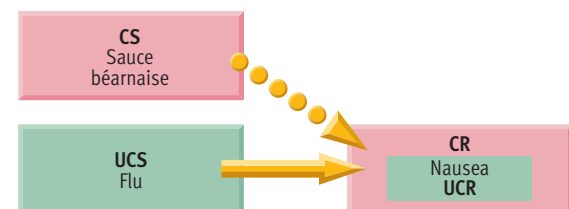
A number of years ago, a prominent psychologist, Martin Seligman, dined out with his wife and enjoyed a steak with sauce béarnaise. About 6 hours afterward, he developed a wicked case of stomach flu and endured severe nausea. Subsequently, when he ordered sauce béarnaise, he was chagrined to discover that its aroma alone nearly made him throw up.

Seligman's experience was not unique. Many people develop aversions to food that has been followed by nausea from illness, alcohol intoxication, or food poisoning. However, Seligman was puzzled by what he called his “sauce béarnaise syndrome” (Seligman & Hager, 1972). On the one hand, it appeared to be the straightforward result of classical conditioning. A neutral stimulus (the sauce) had been paired with an unconditioned stimulus (the flu), which caused an unconditioned response (the nausea). Hence, the sauce béarnaise became a conditioned stimulus eliciting nausea (see Figure 6.22).

On the other hand, Seligman recognized that his aversion to béarnaise sauce seemed to violate certain basic principles of conditioning. First, the lengthy delay of 6 hours between the CS (the sauce) and the UCS (the flu) should have prevented conditioning from occurring. In laboratory studies, a delay of more than 30 seconds between the CS and UCS makes it difficult to establish a conditioned response, yet this

Figure 6.22

Conditioned taste aversion. Martin Seligman's aversion to sauce béarnaise was clearly the product of classical conditioning. However, as the text explains, his acquisition of this response appeared to violate basic principles of classical conditioning. This paradox was resolved by John Garcia's work on conditioned taste aversions (see the text).



Web Link 6.5



Resources About Animal Cognition, Learning, and Behavior

This site provides extensive links to other sites focused on issues related to animal learning. In particular, there are links to most of the leading journals that publish research in this area, including the *Journal of the Experimental Analysis of Behavior*.

conditioning occurred in just one pairing. Second, why was it that *only* the béarnaise sauce became a CS eliciting nausea? Why not other stimuli that were present in the restaurant? Shouldn't plates, knives, tablecloths, or his wife, for example, also trigger Seligman's nausea?

The riddle of Seligman's sauce béarnaise syndrome was solved by John Garcia (1989) and his colleagues. They conducted a series of studies on *conditioned taste aversion* (Garcia, Clarke, & Hankins, 1973; Garcia & Koelling, 1966; Garcia & Rusiniak, 1980). In these studies, they manipulated the kinds of stimuli preceding the onset of nausea and other noxious experiences in rats, using radiation to artificially induce the nausea (see **Figure 6.23**). They found that when taste cues were followed by nausea, rats quickly acquired conditioned taste aversions. However, when taste cues were followed by other types of noxious stimuli (such as shock), rats did *not* develop conditioned taste aversions. Furthermore, visual and auditory stimuli followed by nausea also failed to produce conditioned aversions. In short, Garcia and his co-workers found that it was almost impossible to create certain associations, whereas taste-nausea associations (and odor-nausea associations) were almost impossible to prevent.

What is the theoretical significance of this unique readiness to make connections between taste and nausea? Garcia argues that it is a by-product of the evolutionary history of mammals. Animals that consume

poisonous foods and survive must learn not to repeat their mistakes. Natural selection will favor organisms that quickly learn what *not* to eat. Thus, evolution may have biologically programmed some organisms to learn certain types of associations more easily than others.

Arbitrary Versus Ecological Conditioned Stimuli

Michael Domjan (2005) argues that the rapid conditioning seen in taste-aversion learning is not all that unique—it is just one example of what happens when *ecologically relevant conditioned stimuli* are studied, as opposed to *arbitrary, neutral stimuli*. Domjan points out that laboratory studies of classical conditioning have traditionally paired a UCS with a neutral stimulus that is unrelated to the UCS (such as a bell, tone, or light). This strategy ensured that the association created through conditioning was a newly acquired association rather than the product of previous learning. This approach yielded decades of useful insights about the laws governing classical conditioning, but Domjan argues that a gap exists between this paradigm and the way learning takes place in the real world.

According to Domjan (2005), in natural settings conditioned stimuli generally are not arbitrary cues that are unrelated to the UCS. In the real world, conditioned stimuli tend to have natural relations to the unconditioned stimuli that they predict. For example, a rattlesnake bite is typically preceded by the snake's distinctive rattling sound; copulation among animals is typically preceded by specific mating sig-



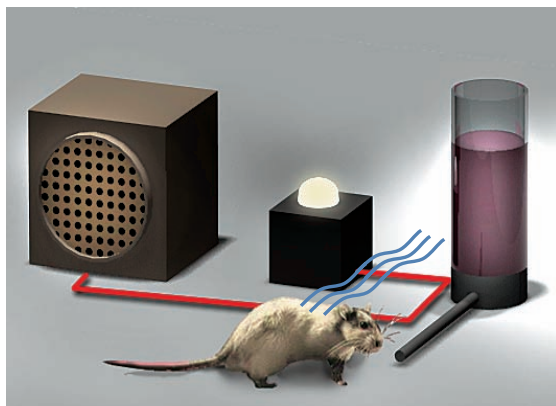
JOHN GARCIA

"Taste aversions do not fit comfortably within the present framework of classical or instrumental conditioning: These aversions selectively seek flavors to the exclusion of other stimuli. Interstimulus intervals are a thousand-fold too long."

Taking advantage of the ease with which conditioned taste aversions can be established, sheep ranchers have reduced coyotes' attacks on their livestock by spreading tainted sheep carcasses around their ranches. The coyotes develop a conditioned response of nausea brought on by the sight of sheep.

Figure 6.23

Garcia and Koelling's research on conditioned taste aversion. In a landmark series of studies, Garcia and Koelling (1966) demonstrated that some stimulus-response associations are much easier to condition than others. Their apparatus is depicted here. Rats drink saccharin-flavored water out of the tube on the right. When they make contact with the tube, they may trigger a bright light and buzzer, a brief electric shock, or radiation exposure that will make them nauseated. This setup allowed Garcia and Koelling to pair various types of stimuli, as discussed in your text.



Gustavson & Ellis study, 1976. © Stuart Ellins

nals; the consumption of toxic food is normally preceded by a specific taste. Hence, Domjan concludes that the heavy focus on arbitrary cues has probably given investigators a somewhat distorted picture of the principles of conditioning. If taste aversion learning appears to “violate” the normal laws of conditioning, it’s because these laws have been compiled in unrealistic situations that are not representative of how conditioning unfolds in natural settings. Thus, Domjan maintains that researchers should shift their focus to ecologically relevant conditioned stimuli, which may yield somewhat different patterns of learning (such as more rapid acquisition, greater resistance to extinction, and so forth).

Domjan (2005) stresses that conditioning is an adaptive process that routinely occurs under natural circumstances in service of reproductive fitness. Over the course of evolution, organisms have developed distinct response systems to deal with crucial tasks, such as finding food and avoiding predators. When a learning task in the laboratory happens to mesh with an animal’s evolutionary history, learning is likely to proceed more quickly and easily than when arbitrary stimuli are used (Domjan, Cusato, & Krause, 2004). Thus, biological constraints on learning are not really “constraints” on the general laws of learning. These species-specific predispositions are the norm—an insight that eluded researchers for decades because they mostly worked with neutral conditioned stimuli.

Evolutionary Perspectives on Learning

So, what is the current thinking on the idea that the laws of learning are *universal* across various species? The predominant view among learning theorists seems to be that the basic mechanisms of learning are *similar* across species but that these mechanisms have sometimes been modified in the course of evolution as species have adapted to the specialized demands of their environments (Shettleworth, 1998). According to this view, learning is a very general process because the biological bases of learning and the basic problems confronted by various organisms are much the same across species. For example, developing the ability to recognize stimuli that signal important events is probably adaptive for virtually any organism. However, given that different organisms confront different adaptive problems to survive and reproduce, it makes sense that learning has evolved along somewhat different paths in different species (Hollis, 1997; Sherry, 1992).

Some evolutionary psychologists take this line of reasoning one step further. The more “radical” view espoused by some theorists is that there is no such

thing as *the* learning process. Rather, there are many learning processes, sculpted by evolution, as specialized mechanisms designed to solve particular types of adaptive problems for particular species (Gallistel, 2000). Thus, some evolutionary psychologists completely reject the idea that there are universal laws of learning.

Recognizing Cognitive Processes in Conditioning

Pavlov, Skinner, and their followers traditionally viewed conditioning as a mechanical process in which stimulus-response associations are “stamped in” by experience. Learning theorists asserted that if creatures such as flatworms can be conditioned, conditioning can’t depend on higher mental processes. This viewpoint did not go entirely unchallenged, as we will discuss momentarily, but mainstream theories of conditioning did not allocate any role to cognitive processes. In recent decades, however, research findings have led theorists to shift toward more cognitive explanations of conditioning. Let’s review how this transition gradually occurred.

Latent Learning and Cognitive Maps

The first major “renegade” to chip away at the conventional view of learning was Edward C. Tolman (1932, 1938), an American psychologist who was something of a gadfly for the behaviorist movement in the 1930s and 1940s. Tolman and his colleagues conducted a series of studies that posed some difficult questions for the prevailing views of conditioning. In one landmark study (Tolman & Honzik, 1930), three groups of food-deprived rats learned to run a complicated maze over a series of once-a-day trials (see **Figure 6.24a**). The rats in Group A received a food reward when they got to the end of the maze each day. Because of this reinforcement, their performance in running the maze (measured by how many “wrong turns” they made) gradually improved over the course of 17 days (see **Figure 6.24b**). The rats in Group B did not receive any food reward. Lacking reinforcement for getting to the goal box swiftly, this group made many “errors” and showed only modest improvement in performance. Group C was the critical group; they did not get any reward for their first 10 trials in the maze, but they were rewarded from the 11th trial onward. The rats in this group showed little improvement in performance over the first 10 trials (just like Group B), but after finding food in the goal box on the 11th trial, they showed sharp improvement on subsequent trials. In fact, their performance



EDWARD CHACE TOLMAN

“Learning consists not in stimulus-response connections but in the building up in the nervous system of sets which function like cognitive maps.”

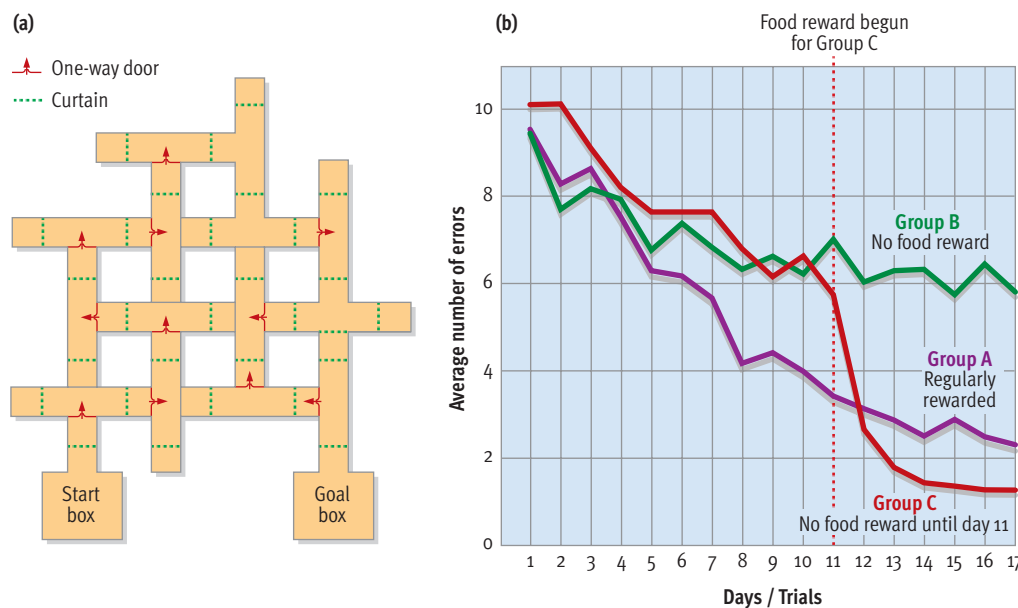


Figure 6.24
Latent learning. (a) In the study by Tolman and Honzik (1930), rats learned to run the complicated maze shown here. (b) The results obtained by Tolman and Honzik (1930) are summarized in this graph. The rats in Group C showed a sudden improvement in performance when a food reward was introduced on Trial 11. Tolman concluded that the rats in this group were learning about the maze all along but that their learning remained “latent” until reinforcement was made available.

Source: Adapted from Tolman, E. C., & Honzik, C. H. (1930). Introduction and removal of reward and maze performance in rats. *University of California Publications in Psychology*, 4, 257–275.

was even a little better than that of the Group A rats who had been rewarded after every trial (see Figure 6.24b).

Tolman concluded that the rats in Group C had been learning about the maze all along, just as much as the rats in group A, but they had no motivation to demonstrate this learning until a reward was introduced. Tolman called this phenomenon **latent learning**—learning that is not apparent from behavior when it first occurs. *Why did these findings present a challenge for the prevailing view of learning?* First, they suggested that learning can take place in the absence of reinforcement—at a time when learned responses were thought to be stamped in by reinforcement. Second, they suggested that the rats who displayed latent learning had formed a *cognitive map* of the maze (a mental representation of the spatial layout) at a time when cognitive processes were thought to be irrelevant to understanding conditioning even in humans.

Tolman (1948) went on to conduct other studies that suggested cognitive processes play a role in conditioning. But his ideas were ahead of their time, and mostly attracted rebuttals and criticism from the influential learning theorists of his era (Hilgard, 1987). In the long run, however, Tolman’s ideas prevailed, as models of conditioning were eventually forced to incorporate cognitive factors.

Signal Relations

One theorist who has been especially influential in demonstrating the importance of cognitive factors in conditioning is Robert Rescorla (1978, 1980; Rescorla & Wagner, 1972). Rescorla asserts that environmental

stimuli serve as signals and that some stimuli are better, or more dependable, signals than others. Hence, he has manipulated *signal relations* in classical conditioning—that is, CS-UCS relations that influence whether a CS is a good signal. A “good” signal is one that allows accurate prediction of the UCS.

In essence, Rescorla manipulates the *predictive value* of a conditioned stimulus. How does he do so? He varies the proportion of trials in which the CS and UCS are paired. Consider the following example. A tone and shock are paired 20 times for one group of rats. Otherwise, these rats are never shocked. For these rats the CS (tone) and UCS (shock) are paired in 100% of the experimental trials. Another group of rats also receive 20 pairings of the tone and shock. However, the rats in this group are also exposed to the shock on 20 other trials when the tone does *not* precede it. For this group, the CS and UCS are paired in only 50% of the trials. Thus, the two groups of rats have had an equal number of CS-UCS pairings, but the CS is a better signal or predictor of shock for the 100% CS-UCS group than for the 50% CS-UCS group.

What did Rescorla find when he tested the two groups of rats for conditioned fear? He found that the CS elicits a much stronger response in the 100% CS-UCS group than in the 50% CS-UCS group. Given that the two groups have received an equal number of CS-UCS pairings, this difference must be due to the greater predictive power of the CS for the 100% group. Numerous studies of signal relations have shown that the predictive value of a CS is an influential factor governing classical conditioning (Rescorla, 1978).



ROBERT RESCORLA

“Pavlovian conditioning is a sophisticated and sensible mechanism by which organisms represent the world. . . . I encourage students to think of animals as behaving like little statisticians. . . . They really are very finely attuned to small changes in the likelihood of events.”



Distinguishing Between Classical Conditioning and Operant Conditioning

Check your understanding of the usual differences between classical conditioning and operant conditioning by indicating the type of conditioning process involved in each of the following examples. In the space on the left, place a C if the example involves classical conditioning, an O if it involves operant conditioning, or a B if it involves both. The answers can be found in Appendix A.

- _____ 1. Whenever Midori takes her dog out for a walk, she wears the same old blue windbreaker. Eventually, she notices that her dog becomes excited whenever she puts on this windbreaker.
- _____ 2. The Creatures are a successful rock band with three hit albums to their credit. They begin their U.S. tour featuring many new, unreleased songs, all of which draw silence from their concert fans. The same fans cheer wildly when the Creatures play any of their old hits. Gradually, the band reduces the number of new songs it plays and starts playing more of the old standbys.
- _____ 3. When Cindy and Mel first fell in love, they listened constantly to the Creatures' hit song "Transatlantic Obsession." Although several years have passed, whenever they hear this song they experience a warm, romantic feeling.
- _____ 4. For nearly 20 years Ralph has worked as a machinist in the same factory. His new foreman is never satisfied with Ralph's work and criticizes him constantly. After a few weeks of heavy criticism, Ralph experiences anxiety whenever he arrives at work. He starts calling in sick more and more frequently to evade this anxiety.

Response-Outcome Relations and Reinforcement

Studies of response-outcome relations and reinforcement also highlight the role of cognitive processes in conditioning. Imagine that on the night before an important exam you study hard while repeatedly playing a Coldplay song. The next morning you earn an A on your exam. Does this result strengthen your tendency to play Coldplay's music before exams? Probably not. Chances are, you will recognize the logical relation between the response of studying hard and the reinforcement of a good grade, and only the response of studying will be strengthened (Killeen, 1981).

Thus, reinforcement is *not* automatic when favorable consequences follow a response. People actively reason out the relations between responses and the outcomes that follow. When a response is followed by a desirable outcome, the response is more likely to be strengthened if the person thinks that the response *caused* the outcome. You might guess that only humans would engage in this causal reasoning. However, evidence suggests that under the right circumstances even pigeons can learn to recognize causal relations between responses and outcomes (Killeen, 1981).

In sum, modern, reformulated models of conditioning view it as a matter of detecting the *contingencies* among environmental events (Matute & Miller, 1998). According to these theories, organisms actively try to figure out what leads to what (the contingencies) in the world around them. Stimuli are viewed as

signals that help organisms minimize their aversive experiences and maximize their pleasant experiences. The new, cognitively oriented theories of conditioning are quite a departure from older theories that depicted conditioning as a mindless, mechanical process. We can also see this new emphasis on cognitive processes in our next subject, observational learning.

➤ REVIEW OF KEY POINTS

- Recent decades have brought profound changes in our understanding of conditioning. Instinctive drift occurs when an animal's innate response tendencies interfere with conditioning. Conditioned taste aversions can be readily acquired even when a lengthy delay occurs between the CS and UCS.
- The findings on instinctive drift and conditioned taste aversion have led to the recognition that there are biological constraints on conditioning. Domjan argues that researchers' focus on arbitrary conditioned stimuli has led to a distorted picture of the principles of conditioning. Some evolutionary psychologists argue that learning processes vary across species because different species have to grapple with very different adaptive problems.
- Tolman's studies of latent learning suggested that cognitive processes contribute to conditioning, but his work was not influential at the time. Rescorla's work on signal relations showed that the predictive value of a CS is an influential factor governing classical conditioning.
- When a response is followed by a desirable outcome, the response is more likely to be strengthened if it appears that the response caused the outcome. Studies of signal relations in classical conditioning and response-outcome relations in operant conditioning demonstrated that cognitive processes play a larger role in conditioning than originally believed.

> Observational Learning

Can classical and operant conditioning account for all learning? Absolutely not. Consider how people learn a fairly basic skill such as driving a car. They do not hop naively into an automobile and start emitting random responses until one leads to favorable consequences. On the contrary, most people learning to drive know exactly where to place the key and how to get started. How are these responses acquired? Through *observation*. Most new drivers have years of experience observing others drive, and they put those observations to work. Learning through observation accounts for a great deal of learning in both animals and humans.

Observational learning occurs when an organism's responding is influenced by the observation of others, who are called models. This process has been investigated extensively by Albert Bandura (1977, 1986). Bandura does not see observational learning as entirely separate from classical and operant conditioning. Instead, he asserts that it greatly extends the reach of these conditioning processes. Whereas previous conditioning theorists emphasized the organism's direct experience, Bandura has demonstrated that both classical and operant conditioning can take place "vicariously" through observational learning.

Essentially, observational learning involves being conditioned indirectly by virtue of observing another's conditioning (see **Figure 6.25**). To illustrate, suppose you observe a friend behaving assertively with a car salesperson. You see your friend's assertive behavior reinforced by the exceptionally good buy she gets on the car. Your own tendency to behave assertively with salespeople might well be strengthened as a result. Notice that the reinforcement is experienced by your friend, not you. The good buy should strengthen your friend's tendency to bargain assertively, but your tendency to do so may also be strengthened indirectly.

Bandura's theory of observational learning can help explain why physical punishment tends to increase aggressive behavior in children, even when it is intended to do just the opposite. Parents who depend on physical punishment often punish a child for hitting other children—by hitting the child. The parents may sincerely intend to reduce the child's aggressive behavior, but they are unwittingly serving as *models* of such behavior. Although they may tell the child that "hitting people won't accomplish anything," they are in the midst of hitting the child in order to accomplish something. Because parents usually accomplish their immediate goal of stopping the child's hitting, the child witnesses the reinforcement of aggressive behavior. In this situation, actions speak louder than words—because of observational learning.

Basic Processes

Bandura has identified four key processes that are crucial in observational learning. The first two—attention and retention—highlight the importance of cognition in this type of learning.

- **Attention.** To learn through observation, you must pay attention to another person's behavior and its consequences.
- **Retention.** You may not have occasion to use an observed response for weeks, months, or even years. Hence, you must store a mental representation of what you have witnessed in your memory.
- **Reproduction.** Enacting a modeled response depends on your ability to reproduce the response by converting your stored mental images into overt behavior. This may not be easy for some responses. For example, most people cannot execute a breathtaking windmill dunk after watching Kobe Bryant do it in a basketball game.

PREVIEW QUESTIONS

- How can conditioning occur indirectly?
- What are the key processes in observational learning?
- What does Bandura have to say about acquisition versus performance?
- How did research by Bandura and colleagues contribute to the dialogue regarding the effects of media violence?
- What have contemporary investigators concluded about the effects of media violence?



ALBERT BANDURA

"Most human behavior is learned by observation through modeling."

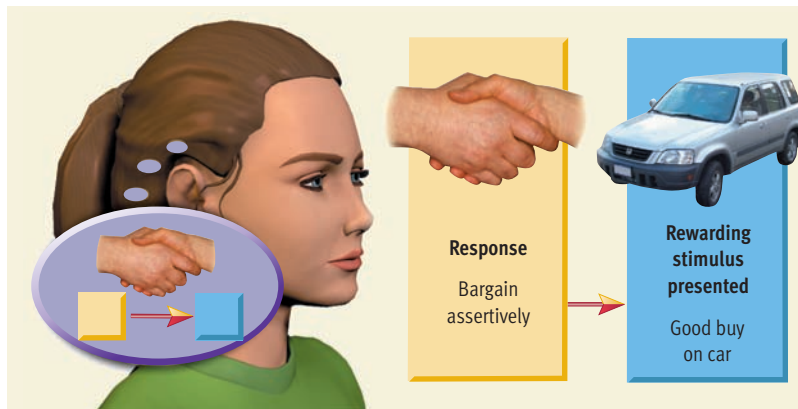


Figure 6.25

Observational learning.

In observational learning, an observer attends to and stores a mental representation of a model's behavior (example: assertive bargaining) and its consequences (example: a good buy on a car). If the observer sees the modeled response lead to a favorable outcome, the observer's tendency to emit the modeled response will be strengthened.

Observational learning occurs in both humans and animals. For example, the English titmouse has learned how to break into containers to swipe cream from its human neighbors and this behavior has been passed across generations through observational learning. In a similar vein, children acquire a diverse array of responses from role models.



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- **Motivation.** Finally, you are unlikely to reproduce an observed response unless you are motivated to do so. Your motivation depends on whether you encounter a situation in which you believe that the response is likely to pay off for you.

Observational learning has proven especially valuable in explaining complex human behaviors, but animals can also learn through observation (Ohman & Mineka, 2001; Zentall, 2003). A simple example is the thieving behavior of the English titmouse, a small bird renowned for its early-morning raids on its human neighbors. The titmouse has learned how to open cardboard caps on bottles of milk delivered to the porches of many homes in England. Having opened the bottle, the titmouse skims the cream from the top of the milk. This clever learned behavior has been passed down from one generation of titmouse to the next through observational learning.

Acquisition Versus Performance

Like Edward C. Tolman (1932) many decades before, Bandura points out that organisms can store cognitive representations of learned responses that they may or may not perform, depending on the reinforcement contingencies.

Thus, he distinguishes between the *acquisition* of a learned response and the *performance* of that response. He maintains that *reinforcement affects which responses are actually performed more than which responses are acquired*. People emit those responses that they think are likely to be reinforced. For instance, you may study hard for a course in which the professor gives fair exams, because you expect studying to lead to reinforcement in the form of a good grade. In contrast, you may hardly open the text for a course in which the professor gives arbitrary, unpredictable exams, because you do not expect studying to be reinforced. Your performance is different in the two situations because you think the reinforcement contingencies are different. Thus, like Skinner, Bandura asserts that reinforcement is a critical determinant of behavior. However, Bandura maintains that reinforcement influences performance rather than learning per se.

Observational Learning and the Media Violence Controversy

The power of observational learning has been at the center of a long-running controversy about the ef-

fects of media violence. Children spend an average of about 40 hours per week with various types of entertainment media, and more than half of that time is devoted to watching television, videotapes, and DVDs (Bushman & Anderson, 2001). Children are very impressionable, and extensive evidence indicates that they pick up many responses from view-

ing models on TV (Huston et al., 1992). Social critics have expressed concern about the amount of violence on television ever since TV became popular in the 1950s. In the 1960s, Bandura and his colleagues conducted landmark research on the issue that remains widely cited and influential. One of those classic studies serves as the Featured Study for Chapter 6.

The Power of Modeling: What They See Is What You Get

This study was designed to explore the influence of observing the consequences of another's behavior on the learning of aggressive behavior in children. In a previous study, the same researchers had shown that children exposed to an aggressive adult model displayed more aggression than children exposed to a similar but non-aggressive model (Bandura, Ross, & Ross, 1961). The first study used live (in-person) adult models who did or did not play very roughly with a 5-foot-tall "Bobo doll" while in the same room with the children. A second study by the same research team investigated whether filmed models were as influential as in-person models (Bandura, Ross, & Ross, 1963a). The researchers found that a TV depiction of an adult model roughing up the Bobo doll led to increased aggression just as exposure to a live model had. In this third study of the series, the investigators used filmed models and manipulated the consequences experienced by the aggressive models. The hypothesis was that children who saw the models rewarded for their aggression would become more aggressive than children who saw the models punished for their aggression.

Method

Subjects. The subjects were 40 girls and 40 boys drawn from a nursery school. The average age for the 80 children was 4 years, 3 months.

Procedure. While at the nursery school, the children were invited (individually) to play in a toy room. On the way to the toy room an adult escort indicated that she needed to stop in her office for a few minutes. The child was told to watch a TV in the office during this brief delay. On the TV, the child was exposed to one of three five-minute film sequences. In the *aggressive-model-rewarded* condition, Rocky and Johnny are playing and Rocky attacks Johnny, striking him with a baton, throwing a ball at him repeatedly, and dragging him off to a far corner of the room. The final scene shows Rocky having a great time with the toys while helping himself to pop and cookies. In the *aggressive-model-punished* condition, Rocky engages in the same pattern of aggression but the outcome is different. Johnny rises to the challenge and thrashes Rocky, who is shown cowering in a corner in the final scene. In the *nonaggressive-model-control* condition, Rocky and Johnny are simply shown engaged in vigorous play without any aggression. In a fourth condition, the *no-model-control* condition, the child did not watch TV while in the office.

After the brief detour to the adult's office, the children were taken to the toy room, as promised, where they were allowed to play alone with a diverse array of toys that allowed for either aggressive or nonaggressive play. Among the toys were two Bobo dolls that served as convenient targets for aggressive responses. The chil-

FEATURED Study

Source: Bandura, A., Ross, D. & Ross, S. (1963b). Vicarious reinforcement and imitative learning. *Journal of Abnormal & Social Psychology*, 67, 601–607.



From Imitation of Film-Mediated Aggressive Models by Bandura et al., used by permission of the author.

The Bobo doll from Albert Bandura's legendary series of studies on observational learning of aggression can be seen here. The photo on the left shows a filmed depiction of an adult role model exhibiting aggressive behavior toward the Bobo doll. The photo on the right shows how one of the young subjects in the study imitated this aggressive behavior later by attacking the Bobo doll with a hammer.

dren's play was observed through a one-way mirror from an adjoining room. The key dependent variable was the number of aggressive acts displayed by the children during the 20-minute play period.

Results

Children in the *aggressive-model-rewarded* condition displayed significantly more total aggression and imitative aggression (specific aggressive acts similar to Rocky's) than children in the *aggressive-model-punished* condition. The amount of imitative aggression exhibited by children in each of the four conditions is summarized in **Figure 6.26**. A clear elevation of imitative aggression was observed only among the children who saw aggression pay off with reinforcement for the model.

Discussion

The results supported a basic premise of Bandura's theory—that observers are more likely to imitate another's behavior when that behavior leads to positive consequences than when it leads to negative consequences. Of particular interest was the fact that filmed models were shown to influence the likelihood of aggressive behavior in children.

Comment

This classic series of studies by Bandura, Ross, and Ross played a prominent role in the early stages of the vigorous debate about the impact of televised violence. People concerned about media violence noted that aggression on TV shows usually leads to rewards and admiration for heroic TV characters. The findings of this study suggested that youngsters watching aggressive

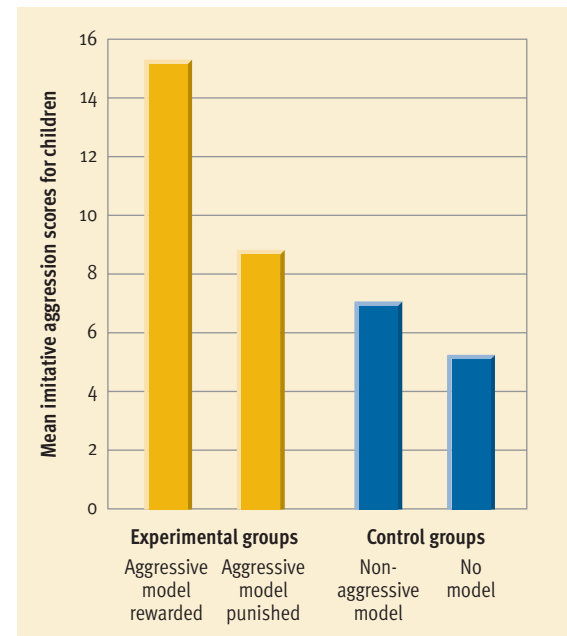


Figure 6.26

Filmed models and aggression. Bandura, Ross, and Ross (1963b) found that acts of imitative aggression were most frequent among children exposed to an aggressive role model on TV whose aggression was rewarded, as predicted by Bandura's theory of observational learning.

models on TV are likely to learn that aggressive behavior pays off. Critics argued that Bandura's Bobo doll studies were too artificial to be conclusive. This criticism led to hundreds of more realistic experiments and correlational studies on the possible link between TV violence and aggressiveness.

Subsequent research demonstrated that youngsters are exposed to an astonishing amount of violence when they watch TV. The National Television Violence Study, a large-scale study of the content of network and cable television shows conducted in 1994–1997, revealed that 61% of programs contained violence; 44% of violent actors were enticing role models (i.e., the “good guys”); 75% of violent actions occurred without punishment or condemnation; and 51% of violent actions were “sanitized,” as they featured no apparent pain (Anderson et al., 2003). It has been estimated that the typical child has vicariously witnessed 8,000 murders and 100,000 other acts of violence on TV by the time he or she finishes grade school (Huston et al., 1992).

Does this steady diet of media violence foster increased aggression? Decades of research since Ban-

dura's pioneering work indicate that the answer is “yes” (Bushman & Huesmann, 2001). The short-term effects of media violence have been investigated in hundreds of experimental studies. These studies consistently demonstrate that exposure to TV and movie violence increases the likelihood of physical aggression, verbal aggression, aggressive thoughts, and aggressive emotions in both children and adults (Anderson et al., 2003). Exposure to aggressive content in video games produces similar results (Anderson, 2004).

The real-world and long-term effects of media violence have been investigated through correlational research. The findings of these studies show that the more violence children watch on TV, the more aggressive the children tend to be at home and at school (Huesmann & Miller, 1994). Of course, critics point out that this correlation could reflect a variety of

Image Not Available

causal relationships (see **Figure 6.27**). Perhaps high aggressiveness in children causes an increased interest in violent television shows. However, a handful of long-term studies that have followed the same subjects since the 1960s and 1970s have clarified the causal relations underlying the link between media violence and elevated aggression. These studies show that the extent of youngsters' exposure to media violence in childhood predicts their aggressiveness in adolescence and early adulthood, but not vice versa (Huesman, 1986; Huesman et al., 2003). In other words, high exposure to media violence precedes, and presumably causes, high aggressiveness.

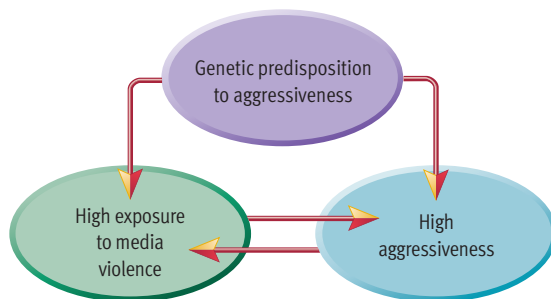
Although the empirical evidence linking media violence to aggression is clear, convincing, and unequivocal, the general public remains uncertain, perhaps even skeptical (Bushman & Anderson, 2001). One reason is that everyone knows individuals (perhaps themselves) who were raised on a robust diet of

media violence but who do not appear to be particularly aggressive. If media violence is so horrible, why aren't we all axe murderers? The answer is that aggressive behavior is influenced by a number of factors besides media violence, which only has a "modest" effect on people's aggressiveness. The problem, experts say, is that TV and movies reach millions upon millions of people, so even a small effect can have big repercussions (Bushman & Anderson, 2001). Suppose that 25 million people watch an extremely violent program. Even if only 1 in 100 viewers becomes a little more prone to aggression, that is 250,000 people who are a bit more likely to wreak havoc in someone's life.

In any event, the heated debate about media violence shows that observational learning plays an important role in regulating behavior. It represents a third major type of learning that builds on the first two types—classical conditioning and operant conditioning. These three basic types of learning are summarized and compared in an Illustrated Overview on pages 248–249.

Figure 6.27

The correlation between exposure to media violence and aggression. The more violence children watch on TV, the more aggressive they tend to be, but this correlation could reflect a variety of underlying causal relationships. Although watching violent shows probably causes increased aggressiveness, it is also possible that aggressive children are drawn to violent shows. Or perhaps a third variable (such as a genetic predisposition to aggressiveness) leads to both a preference for violent shows and high aggressiveness.



➤ REVIEW OF KEY POINTS

- In observational learning, an organism is conditioned vicariously by watching a model's conditioning. Both classical and operant conditioning can occur through observational learning, which depends on the processes of attention, retention, reproduction, and motivation. The principles of observational learning have been used to explain why physical punishment increases aggressive behavior.
- According to Bandura, reinforcement influences which responses one will perform more than it influences the acquisition of new responses. Research on observational learning has played a central role in the debate about the effects of media violence for many decades. This research suggests that media violence contributes to increased aggression among children and adults.

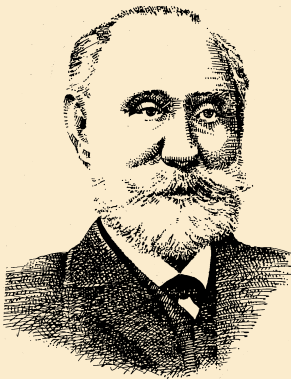
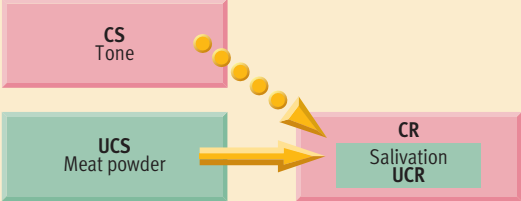

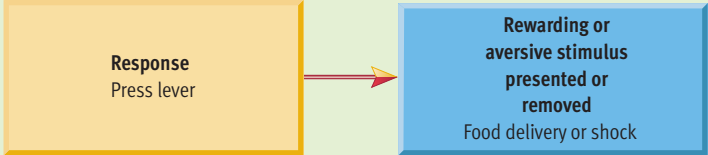
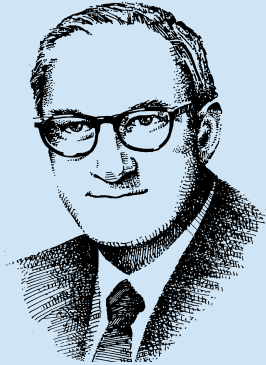
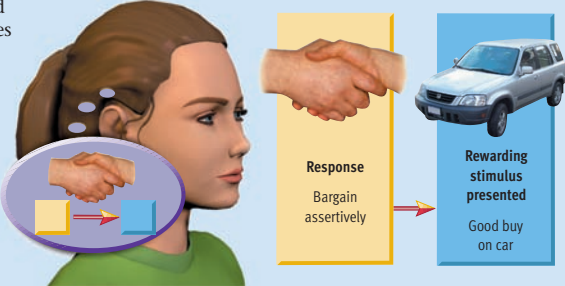
Web Link 6.6



Media Violence
Maintained by a Canadian nonprofit organization called the Media Awareness Network, which develops media literacy programs, this site permits visitors to access a great deal of background information and dialogue on the debate about the effects of violence in the media.



Illustrated Overview of Three Types of Learning

Type of learning	Procedure	Diagram	Result
Classical conditioning Ivan Pavlov 	A neutral stimulus (for example, a tone) is paired with an unconditioned stimulus (such as food) that elicits an unconditioned response (salivation).		The neutral stimulus becomes a conditioned stimulus that elicits the conditioned response (for example, a tone triggers salivation).
Operant conditioning B. F. Skinner 	In a stimulus situation, a response is followed by favorable consequences (reinforcement) or unfavorable consequences (punishment).		If reinforced, the response is strengthened (emitted more frequently); if punished, the response is weakened (emitted less frequently).
Observational learning Albert Bandura 	An observer attends to a model's behavior (for example, aggressive bargaining) and its consequences (for example, a good buy on a car).		The observer stores a mental representation of the modeled response; the observer's tendency to emit the response may be strengthened or weakened, depending on the consequences observed.

Typical kinds of responses

Mostly (but not always) involuntary reflexes and visceral responses

Mostly (but not always) voluntary, spontaneous responses

Mostly voluntary responses, often consisting of novel and complex sequences

Examples in animals

Dogs learn to salivate to the sound of a tone that has been paired with meat powder.

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Trained animals perform remarkable feats because they have been reinforced for gradually learning closer and closer approximations of responses they do not normally emit.



Courtesy of Animal Behavior Enterprises, Inc.

An English titmouse learns to break into milk bottles by observing the thievery of other titmice.

Image Not Available

Examples in humans

Little Albert learns to fear a white rat and other white, furry objects through classical conditioning

Image Not Available

Casino patrons tend to exhibit high, steady rates of gambling, as most games of chance involve complex variable-ratio schedules of reinforcement.

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A young boy performs a response that he has acquired through observational learning.



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> Reflecting on the Chapter's Themes

Heredity and
Environment



Sociohistorical
Context



Two of our seven unifying themes stand out in this chapter. First, you can see how nature and nurture interactively govern behavior. Second, looking at psychology in its sociohistorical context, you can see how progress in psychology spills over to affect trends and values in society at large. Let's examine each of these points in more detail.

In regard to nature versus nurture, research on learning clearly demonstrates the enormous power of the environment in shaping behavior. Pavlov's model of classical conditioning shows how experiences can account for everyday fears and other emotional responses. Skinner's model of operant conditioning shows how reinforcement and punishment can mold everything from a child's bedtime whimpering to an adult's restaurant preferences. Indeed, many learning theorists once believed that *all* aspects of behavior could be explained in terms of environmental determinants. In recent decades, however, evidence on instinctive drift and conditioned taste aversion have shown that there are biological constraints on conditioning. Thus, even in explana-

tions of learning—an area once dominated by nurture theories—we see once again that heredity and environment jointly influence behavior.

The history of research on conditioning also shows how progress in psychology can seep into every corner of society. For example, the behaviorists' ideas about reinforcement and punishment have influenced patterns of discipline in our society. Research on operant conditioning has also affected management styles in the business world, leading to an increased emphasis on positive reinforcement. In the educational arena, the concept of individualized, programmed learning is a spinoff from behavioral research. The fact that the principles of conditioning are routinely applied in homes, businesses, schools, and factories clearly shows that psychology is not an ivory tower endeavor.

In the upcoming Personal Application, you will see how you can apply the principles of conditioning to improve your self-control, as we discuss the technology of behavior modification.

PERSONAL Application

Achieving Self-Control Through Behavior Modification

Answer the following “yes” or “no.”

- ___ 1 Do you have a hard time passing up food, even when you're not hungry?
- ___ 2 Do you wish you studied more often?
- ___ 3 Would you like to cut down on your smoking or drinking?
- ___ 4 Do you experience difficulty in getting yourself to exercise regularly?

If you answered “yes” to any of these questions, you have struggled with the challenge of self-control. This Application discusses how you can use the principles and techniques of behavior modification to improve your self-control. **Behavior modification is a systematic approach to changing behavior through the application of the principles of conditioning.** Advocates of behav-

ior modification assume that behavior is mainly a product of learning, conditioning, and environmental control. They further assume that *what is learned can be unlearned*. Thus, they set out to “recondition” people to produce more desirable and effective patterns of behavior.

The technology of behavior modification has been applied with great success in schools, businesses, hospitals, factories, child-care facilities, prisons, and mental health centers (Kazdin, 2001; O'Donohue, 1998; Rachman, 1992). Moreover, behavior modification techniques have proven particularly valuable in efforts to improve self-control. Our discussion will borrow liberally from an excellent book on self-modification by David Watson and Roland Tharp (2002). We will discuss

five steps in the process of self-modification, which are outlined in **Figure 6.28**.

Specifying Your Target Behavior

The first step in a self-modification program is to specify the target behavior(s) that you want to change. Behavior modification can only be applied to a clearly defined, overt response, yet many people have difficulty pinpointing the behavior they hope to alter. They tend to describe their problems in terms of unobservable personality *traits* rather than overt *behaviors*. For example, asked what behavior he would like to change, a man might say, “I'm too irritable.” That may be

true, but it is of little help in designing a self-modification program. To use a behavioral approach, vague statements about traits need to be translated into precise descriptions of specific target behaviors.

To identify target responses, you need to ponder past behavior or closely observe future behavior and list specific *examples* of responses that lead to the trait description. For instance, the man who regards himself as “too irritable” might identify two overly frequent responses, such as arguing with his

wife and snapping at his children. These are specific behaviors for which he could design a self-modification program.

Gathering Baseline Data

The second step in behavior modification is to gather baseline data. You need to systematically observe your target behavior for a period of time (usually a week or two) before you work out the details of your program. In gathering your baseline data, you need to monitor three things.

First, you need to determine the initial response level of your target behavior. After all, you can’t tell whether your program is working effectively unless you have a baseline for comparison. In most cases, you would simply keep track of how often the target response occurs in a certain time interval. Thus, you might count the daily frequency of snapping at your children, smoking cigarettes, or biting your fingernails. *It is crucial to gather accurate data.* You should keep permanent written records, and it is usually best

to portray these records graphically (see **Figure 6.29**).

Second, you need to monitor the *antecedents* of your target behavior. Antecedents are events that typically precede the target response. Often these events play a major role in evoking your target behavior. For example, if your target is overeating, you might discover that the bulk of your overeating occurs late in the evening while you watch TV. If you can pinpoint this kind of antecedent-response connection, you may be able to design your program to circumvent or break the link.

Third, you need to monitor the typical consequences of your target behavior. Try to identify the reinforcers that are maintaining an undesirable target behavior or the unfavorable outcomes that are suppressing a desirable target behavior. In trying to identify reinforcers, remember that avoidance behavior is usually maintained by negative reinforcement. That is, the payoff for avoidance is usually the removal of something aversive, such as anxiety or a threat to self-esteem. You should also take into account

Figure 6.28

Steps in a self modification program. This flowchart provides an overview of the five steps necessary to execute a self-modification program. Many people are tempted to plunge into their program and skip the first two steps, but these steps are critical to success.

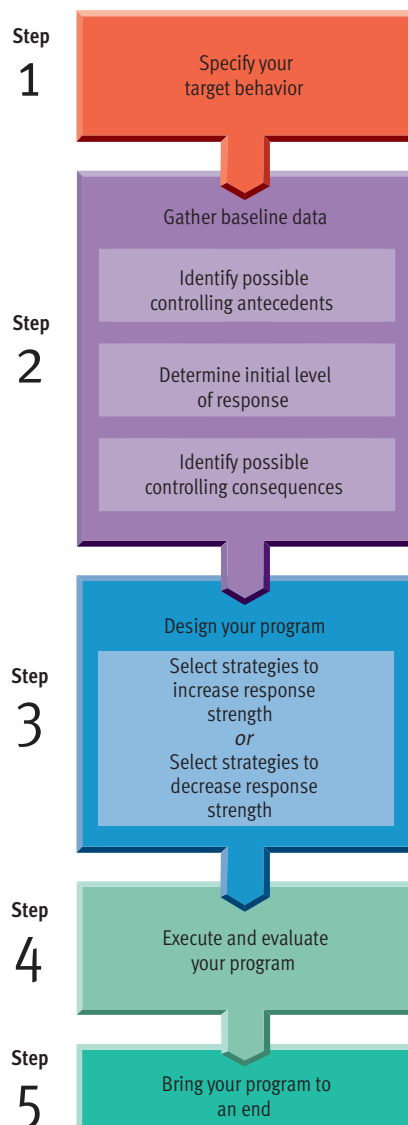
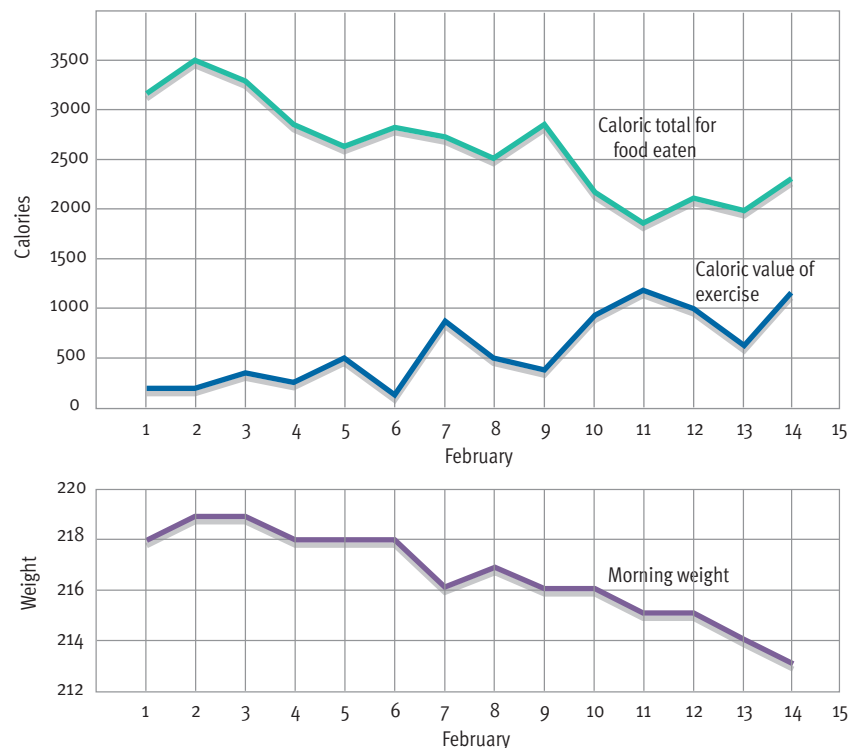


Figure 6.29

Example of recordkeeping in a self-modification program. Graphic records are ideal for tracking progress in behavior modification efforts. The records shown here illustrate what people would be likely to track in a behavior modification program for weight loss.



the fact that a response may not be reinforced every time, as most behavior is maintained by intermittent reinforcement.

Designing Your Program

Once you have selected a target behavior and gathered adequate baseline data, it is time to plan your intervention program. Generally speaking, your program will be designed either to increase or to decrease the frequency of a target response.

Increasing Response Strength

Efforts to increase the frequency of a target response depend largely on the use of positive reinforcement. In other words, you reward yourself for behaving properly. Although the basic strategy is quite simple, doing it skillfully involves a number of considerations.

Selecting a Reinforcer To use positive reinforcement, you need to find a reward that will be effective for you. Reinforcement is subjective. What is reinforcing for one person may not be reinforcing for another. To determine your personal reinforcers you need to ask yourself questions such as: What do I like to do for fun? What makes me feel good?

What would be a nice present? What would I hate to lose? (See **Figure 6.30**.)

You don't have to come up with spectacular new reinforcers that you've never experienced before. *You can use reinforcers that you are already getting.* However, you have to restructure the contingencies so that you get them only if you behave appropriately. For example, if you normally buy two compact discs per week, you might make these purchases contingent on studying a certain number of hours during the week.

Arranging the Contingencies Once you have chosen your reinforcer, you have to set up reinforcement contingencies. These contingencies will describe the exact behavioral goals that must be met and the reinforcement that may then be awarded. For example, in a program to increase exercise, you might make spending \$40 on clothes (the reinforcer) contingent on having jogged 15 miles during the week (the target behavior).

Try to set behavioral goals that are both challenging and realistic. You want your goals to be challenging so that they lead to improvement in your behavior. However, setting unrealistically high goals—a common mistake in self-modification—often leads to unnecessary discouragement.

Decreasing Response Strength

Let's turn now to the challenge of reducing the frequency of an undesirable response. You can go about this task in a number of ways. Your principal options include reinforcement, control of antecedents, and punishment.

Reinforcement Reinforcers can be used in an indirect way to decrease the frequency of a response. This may sound paradoxical, since you have learned that reinforcement strengthens a response. The trick lies in how you define the target behavior. For example, in the case of overeating you might define your target behavior as eating more than 1600 calories a day (an excess response that

Figure 6.30

Selecting a reinforcer. Finding a good reinforcer to use in a behavior modification program can require a lot of thought. The questions listed here can help people identify their personal reinforcers.

Source: Adapted from Watson, D. L., & Tharp, R. G. (1997). *Self-directed behavior: Self-modification for personal adjustment*. Belmont, CA: Wadsworth. Reprinted by permission.

1. What will be the rewards of achieving your goal?
2. What kind of praise do you like to receive, from yourself and others?
3. What kinds of things do you like to have?
4. What are your major interests?
5. What are your hobbies?
6. What people do you like to be with?
7. What do you like to do with those people?
8. What do you do for fun?
9. What do you do to relax?
10. What do you do to get away from it all?
11. What makes you feel good?
12. What would be a nice present to receive?
13. What kinds of things are important to you?
14. What would you buy if you had an extra \$20? \$50? \$100?
15. On what do you spend your money each week?
16. What behaviors do you perform every day? (Don't overlook the obvious or commonplace.)
17. Are there any behaviors you usually perform instead of the target behavior?
18. What would you hate to lose?
19. Of the things you do every day, which would you hate to give up?
20. What are your favorite daydreams and fantasies?
21. What are the most relaxing scenes you can imagine?



Smoking is just one of the many types of maladaptive habits that can be reduced or eliminated through self-modification techniques.

© Nicola Sutton/Life File/Photodisc Green/Getty Images



© Mark Richards/PhotoEdit

Overeating is another type of maladaptive behavior that can be changed with a self-modification program.

you want to decrease) or eating less than 1600 calories a day (a deficit response that you want to increase). You can choose the latter definition and reinforce yourself whenever you eat less than 1600 calories in a day. Thus, you can reinforce yourself for not emitting a response, or for emitting it less, and thereby decrease a response through reinforcement.

Control of Antecedents A worthwhile strategy for decreasing the occurrence of an undesirable response may be to identify its antecedents and avoid exposure to them. This strategy is especially useful when you are trying to decrease the frequency of a consummatory response, such as smoking or eating. In the case of overeating, for instance, the easiest way to resist temptation is to avoid having to face it. Thus, you might stay away from favorite restaurants, minimize time spent in your kitchen, shop for groceries just after eating (when willpower is higher), and avoid purchasing favorite foods.

Punishment The strategy of decreasing unwanted behavior by punishing yourself for that behavior is an obvious option that peo-

ple tend to overuse. The biggest problem with punishment in a self-modification effort is that it is difficult to follow through and punish yourself. Nonetheless, there may be situations in which your manipulations of reinforcers need to be bolstered by the threat of punishment.

If you're going to use punishment, keep two guidelines in mind. First, do not use punishment alone. Use it in conjunction with positive reinforcement. If you set up a program in which you can earn only negative consequences, you probably won't stick to it. Second, use a relatively mild punishment so that you will actually be able to administer it to yourself.

Executing and Evaluating Your Program

Once you have designed your program, the next step is to put it to work by enforcing the contingencies that you have carefully planned. During this period, you need to continue to accurately record the frequency of your target behavior so you can evaluate your progress. The success of your program depends on your not "cheating."

The most common form of cheating is to reward yourself when you have not actually earned it.

You can do two things to increase the likelihood that you will comply with your program. One is to make up a **behavioral contract**—a written agreement outlining a promise to adhere to the contingencies of a behavior modification program. The formality of signing such a contract in front of friends or family seems to make many people take their program more seriously. You can further reduce the likelihood of cheating by having someone other than yourself dole out the reinforcers and punishments.

Ending Your Program

Generally, when you design your program you should spell out the conditions under which you will bring it to an end. This involves setting terminal goals such as reaching a certain weight, studying with a certain regularity, or going without cigarettes for a certain length of time. Often, it is a good idea to phase out your program by planning a gradual reduction in the frequency or potency of your reinforcement for appropriate behavior.

REVIEW OF KEY POINTS

- In behavior modification, the principles of learning are used to change behavior directly. Behavior modification techniques can be used to increase one's self-control. The first step in self-modification involves specifying the overt target behavior to be increased or decreased.
- The second step involves gathering baseline data about the initial rate of the target response and identifying any typical antecedents and consequences associated with the behavior.
- The third step is to design a program. If you are trying to increase the strength of a response, you'll depend on positive reinforcement. The reinforcement contingencies should spell out exactly what you have to do to earn your reinforcer. A number of strategies can be used to decrease the strength of a response, including reinforcement, control of antecedents, and punishment.
- The fourth step is executing and evaluating your program. The final step is to determine how and when you will phase out your program.

CRITICAL THINKING Application

Manipulating Emotions: Pavlov and Persuasion

With all due respect to the great Ivan Pavlov, when we focus on his demonstration that dogs can be trained to slobber in response to a tone, it is easy to lose sight of the importance of classical conditioning. At first glance, most people do not see a relationship between Pavlov's slobbering dogs and anything that they are even remotely interested in. However, in the main body of the chapter, we saw that classical conditioning actually contributes to the regulation of many important aspects of behavior, including fears, phobias, and other emotional reactions; immune function and other physiological processes; food preferences; and even sexual arousal. In this Application you will learn that classical conditioning is routinely used to manipulate emotions in persuasive efforts. If you watch TV, you have been subjected to Pavlovian techniques. An understanding of these techniques can help you recognize when your emotions are being manipulated by advertisers, politicians, and the media.

Manipulation efforts harnessing Pavlovian conditioning generally involve a special subtype of classical conditioning that theorists have recently christened *evaluative conditioning*. **Evaluative conditioning consists of efforts to transfer the emotion attached to a UCS to a new CS.** In other words, evaluative conditioning involves the acquisition of emotion-laden likes and dislikes, or preferences through classical conditioning. Of interest here is that research shows that attitudes can be shaped through evaluative conditioning without participants' conscious awareness (Olson & Fazio, 2001) and that evaluative conditioning is remarkably resistant to extinction (Walther, Nagengast, & Trasselli, 2005). Thus, an especially interesting aspect of evaluative conditioning is that people often are unaware of the origin of their attitudes or of the fact that they even feel the way they do. The key to this process is simply to manipulate the automatic, subconscious associations that people make in response to various stimuli. Let's look at how

this manipulation is done in advertising, business negotiations, and the world of politics.

Classical Conditioning in Advertising

The art of manipulating people's associations has been perfected by the advertising industry, leading Till and Priluck (2000, p. 57) to comment, "conditioning of attitudes towards products and brands has become generally accepted and has developed into a unique research stream." Advertisers consistently endeavor to pair the products they are peddling with stimuli that seem likely to elicit positive emotional responses. An extensive variety of stimuli are used for this purpose. Products are paired with well-liked celebrity spokespersons; depictions of warm, loving families; beautiful pastoral scenery; cute, cuddly pets; enchanting, rosy-cheeked children; upbeat, pleasant music; and opulent surroundings that reek of wealth. Advertisers also like to pair their products with exciting events, such as the NBA Finals, and cherished symbols, such as flags and the Olympic rings insignia. But, above all else, advertisers like to link their products with sexual imagery and extremely attractive models—especially, glamorous, alluring women (Reichert, 2003; Reichert & Lambiase, 2003).

Advertisers mostly seek to associate their products with stimuli that evoke pleasurable feelings of a general sort, but in some cases they try to create more specific associations. For example, cigarette brands sold mainly to men are frequently paired with tough-looking men in rugged settings to create an association between the cigarettes and masculinity. In contrast, cigarette brands that are mainly marketed to women are paired with images that evoke feelings of femininity. In a similar vein, manufacturers of designer jeans typically seek to forge associations between their products and things that are young, urban, and hip. Advertisers marketing expensive automobiles or platinum credit cards pair their products with symbols of affluence,

luxury, and privilege, such as mansions, butlers, and dazzling jewelry.

Classical Conditioning in Business Negotiations

In the world of business interactions, two standard practices are designed to get customers to make an association between one's business and pleasurable feelings. The first is to take customers out to dinner at fine restaurants. The provision of delicious food and fine wine in a luxurious environment is a powerful unconditioned stimulus that reliably elicits pleasant feelings that are likely to be associated with the host. The second practice is the strategy of entertaining customers at major events, such as concerts and football games. Over the last couple of decades, America's sports arenas have largely been rebuilt with vastly more "luxury sky-boxes" to accommodate this business tactic. It reaches its zenith every year at the Super Bowl, where most of the seats go to the guests of Fortune 500 corporations. This practice pairs the host with both pleasant feelings and the excitement of a big event.

It is worth noting that these strategies take advantage of other processes besides classical conditioning. They also make use of the *reciprocity norm*—the social rule that one should pay back in kind what one re-



The practice of taking customers out to dinner at expensive, luxurious restaurants takes advantage of the process of classical conditioning.

ceives from others (Cialdini, 2001). Thus, wining and dining clients creates a sense of obligation that they should reciprocate their host's generosity—presumably in their business dealings.

Classical Conditioning in the World of Politics

Like advertisers, candidates running for election need to influence the attitudes of many people quickly, subtly, and effectively—and they depend on evaluative conditioning to help them do so. For example, have you noticed how politicians show up at an endless variety of pleasant public events (such as the opening of a new mall) that often have nothing to do with their public service? When a sports team wins some sort of championship, local politicians are drawn like flies to the subsequent celebrations. They want to pair themselves with these positive events, so that they are associated with pleasant emotions.

Election campaign ads use the same techniques as commercial ads (except they don't rely much on sexual appeals). Candidates are paired with popular celebrities, wholesome families, pleasant music, and symbols of patriotism. Cognizant of the power of classical conditioning, politicians also exercise great care to ensure that they are not paired with people or events that might trigger negative feelings. For example, in 1999, when the U.S. government finally turned control of the Panama Canal over to Panama, President Clinton and Vice-President Gore chose to not attend the ceremonies because this event was viewed negatively in some quarters.

The ultimate political perversion of the principles of classical conditioning probably occurred in Nazi Germany. The Nazis used many propaganda techniques to create prejudice toward Jews and members of other targeted groups (such as Gypsies). One such strategy was the repeated pairing of disgusting, repulsive images with stereotypical pictures of Jews. For example, the Nazis would show alternating pictures of rats or roaches crawling over filthy garbage and stereotypical Jewish faces, so that the two images would become associated in the minds of the viewers. Thus, the German population was condi-



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Political candidates are very savvy about the potential power of classical conditioning. For example, they like to be seen in public with popular celebrities who elicit positive feelings among many voters.

tioned to have negative emotional reactions to Jews and to associate them with vermin subject to extermination. The Nazis reasoned that if people would not hesitate to exterminate rats and roaches, then why not human beings associated with these vermin?

Becoming More Aware of Classical Conditioning Processes

How effective are the efforts to manipulate people's emotions through classical conditioning? It's hard to say. In the real world, these strategies are always used in combination with other persuasive tactics, which creates multiple confounds that make it difficult to assess the impact of the Pavlovian techniques (Walther et al., 2005). Laboratory research can eliminate these confounds, but surprisingly little research on these strategies has been published, and virtually all of it has dealt with advertising. The advertising studies suggest that classical conditioning can be effective and leave enduring imprints on consumers' attitudes (Grossman & Till, 1998; Shimp, Stuart, & Engle, 1991;

Walther & Grigoriadis, 2003). And research indicates that sexual appeals in advertising are attention getting, likable, and persuasive (Reichert, Heckler, & Jackson, 2001). But a great deal of additional research is needed. Given the monumental sums that advertisers spend using these techniques, it seems reasonable to speculate that individual companies have data on their specific practices to demonstrate their efficacy, but these data are not made available to the public.

What can you do to reduce the extent to which your emotions are manipulated through Pavlovian procedures? Well, you could turn off your radio and TV, close up your magazines, stop your newspaper, disconnect your modem, and withdraw into a media-shielded shell, but that hardly seems realistic for most people. Realistically, the best defense is to make a conscious effort to become more aware of the pervasive attempts to condition your emotions and attitudes. Some research on persuasion suggests that *to be forewarned is to be forearmed* (Pfau et al., 1990). In other words, if you know how media sources try to manipulate you, you should be more resistant to their strategies.

Table 6.2 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding how Pavlovian conditioning can be used to manipulate emotions	The critical thinker understands how stimuli can be paired together to create automatic associations that people may not be aware of.
Developing the ability to detect conditioning procedures used in the media	The critical thinker can recognize Pavlovian conditioning tactics in commercial and political advertisements.

CHAPTER 6 *Recap*

Key Ideas

Classical Conditioning

- Classical conditioning explains how a neutral stimulus can acquire the capacity to elicit a response originally evoked by another stimulus. This kind of conditioning was originally described by Ivan Pavlov.
- Many kinds of everyday responses are regulated through classical conditioning, including phobias, fears, and pleasant emotional responses. Even physiological responses such as immune and sexual functioning respond to classical conditioning.
- A conditioned response may be weakened and extinguished entirely when the CS is no longer paired with the UCS. In some cases, spontaneous recovery occurs, and an extinguished response reappears after a period of nonexposure to the CS.
- Conditioning may generalize to additional stimuli that are similar to the original CS. The opposite of generalization is discrimination, which involves not responding to stimuli that resemble the original CS. Higher-order conditioning occurs when a CS functions as if it were a UCS, to establish new conditioning.

Operant Conditioning

- Operant conditioning involves largely voluntary responses that are governed by their consequences. Following the lead of E. L. Thorndike, B. F. Skinner investigated this form of conditioning, working mainly with rats and pigeons in Skinner boxes.
- The key dependent variable in operant conditioning is the rate of response over time. When this responding is shown graphically, steep slopes indicate rapid responding. New operant responses can be shaped by gradually reinforcing closer and closer approximations of the desired response. In operant conditioning, extinction occurs when reinforcement for a response is terminated and the rate of that response declines.
- Operant responses are regulated by discriminative stimuli that are cues regarding the likelihood of obtaining reinforcers. These stimuli are subject to the same processes of generalization and discrimination that occur in classical conditioning. Primary reinforcers are unlearned; secondary reinforcers acquire their reinforcing quality through conditioning.
- Intermittent schedules of reinforcement produce greater resistance to extinction than similar continuous schedules. Ratio schedules tend to yield higher rates of response than interval schedules. Shorter intervals and higher ratios are associated with faster responding.
- Responses can be strengthened through either the presentation of positive reinforcers or the removal of negative reinforcers. Negative reinforcement regulates escape and avoidance learning. The process of avoidance learning may shed light on why phobias are so difficult to eliminate.
- With punishment, unfavorable consequences lead to a decline in response strength. Some of the problems associated with physical punishment as a disciplinary procedure are emotional side effects and increased aggressive behavior.

Changing Directions in the Study of Conditioning

- The findings on instinctive drift and conditioned taste aversion have led to the recognition that there are species-specific biological constraints on conditioning. Domjan argues that researchers' focus on arbitrary conditioned stimuli has led to a distorted picture of the principles of conditioning. Some evolutionary psychologists argue that learning processes vary considerably across species.
- Tolman's studies of latent learning suggested that cognitive processes contribute to conditioning, but his work was not influential at the time. Studies of signal relations in classical conditioning and response-outcome relations in operant conditioning demonstrated that cognitive processes play a larger role in conditioning than originally believed.

Observational Learning

- In observational learning, an organism is conditioned by watching a model's conditioning. Both classical and operant conditioning can occur through observational learning, which depends on the processes of attention, retention, reproduction, and motivation.

- According to Bandura, reinforcement influences which responses one will perform more than it influences the acquisition of new responses. Research on observational learning has played a central role in the debate about the effects of media violence for many decades. This research suggests that media violence contributes to increased aggression among children and adults.

Reflecting on the Chapter's Themes

- Two of our key themes were especially apparent in our coverage of learning and conditioning. One theme involves the interaction of heredity and environment in learning. The other involves the way progress in psychology affects society at large.

PERSONAL APPLICATION • Achieving Self-Control Through Behavior Modification

- The first step in self-modification is specifying the target behavior to be increased or decreased. The second step is gathering baseline data.
- The third step is to design a program, using procedures such as reinforcement, control of antecedents, and punishment. The fourth step is executing and evaluating your program. The final step is to determine how and when you will phase out your program.

CRITICAL THINKING APPLICATION • Manipulating Emotions: Pavlov and Persuasion

- Advertisers routinely pair their products with stimuli that seem likely to elicit positive emotions or other specific feelings. The practice of taking customers out to dinner or to major events also takes advantage of Pavlovian conditioning. Politicians also work to pair themselves with positive events. The best defense against these tactics is to become more aware of efforts to manipulate your emotions.

Key Terms

Acquisition (p. 220)
Avoidance learning (p. 234)
Behavior modification (p. 250)
Behavioral contract (p. 253)
Classical conditioning (p. 216)
Conditioned reinforcers (p. 230)
Conditioned response (CR) (p. 217)
Conditioned stimulus (CS) (p. 217)
Continuous reinforcement (p. 231)
Cumulative recorder (p. 227)
Discriminative stimuli (p. 229)
Elicit (p. 217)
Emit (p. 226)
Escape learning (p. 234)
Evaluative conditioning (p. 254)
Extinction (p. 220)
Fixed-interval (FI) schedule (p. 232)
Fixed-ratio (FR) schedule (p. 232)
Higher-order conditioning (p. 223)
Instinctive drift (p. 238)
Instrumental learning (p. 224)
Intermittent reinforcement (p. 231)
Latent learning (p. 241)
Law of effect (p. 225)
Learning (p. 215)
Negative reinforcement (p. 233)
Observational learning (p. 243)
Operant chamber (p. 226)
Operant conditioning (p. 224)
Partial reinforcement (p. 231)
Pavlovian conditioning (p. 216)
Phobias (p. 216)
Positive reinforcement (p. 233)

Primary reinforcers (p. 230)
Punishment (p. 235)
Reinforcement (p. 225)
Reinforcement contingencies (p. 226)
Resistance to extinction (p. 228)
Schedule of reinforcement (p. 231)
Secondary reinforcers (p. 230)
Shaping (p. 227)
Skinner box (p. 226)
Spontaneous recovery (pp. 221–222)
Stimulus discrimination (p. 223)
Stimulus generalization (p. 222)
Trial (p. 217)
Unconditioned response (UCR) (p. 217)
Unconditioned stimulus (UCS) (p. 217)
Variable-interval (VI) schedule (p. 232)
Variable-ratio (VR) schedule (p. 232)

Key People

Albert Bandura (p. 243)
John Garcia (p. 239)
Ivan Pavlov (p. 216)
Robert Rescorla (p. 241)
Martin Seligman (p. 238)
B. F. Skinner (p. 225)
E. L. Thorndike (pp. 224–225)
Edward C. Tolman (pp. 240–241)
John B. Watson (p. 222)

CHAPTER 6 Practice Test

- After repeatedly pairing a tone with meat powder, Pavlov found that a dog will salivate when the tone is presented. Salivation to the tone is a(n):
A. unconditioned stimulus.
B. unconditioned response.
C. conditioned stimulus.
D. conditioned response.
- Sam's wife always wears the same black nightgown whenever she is "in the mood" for sexual relations. Sam becomes sexually aroused as soon as he sees his wife in the nightgown. For Sam, the nightgown is a(n):
A. unconditioned stimulus.
B. unconditioned response.
C. conditioned stimulus.
D. conditioned response.
- Watson and Rayner (1920) conditioned "Little Albert" to fear white rats by banging a hammer on a steel bar as the child played with a white rat. Later, it was discovered that Albert feared not only white rats but white stuffed toys and Santa's beard as well. Albert's fear of these other objects can be attributed to:
A. the law of effect.
B. stimulus generalization.
C. stimulus discrimination.
D. an overactive imagination.
- The phenomenon of higher-order conditioning shows that:
A. only a genuine, natural UCS can be used to establish a CR.
B. auditory stimuli are easier to condition than visual stimuli.
C. visual stimuli are easier to condition than auditory stimuli.
D. an already established CS can be used in the place of a natural UCS.
- Which of the following statements is (are) true?
A. Classical conditioning regulates reflexive, involuntary responses exclusively.
B. Operant conditioning regulates voluntary responses exclusively.
C. The distinction between the two types of conditioning is not absolute, with both types jointly and interactively governing some aspects of behavior.
D. Both a and b.
- A pigeon in a Skinner box is pecking the disk at a high, steady rate. The graph portraying this pigeon's responding will have:
A. a steep, unchanging slope.
B. a shallow, unchanging slope.
C. a progressively steeper slope.
D. a progressively shallower slope.
- A primary reinforcer has _____ reinforcing properties; a secondary reinforcer has _____ reinforcing properties.
A. biological; acquired
B. conditioned; unconditioned
C. weak; potent
D. immediate; delayed
- The steady, rapid responding of a person playing a slot machine is an example of the pattern of responding typically generated on a _____ schedule.
A. fixed-ratio
B. variable-ratio
C. fixed-interval
D. variable-interval
- Positive reinforcement _____ the rate of responding; negative reinforcement _____ the rate of responding.
A. increases; decreases
B. decreases; increases
C. increases; increases
D. decreases; decreases
- Research on avoidance learning suggests that a fear response is acquired through _____ conditioning; the avoidance response is maintained as a result of _____ conditioning.
A. classical; operant
B. operant; classical
C. classical; classical
D. operant; operant
- Nolan used to love tequila. However, a few weeks ago he drank way too much tequila and became very, very sick. His tendency to drink tequila has since declined dramatically. In operant terms, this sequence of events represents:
A. generalization
B. negative reinforcement.
C. higher-order conditioning.
D. punishment.
- According to Rescorla, the strength of a conditioned response depends on:
A. the number of trials in which the CS and UCS are paired.
B. the number of trials in which the CS is presented alone.
C. the percentage of trials in which the CS and UCS are paired.
D. resistance to extinction.
- Skinner maintained that reinforcement determines the acquisition of a response; Bandura maintains that reinforcement determines the _____ of a response.
A. acquisition
B. development
C. performance
D. generalization
- The link between physical punishment and subsequent aggressive behavior is probably best explained by:
A. observational learning.
B. noncontingent reinforcement.
C. resistance to extinction.
D. classical conditioning.
- The *second* step in a self-modification program is to:
A. specify the target behavior.
B. design your program.
C. gather baseline data.
D. set up a behavioral contact.

1 D pp. 217-218	5 C p. 224
2 C pp. 217-218	4 D pp. 223-224
3 B p. 222	10 A pp. 234-235
4 D pp. 223-224	9 C p. 233
5 C p. 224	8 B pp. 231-232
6 A p. 227	7 A p. 230
7 A p. 230	12 C p. 241
8 B pp. 231-232	13 C p. 244
9 C p. 233	14 A p. 243
10 A pp. 234-235	15 C p. 251
11 D pp. 235-236	

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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CHAPTER

7

Human Memory



Encoding: Getting Information into Memory

The Role of Attention
Levels of Processing
Enriching Encoding

Storage: Maintaining Information in Memory

Sensory Memory
Short-Term Memory
Long-Term Memory

FEATURED STUDY • How Accurate Are Flashbulb Memories?

Are Short-Term Memory and Long-Term Memory Really Separate?
How Is Knowledge Represented and Organized in Memory?

Retrieval: Getting Information out of Memory

Using Cues to Aid Retrieval
Reinstating the Context of an Event
Reconstructing Memories and the Misinformation Effect
Source Monitoring and Reality Monitoring

Forgetting: When Memory Lapses

How Quickly We Forget: Ebbinghaus's Forgetting Curve
Measures of Forgetting
Why We Forget
The Recovered Memories Controversy

In Search of the Memory Trace: The Physiology of Memory

The Biochemistry of Memory
The Neural Circuitry of Memory
The Anatomy of Memory

Systems and Types of Memory

Declarative Versus Procedural Memory
Semantic Versus Episodic Memory
Prospective Versus Retrospective Memory

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Improving Everyday Memory

Engage in Adequate Rehearsal
Schedule Distributed Practice and Minimize Interference
Engage in Deep Processing and Organize Information
Enrich Encoding with Verbal Mnemonics
Enrich Encoding with Visual Mnemonics

CRITICAL THINKING APPLICATION • Understanding the Fallibility of Eyewitness Accounts

The Contribution of Hindsight Bias
The Contribution of Overconfidence
Strategies to Reduce Overconfidence

Recap

Practice Test

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If you live in the United States, you've undoubtedly handled thousands upon thousands of American pennies. Surely, then, you remember what a penny looks like—or do you? Take a look at **Figure 7.1**. Which drawing corresponds to a real penny? Did you have a hard time selecting the real one? If so, you're not alone. Nickerson and Adams (1979) found that most people can't recognize the real penny in this collection of drawings. And their surprising finding was not a fluke. Undergraduates in England showed even worse memory for British coins (Jones, 1990). How can that be? Why do most of us have so poor a memory for an object we see every day?

Let's try another exercise. A definition of a word follows. It's not a particularly common word, but there's a good chance that you're familiar with it. Try to think of the word.

Definition: Favoritism shown or patronage granted by persons in high office to relatives or close friends.

If you can't think of the word, perhaps you can remember the letter of the alphabet it begins with, or what it sounds like. If so, you're experiencing the *tip-of-the-tongue phenomenon*, in which forgotten information feels like it's just out of reach. In this case, the word you may be reaching for is *nepotism*.

You've probably endured the tip-of-the-tongue phenomenon while taking exams. You blank out on a term that you're sure you know. You may feel as if you're on the verge of remembering the term, but you can't quite come up with it. Later, perhaps while



Figure 7.1
A simple memory test. Nickerson and Adams (1979) presented these 15 versions of an object most people have seen hundreds or thousands of times and asked, "Which one is correct?" Can you identify the real penny shown here?

Source: Nickerson, R. S., & Adams, M. J. (1979). Long-term memory for a common object. *Cognitive Psychology*, 11, 287–307. Copyright © 1979 Elsevier Science USA, reproduced with permission from the publisher.

you're driving home, the term suddenly comes to you. "Of course," you may say to yourself, "how could I forget that?" That's an interesting question. Clearly, the term was stored in your memory.

As these examples suggest, memory involves more than taking information in and storing it in some mental compartment. In fact, psychologists probing the workings of memory have had to grapple with three enduring questions: (1) How does information get *into* memory? (2) How is information *maintained* in memory? and (3) How is information pulled *back out* of memory? These three questions correspond to the three key processes involved in memory (see **Figure 7.2**): *encoding* (getting information in), *storage* (maintaining it), and *retrieval* (getting it out).

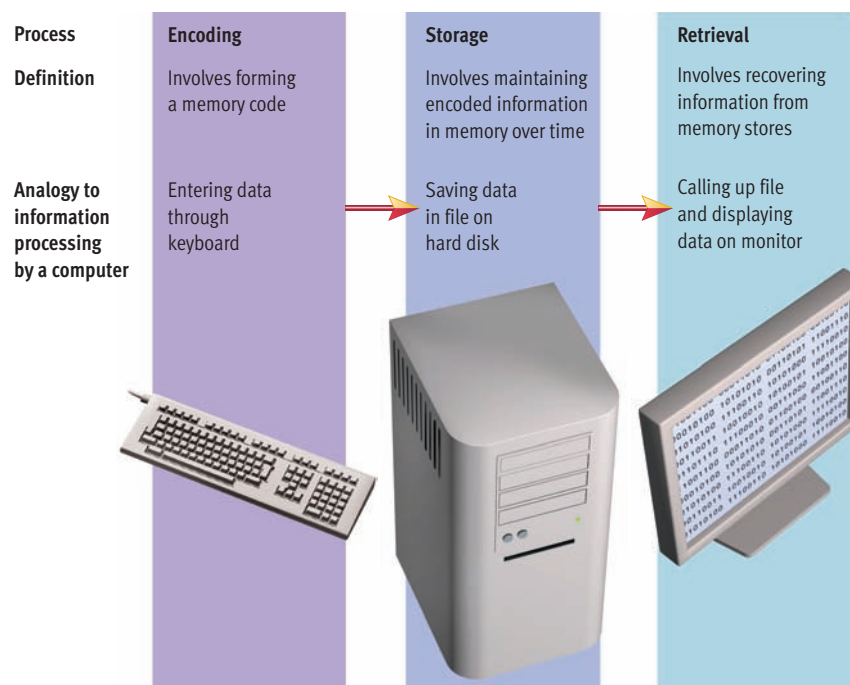


Figure 7.2
Three key processes in memory. Memory depends on three sequential processes: encoding, storage, and retrieval. Some theorists have drawn an analogy between these processes and elements of information processing by computers, as depicted here. The analogies for encoding and retrieval work pretty well, but the storage analogy is somewhat misleading. When information is stored on a hard drive, it remains unchanged indefinitely and you can retrieve an exact copy. As you will learn in this chapter, memory storage is a much more dynamic process. People's memories change over time and are rough reconstructions rather than exact copies of past events.

Encoding involves forming a memory code. For example, when you form a memory code for a word, you might emphasize how it looks, how it sounds, or what it means. Encoding usually requires attention, which is why you may not be able to recall exactly what a penny looks like—most people don’t pay much attention to the appearance of a penny. **Storage involves maintaining encoded information in memory over time.** Psychologists have focused much of their memory research on trying to identify just what factors help or hinder memory storage. But, as the tip-of-the-tongue phenomenon shows, information storage isn’t enough to guarantee that you’ll remember something. You need to be able to get information out of storage. **Retrieval involves recovering information from memory stores.** Research issues concerned with retrieval include the study of how people search memory and

why some retrieval strategies are more effective than others.

Most of this chapter is devoted to an examination of memory encoding, storage, and retrieval. As you’ll see, these basic processes help explain the ultimate puzzle in the study of memory: why people forget. Just as memory involves more than storage, forgetting involves more than “losing” something from the memory store. Forgetting may be due to deficiencies in any of the three key processes in memory—encoding, storage, or retrieval. After our discussion of forgetting, we will take a brief look at the physiological bases of memory. Finally, we will describe distinctions between different types of memory. The chapter’s Personal Application provides some practical advice on how to improve your memory. The Critical Thinking Application discusses some reasons that memory is less reliable than people assume it to be.

> Encoding: Getting Information into Memory

PREVIEW QUESTIONS

- What does attention have to do with memory?
- What types of encoding produce deeper processing?
- How do levels of processing relate to retention?
- How does elaboration enhance encoding?
- How does the use of visual imagery improve memory?
- What is self-referent encoding?

Have you ever been introduced to someone and then realized only 30 seconds into your interaction that you had already “forgotten” his or her name? More often than not, this familiar kind of forgetting results from a failure to form a memory code for the name. When you’re introduced to people, you’re often busy sizing them up and thinking about what you’re going to say. With your attention diverted in this way, names go in one ear and out the other. You don’t remember them because they aren’t encoded for storage into memory. Psychologists have observed a similar phenomenon in the laboratory, which they have dubbed the *next-in-line effect*. If participants in a small group take turns speaking to the group, subsequent memory tests reveal that the subjects tend to not recall much of what was said just before they took their turn (Bond, Pitre, & Van Leeuwen, 1991). Why? Because when participants are next in line to speak, they are too preoccupied rehearsing to pay attention to what is being said.

Like the problem of forgetting people’s names just after you’ve met them, the next-in-line effect illustrates that active encoding is a crucial process in memory. In this section, we discuss the role of attention in encoding, various types of encoding, and ways to enrich the encoding process.

The Role of Attention

Although there are some fascinating exceptions, you generally need to pay attention to information if you

intend to remember it (Lachter, Forster, & Ruthruff, 2004; Mulligan, 1998). For example, if you sit through a class lecture but pay little attention to it, you’re unlikely to remember much of what the professor had to say. **Attention involves focusing awareness on a narrowed range of stimuli or events.** If you pause to devote a little attention to the matter, you’ll realize that selective attention is critical to everyday functioning. If your attention were distributed equally among all stimulus inputs, life would be utter chaos. If you weren’t able to filter out most of the potential stimulation around you, you wouldn’t be able to read a book, converse with a friend, or even carry on a coherent train of thought.

Attention is often likened to a *filter* that screens out most potential stimuli while allowing a select few to pass through into conscious awareness. However, a great deal of debate has been devoted to *where* the filter is located in the information-processing system. The key issue in this debate is whether stimuli are screened out *early*, during sensory input, or *late*, after the brain has processed the meaning or significance of the input (see Figure 7.3).

Evidence on the “cocktail party phenomenon” suggests the latter. For example, imagine a young woman named Claudia at a crowded party where many conversations are taking place. Claudia is paying attention to her conversation with a friend and filtering out the other conversations. However, if someone in another conversation mentions her name, Claudia may notice it, even though she has been ignoring that

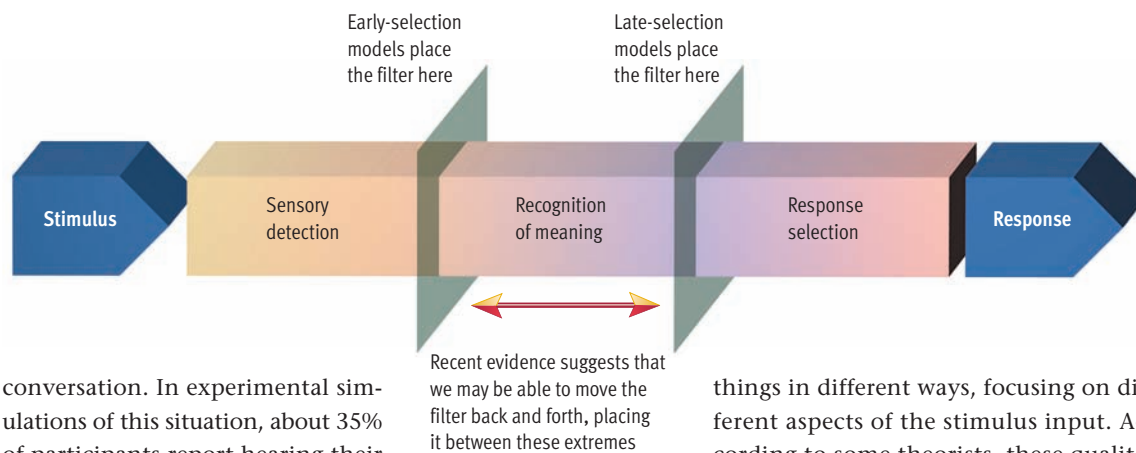


Figure 7.3
Models of selective attention. Early-selection models propose that input is filtered before meaning is processed. Late-selection models hold that filtering occurs after the processing of meaning. There is evidence to support early, late, and intermediate selection, suggesting that the location of the attentional filter may not be fixed.

conversation. In experimental simulations of this situation, about 35% of participants report hearing their own name (Wood & Cowan, 1995).

If selection is early, how can these people register input they've been blocking out? This cocktail party phenomenon suggests that attention involves *late* selection, based on the *meaning* of input.

Which view is supported by the weight of scientific evidence—early selection or late selection? Studies have found ample evidence for *both* as well as for intermediate selection (Cowan, 1988; Posner & DiGirolamo, 2000). These findings have led some theorists to conclude that the location of the attention filter may be flexible rather than fixed (Shiffrin, 1988).

Wherever filtering occurs, it is clear that people have difficulty if they attempt to focus their attention on two or more inputs simultaneously. For example, if Claudia tried to continue her original conversation while also monitoring the other conversation in which she was mentioned, she would struggle in her efforts to attend to both conversations and would remember less of her original conversation. Studies indicate that when participants are forced to divide their attention between memory encoding and some other task, large reductions in memory performance are seen (Craik, 2001; Craik & Kester, 2000). Actually, the negative effects of divided attention are not limited to memory. Divided attention can have a negative impact on the performance of quite a variety of tasks, especially when the tasks are complex or unfamiliar (Pashler, Johnston, & Ruthruff, 2001). This principle appears to apply to the controversy about the advisability of driving while conversing on a cellular telephone. One recent study of a simulated driving task suggests that cellular conversations double the chances of missing traffic signals and slow down reactions to signals that are detected (Strayer & Johnston, 2001).

Levels of Processing

PSYK Trek
SIM5,6a

Attention is critical to the encoding of memories, but not all attention is created equal. You can attend to

things in different ways, focusing on different aspects of the stimulus input. According to some theorists, these qualitative differences in *how* people attend to

information are important factors influencing how much they remember. In an influential theoretical treatise, Fergus Craik and Robert Lockhart (1972) proposed that incoming information can be processed at different levels. For instance, they maintained that in dealing with verbal information, people engage in three progressively deeper levels of processing: structural, phonemic, and semantic encoding (see **Figure 7.4**). *Structural encoding* is relatively shallow processing that emphasizes the physical structure of the stimulus. For example, if words are flashed on a screen, structural encoding registers such things as how they were printed (capital, lowercase, and so on) or the length of the words (how many letters). Further analysis may result in *phonemic encoding*, which emphasizes what a word sounds like. Phonemic encoding involves naming or saying (perhaps silently) the words. Finally, *semantic encoding* emphasizes the meaning of verbal input; it involves thinking about the objects and actions the words represent. **Levels-**

Figure 7.4
Levels-of-processing theory. According to Craik and Lockhart (1972), structural, phonemic, and semantic encoding—which can be elicited by questions such as those shown on the right—involve progressively deeper levels of processing, which should result in more durable memories.

	Level of processing	Type of encoding	Example of questions used to elicit appropriate encoding
Depth of processing	Shallow processing	Structural encoding: emphasizes the physical structure of the stimulus	Is the word written in capital letters?
	Intermediate processing	Phonemic encoding: emphasizes what a word sounds like	Does the word rhyme with weight?
	Deep processing	Semantic encoding: emphasizes the meaning of verbal input	Would the word fit in the sentence: "He met a _____ on the street?"

of-processing theory proposes that deeper levels of processing result in longer-lasting memory codes.

In one experimental test of levels-of-processing theory, Craik and Tulving (1975) compared the durability of structural, phonemic, and semantic encoding. They directed subjects' attention to particular aspects of briefly presented stimulus words by asking them questions about various characteristics of the words (see **Figure 7.4**). The questions were designed to engage the subjects in different levels of processing. After responding to 60 words, the subjects received an unexpected test of their memory for the words. As predicted, the subjects' recall was low after structural encoding, notably better after phonemic encoding, and highest after semantic encoding (see **Figure 7.5**).

The hypothesis that deeper processing leads to enhanced memory has been replicated in many studies (Craik, 2002; Lockhart & Craik, 1990). Nonetheless, the levels-of-processing model is not without its weaknesses (Roediger & Gallo, 2001; Watkins, 2002). Among other things, critics ask, what exactly is a "level" of processing? And how do we determine whether one level is deeper than another? Efforts to find an objective index of processing depth have failed, leaving the levels in levels-of-processing theory vaguely defined (Craik, 2002). Still, the theory has been enormously influential; it has shown that memory involves more than just storage and has inspired a great deal of research on how processing considerations influence memory (Roediger, Gallo, & Geraci, 2002).

Enriching Encoding

Structural, phonemic, and semantic encoding do not exhaust the options when it comes to forming memory codes. There are other dimensions to encoding, dimensions that can enrich the encoding process and thereby improve memory.

Elaboration

Semantic encoding can often be enhanced through a process called elaboration. **Elaboration is linking a stimulus to other information at the time of encoding.** For example, let's say you read that phobias are often caused by classical conditioning, and you apply this idea to your own fear of spiders. In doing so, you are engaging in elaboration. The additional associations created by elaboration usually help people remember information. Differences in elaboration can help explain why different approaches to semantic processing result in varied amounts of retention (Craik & Tulving, 1975; Willoughby, Motz, & Wood, 1997).



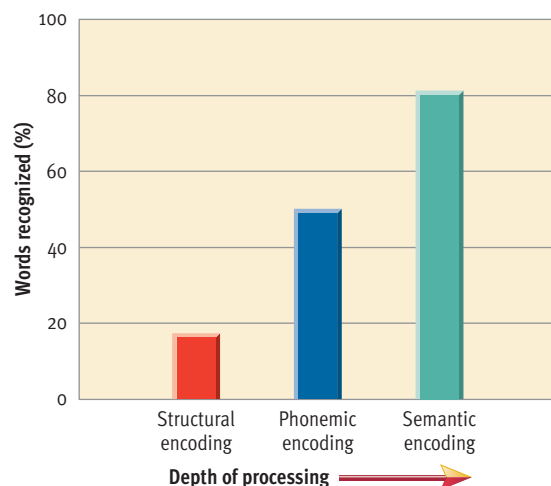
Visual Imagery

Imagery—the creation of visual images to represent the words to be remembered—can also be used to enrich encoding. Of course, some words are easier to create images for than others. If you were asked to remember the word *juggler*, you could readily form an image of someone juggling balls. However, if you were asked to remember the word *truth*, you would probably have more difficulty forming a suitable image. The difference is that *juggler* refers to a concrete object, whereas *truth* refers to an abstract concept. Allan Paivio (1969) points out that it is easier to form images of concrete objects than of abstract concepts. He believes that this ease of image formation affects memory.

The beneficial effect of imagery on memory was demonstrated in a study by Paivio, Smythe, and Yuille (1968). They asked subjects to learn a list of 16 pairs of words. They manipulated whether the words were concrete, high-imagery words or abstract, low-imagery words. In terms of imagery potential, the list contained four types of pairings: high-high (*juggler-dress*), high-low (*letter-effort*), low-high (*duty-hotel*), and low-low (*quality-necessity*). The results showed that high-imagery words are easier to remember than low-imagery words (see **Figure 7.6**). Similar results were observed in a more recent study that controlled for additional confounding factors (Paivio, Khan, & Begg, 2000).

According to Paivio (1986), imagery facilitates memory because it provides a second kind of memory code, and two codes are better than one. His **dual-coding theory holds that memory is enhanced by forming semantic and visual codes, since either can lead to recall.** Although some aspects of dual-coding theory have been questioned, it's clear that the use of mental imagery can enhance memory in many situations (Marschark, 1992; McCauley, Eskes, & Moscovitch, 1996).

Figure 7.5
Retention at three levels of processing. In accordance with levels-of-processing theory, Craik and Tulving (1975) found that structural, phonemic, and semantic encoding, which involve progressively deeper levels of processing, led to progressively better retention. (Data from Craik & Tulving, 1975)



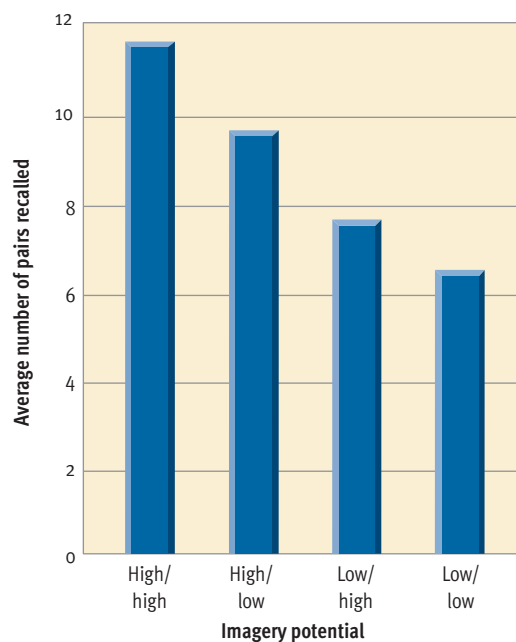


Figure 7.6
The effect of visual imagery on retention. Participants given pairs of words to remember showed better recall for high-imagery pairings than for low-imagery pairings, demonstrating that visual imagery can enrich encoding. (Data from Paivio, Smythe, & Yuille, 1968)

Self-Referent Encoding

Making material *personally* meaningful can also enrich encoding. People's recall of information tends to be slanted in favor of material that is personally relevant (Kahan & Johnson, 1992). *Self-referent encoding*

involves deciding how or whether information is personally relevant. This approach to encoding was compared to structural, phonemic, and semantic encoding in a study by Rogers, Kuiper, and Kirker (1977). To induce self-referent encoding, subjects were asked to decide whether adjectives flashed on a screen applied to them personally. The results showed that self-referent encoding led to improved recall of the adjectives. Self-referent encoding appears to enhance recall by promoting additional elaboration and better organization of information (Symons & Johnson, 1997).

➤ REVIEW OF KEY POINTS

- Three key processes contribute to memory: encoding, storage, and retrieval. The next-in-line effect illustrates that active encoding is crucial to memory.
- Attention, which facilitates encoding, is inherently selective and has been compared to a filter. The cocktail party phenomenon suggests that input is screened late in mental processing. The empirical evidence indicates that people may have some flexibility in where they place their attention filter.
- According to levels-of-processing theory, structural, phonemic, and semantic encoding represent progressively deeper levels of processing. Deeper processing results in better recall of information.
- Elaboration enriches encoding by linking a stimulus to other information, such as examples of an idea. The creation of visual images to represent words can enrich encoding. Visual imagery may help by creating two memory codes rather than just one. Encoding that emphasizes personal self-reference may be especially useful in facilitating retention.

➤ Storage: Maintaining Information in Memory

In their efforts to understand memory storage, theorists have historically related it to the technologies of their age (Roediger, 1980). One of the earliest models used to explain memory storage was the wax tablet. Both Aristotle and Plato compared memory to a block of wax that differed in size and hardness for various individuals. Remembering, according to this analogy, was like stamping an impression into the wax. As long as the image remained in the wax, the memory would remain intact.

Modern theories of memory reflect the technological advances of the 20th century. For example, many theories formulated at the dawn of the computer age drew an analogy between information storage by computers and information storage in human memory (Atkinson & Shiffrin, 1968, 1971; Broadbent, 1958; Waugh & Norman, 1965). The main contribu-

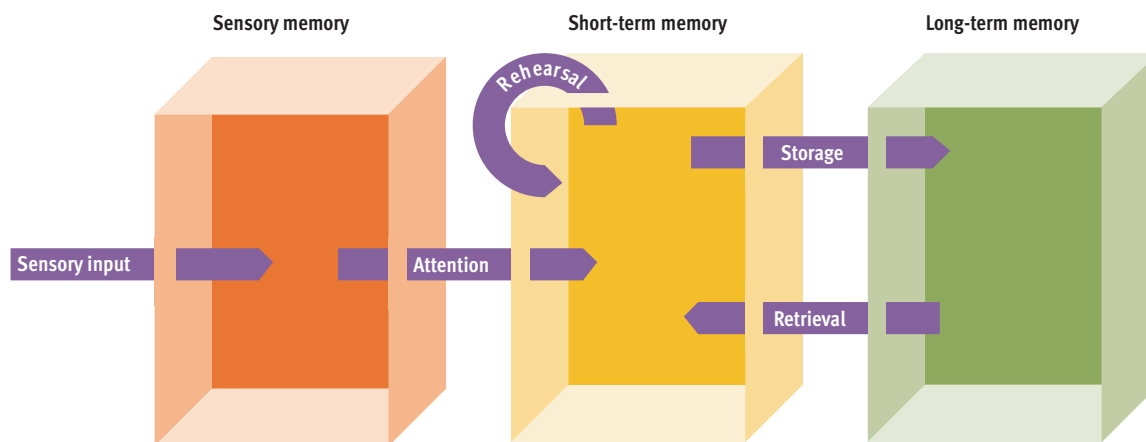
tion of these *information-processing theories* was to subdivide memory into three separate memory stores (Estes, 1999; Pashler & Carrier, 1996). The names for these stores and their exact characteristics varied some from one theory to the next. For purposes of simplicity, we'll organize our discussion around the model devised by Atkinson and Shiffrin, which proved to be the most influential of the information-processing theories. According to their model, incoming information passes through two temporary storage buffers—the sensory store and short-term store—before it is transferred into a long-term store (see Figure 7.7 on the next page). Like the wax tablet before it, the information-processing model of memory serves as a metaphor; the three memory stores are not viewed as anatomical structures in the brain, but rather as functionally distinct types of memory.

PREVIEW QUESTIONS

- What is sensory memory?
- What is the duration and capacity of the short-term store?
- What are the components of working memory?
- Is long-term storage permanent?
- Why have some theorists questioned the distinction between short-term and long-term memory?
- How is information organized and represented in memory?

Figure 7.7

The Atkinson and Shiffrin model of memory storage. Atkinson and Shiffrin (1971) proposed that memory is made up of three information stores. *Sensory memory* can hold a large amount of information just long enough (a fraction of a second) for a small portion of it to be selected for longer storage. *Short-term memory* has a limited capacity, and unless aided by rehearsal, its storage duration is brief. *Long-term memory* can store an apparently unlimited amount of information for indeterminate periods.



Sensory Memory



The *sensory memory* preserves information in its original sensory form for a brief time, usually only a fraction of a second. Sensory memory allows the sensation of a visual pattern, sound, or touch to linger for a brief moment after the sensory stimulation is over. In the case of vision, people really perceive an *afterimage* rather than the actual stimulus. You can demonstrate the existence of afterimages for yourself by rapidly moving a lighted sparkler or flashlight in circles in the dark. If you move a sparkler fast enough, you should see a complete circle even though the light source is only a single point (see the adjacent photo). The sensory memory preserves the sensory image long enough for you to perceive a continuous circle rather than separate points of light.

The brief preservation of sensations in sensory memory is adaptive in that it gives you additional time to try to recognize stimuli. However, you'd better take advantage of this stimulus persistence immediately, because it doesn't last long. This brevity was demonstrated in a classic experiment by George Sperling (1960). His subjects saw three rows of letters

flashed on a screen for just $\frac{1}{20}$ of a second. A tone following the exposure signaled which row of letters the subject should report to the experimenter (see Figure 7.8). Subjects were fairly accurate when the signal occurred immediately. However, their accuracy steadily declined as the delay of the tone increased to one second. Why? Because memory traces in the sensory store decay in about $\frac{1}{4}$ of a second (Massaro & Loftus, 1996). There is some debate about whether stimulus persistence really involves *memory storage* (Nairne, 2003). Some theorists view it as an artifact of the perceptual processing of incoming stimuli caused by excitatory feedback in specific neural circuits (Francis, 1999). In other words, stimulus persistence may be more like an echo than a memory.

Short-Term Memory



Short-term memory (STM) is a limited-capacity store that can maintain unrehearsed information for up to about 20 seconds. In contrast, information stored in long-term memory may last weeks, months, or years. However, there is a way that you can maintain information in your short-term store indefinitely. How? Primarily, by engaging in *rehearsal*—the process of repetitively verbalizing or thinking about the information. For instance, when you look up a phone number, you probably recite it over and over until you can dial it. Rehearsal keeps recycling the information through your short-term memory. In theory, this recycling could go on forever, but in reality something eventually distracts you and breaks the rehearsal loop. In any event, this reliance on recitation illustrates another facet of short-term memory—it depends primarily on *phonemic encoding*.

Because the image of the sparkler persists briefly in sensory memory, when the sparkler is moved fast enough, the blending of afterimages causes people to see a continuous stream of light instead of a succession of individual points.



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Durability of Storage



Without rehearsal, information in short-term memory is lost in 10 to 20 seconds (Nairne, 2003). This rapid

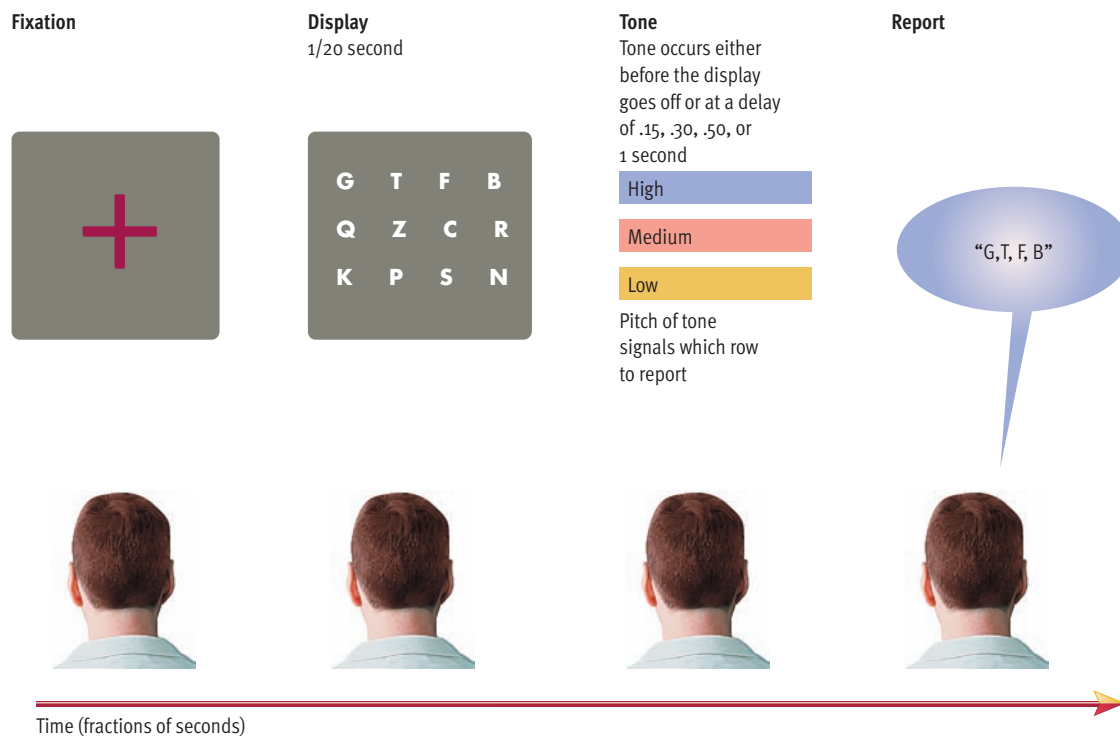


Figure 7.8
Sperling's (1960) study of sensory memory. After the participants had fixated on the cross, the letters were flashed on the screen just long enough to create a visual afterimage. High, medium, and low tones signaled which row of letters to report. Because subjects had to rely on the afterimage to report the letters, Sperling (1960) was able to measure how rapidly the afterimage disappeared by varying the delay between the display and the signal to report.

loss was demonstrated in a study by Peterson and Peterson (1959). They measured how long undergraduates could remember three consonants if they couldn't rehearse them. To prevent rehearsal, they required the students to count backward by threes from the time the consonants were presented until they saw a light that signaled the recall test (see **Figure 7.9**). Their re-

sults showed that subjects' recall accuracy was pretty dismal after only 15 seconds. Theorists originally believed that the loss of information from short-term memory was due purely to time-related *decay* of memory traces, but follow-up research showed that *interference* from competing material also contributes (Lewandowsky, Duncan, & Brown, 2004; Nairne, 2002).

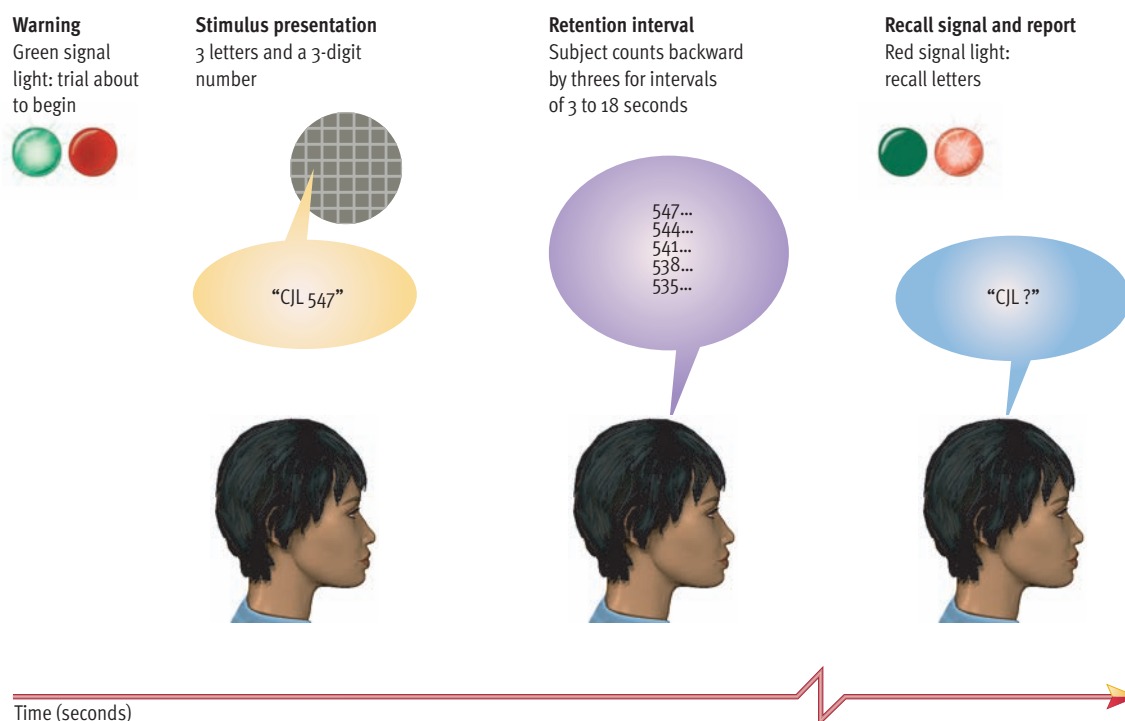


Figure 7.9
Peterson and Peterson's (1959) study of short-term memory. After a warning light was flashed, the participants were given three consonants to remember. The researchers prevented rehearsal by giving the subjects a three-digit number at the same time and telling them to count backward by three from that number until given the signal to recall the letters. By varying the amount of time between stimulus presentation and recall, Peterson and Peterson (1959) were able to measure how quickly information was lost from short-term memory.



GEORGE MILLER

"The Magical Number Seven, Plus or Minus Two."

Web Link 7.1



The Magical Number Seven Plus or Minus Two
In 1956, Princeton psychology professor George A. Miller published one of the most famous papers in the history of psychology: "The Magical Number Seven Plus or Minus Two: Some Limits on Our Capacity for Processing Information." At this site, you'll find a copy of the original text with tables so you can see why this is such an important research milestone in psychology.



ALAN BADDELEY

"The concept of working memory proposes that a dedicated system maintains and stores information in the short term, and that this system underlies human thought processes."

Capacity of Storage



Short-term memory is also limited in the number of items it can hold. The small capacity of STM was pointed out by George Miller (1956) in a famous paper called "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information." Miller noticed that people could recall only about seven items in tasks that required the use of STM. When short-term memory is filled to capacity, the insertion of new information "bumps out" some of the information currently in STM. The limited capacity of STM constrains people's ability to perform tasks in which they need to mentally juggle various pieces of information (Baddeley & Hitch, 1974). Some approaches to this issue suggest that the capacity of short-term memory may even be less than widely assumed. Nelson Cowan (2001) asserts that the evidence indicates that the capacity of STM is *four plus or minus one*.

You can increase the capacity of your short-term memory by combining stimuli into larger, possibly higher-order units, called *chunks* (Simon, 1974). A **chunk is a group of familiar stimuli stored as a single unit**. You can demonstrate the effect of chunking by asking someone to recall a sequence of 12 letters grouped in the following way:

FBI - INB - CC - IAIB - M

As you read the letters aloud, pause at the hyphens. Your subject will probably attempt to remember each letter separately because there are no obvious groups or chunks. But a string of 12 letters is too long for STM, so errors are likely. Now present the same string of letters to another person, but place the pauses in the following locations:

FBI - NBC - CIA - IBM

The letters now form four familiar chunks that should occupy only four slots in STM, resulting in successful recall (Bower & Springston, 1970).

To successfully chunk the letters I B M, a subject must first recognize these letters as a familiar unit. This familiarity has to be stored somewhere in long-term memory. Thus, in this case information was transferred from long-term into short-term memory. This situation is not unusual. People routinely draw information out of their long-term memory banks to evaluate and understand information that they are working with in short-term memory.

Short-Term Memory as "Working Memory"



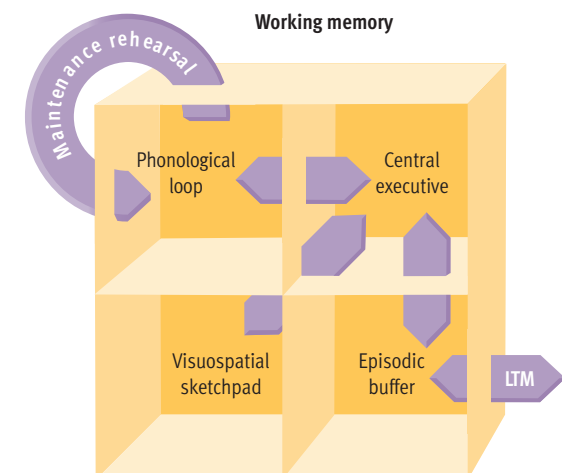
Research eventually uncovered a number of problems with the original model of short-term memory (Bower, 2000). Among other things, studies showed

that short-term memory is *not* limited to phonemic encoding as originally thought and that decay is *not* the only process responsible for the loss of information from STM. These and other findings suggested that short-term memory involves more than a simple rehearsal buffer, as originally envisioned. To make sense of such findings, Alan Baddeley (1986, 1992, 2001) proposed a more complex, modular model of short-term memory that characterizes it as "working memory."

Baddeley's model of working memory consists of four components (see Figure 7.10). The first component is the *phonological loop* that represented all of STM in earlier models. This component is at work when you use recitation to temporarily hold on to a phone number. Baddeley (2003) believes that the phonological loop evolved to facilitate the acquisition of language. The second component in working memory is a *visuospatial sketchpad* that permits people to temporarily hold and manipulate visual images. This element is at work when you try to mentally rearrange the furniture in your bedroom or map out a complicated route that you need to follow to travel somewhere. Researchers investigate this module of working memory by showing subjects visual sequences and spatial arrays, which they are asked to recreate. The third component is a *central executive* system. It controls the deployment of attention, switching the focus of attention and dividing attention as needed (for example, dividing attention between a conversation with your mother and a TV show you are simultaneously trying to watch). The central executive also coordinates the actions of the other modules. The fourth component is the *episodic buffer*, a tem-

Figure 7.10

Baddeley's model of working memory. This diagram depicts the revised model of the short-term store proposed by Alan Baddeley. According to Baddeley (2001), working memory includes four components: a phonological loop, a visuospatial sketchpad, a central executive system, and an episodic buffer.



porary, limited-capacity store that allows the various components of working memory to integrate information and that serves as an interface between working memory and long-term memory. The two key characteristics that originally defined short-term memory—limited capacity and storage duration—are still present in the concept of working memory, but Baddeley’s model accounts for evidence that STM handles a greater variety of functions than previously thought.

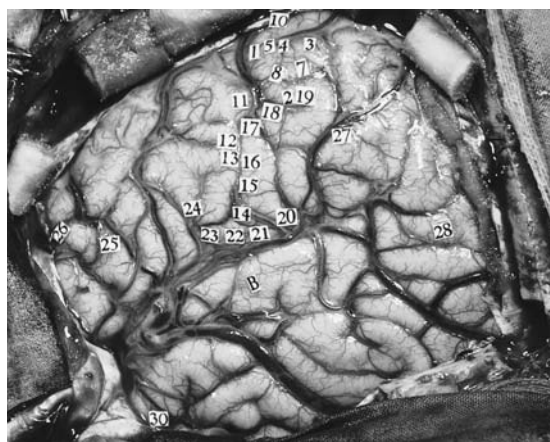
Baddeley’s model of working memory has generated an enormous volume of research. Much of the early research demonstrated that the separate modules work independently, as hypothesized. For example, studies showed that visual processing tasks that engaged the visuospatial sketchpad did not interfere much with verbal processing tasks that engaged the phonological loop, and vice versa (Logie, Zucco, & Baddeley, 1990). Another line of research has shown that people vary in how well they can juggle information in their working memory while fending off distractions (Engle, 2001). Interestingly, these variations in *working memory capacity* correlate positively with measures of high-level cognitive abilities, such as reading comprehension, complex reasoning, and even intelligence (Engle et al., 1999). This finding has led some theorists to conclude that working memory capacity plays a fundamental role in complex cognitive processes (Lepine, Barrouillet, & Camos, 2005). Researchers are also making progress in identifying the brain areas and neural mechanisms that underlie various aspects of working memory (Jonides, Lacey, & Nee, 2005; see p. 287).

Long-Term Memory



Long-term memory (LTM) is an unlimited capacity store that can hold information over lengthy periods of time. Unlike sensory and short-term memory, which have very brief storage durations, LTM can store information indefinitely. In fact, one point of view is that all information stored in long-term memory is stored there *permanently*. According to this view, forgetting occurs only because people sometimes cannot *retrieve* needed information from LTM.

The notion that LTM storage may be permanent is certainly intriguing. A couple of interesting lines of research have seemed to provide compelling evidence of permanent storage. However, each line of research has turned out to be less compelling than it appeared at first glance. The first line of research consisted of some landmark studies conducted by Canadian neuroscientist Wilder Penfield in the 1960s. He reported triggering long-lost memories through electrical stimulation of the brain (ESB) during brain surgeries (Penfield & Perot, 1963). When Penfield used



Reproduced with permission of the Literary Executors of the Wilder Penfield Estate. Courtesy of William Feindel.

Wilder Penfield and his associates conducted a series of studies with human subjects undergoing brain surgery for medical reasons. In these studies they used electrical stimulation of the brain to map out brain function in the cortex. In the course of these studies they thought they triggered long-lost memories when they stimulated areas in the temporal lobe (seen near the bottom of the photo). However, as your text explains, subsequent evidence led to a reinterpretation of their findings.

ESB (see Chapter 3) to map brain function in patients undergoing surgery for epilepsy, he found that stimulation of the temporal lobe sometimes elicited vivid descriptions of events long past. Patients would describe events that apparently came from their childhood—such as “being in a lumberyard” or “watching Mom make a phone call”—as if they were there once again. Penfield and others inferred that these descriptions were exact playbacks of long-lost memories unearthed by electrical stimulation of the brain.

The second line of research has centered on the phenomenon of **flashbulb memories, which are unusually vivid and detailed recollections of momentous events**. For instance, many older adults in the United States can remember exactly where they were, what they were doing, and how they felt when they learned that President John F. Kennedy had been shot. You may have a similar recollection related to the ter-

Image Not Available

rorist attacks that took place in New York and Washington, DC, on September 11, 2001. The vivid detail of people's memories of President Kennedy's assassination over 40 years ago would seem to provide a striking example of permanent storage.

So, why don't these lines of evidence demonstrate that LTM storage is permanent? Let's look at each. Closer scrutiny eventually showed that the remarkable "memories" activated by ESB in Penfield's studies often included major distortions or factual impossibilities. For instance, the person who recalled being in a lumberyard had never actually been to one. The ESB-induced recollections of Penfield's subjects apparently were hallucinations, dreams, or loose reconstructions of events rather than exact replays of the

past (Squire, 1987). In a similar vein, subsequent research has undermined the notion that flashbulb memories represent an instance of permanent storage. Although flashbulb memories tend to be strong, vivid, and detailed, studies suggest that they are neither as accurate nor as special as once believed (Neisser & Harsch, 1992; Schmolck, Buffalo, & Squire, 2000). Like other memories, they become less detailed and complete with time and are often inaccurate (Pezdek, 2003; Weaver & Krug, 2004). This observation brings us to our Featured Study for this chapter, which examined the accuracy of students' flashbulb memories of the 9/11 terrorist attacks on the World Trade Center in New York and the Pentagon in Washington, DC.

FEATURED Study

Source: Talarico, J. M., & Rubin, D. G. (2003). Confidence, not consistency, characterizes flashbulb memories. *Psychological Science*, 14, 455–461.

How Accurate Are Flashbulb Memories?

Overall, research on flashbulb memories has suggested that they are not any more accurate than other memories, but the findings have been somewhat inconsistent, probably because the studies have focused on different notable events, used different types of samples, and varied methods of measuring memory accuracy. Another problem is that events capable of generating flashbulb memories—such as the 9/11 terrorist attacks in this case—occur infrequently and unexpectedly, so many studies have been launched weeks or months after the focal event, which makes it hard to determine exactly what subjects experienced at the time. The chief advantages of the present study were that it was launched immediately (the day after the 9/11 terrorist attacks) and that it compared recall of this event to an everyday event (of each subject's choice) that had occurred in the same time frame. Thus, the investigators were able to collect better data on questions such as: How do people feel about their flashbulb memories? Are flashbulb memories exceptionally vivid? And, most critically, are flashbulb memories more accurate than other memories?

Method

Participants. Students at Duke University were contacted and tested on September 12 for their memory of hearing about the 9/11 terrorist attacks. The 54 students (14 males, 40 females) were randomly assigned to three groups. The first group was retested one week after 9/11; the second group was retested six weeks after the attacks; the third group was retested 32 weeks after the incident.

Procedure. For purposes of comparison, each subject was asked to identify and describe a recent (last three days) memorable event in their lives. They then filled out similar questionnaires and rating scales inquiring about this event and their experiences on 9/11. When subjects returned for their retesting, they responded to the same questionnaires and rating scales. Accuracy of

recall was gauged by measuring how consistent the retest reports were with the original reports collected on September 12.

Materials. The questionnaire administered on September 12 and in the retest sessions asked subjects open-ended questions about their experiences when they learned of the terrorist attacks, such as: When did you first hear the news? Where were you when you first heard the news? Who or what first told you the information? Similar questions were also posed regarding the everyday event chosen by the subject, such as: When did this event occur? Where were you, physically? Participants were also asked to respond to various 7-point rating scales that measured their perceptions about the vividness of their memories and their confidence in the accuracy of their recollections.

Results

The principal finding was that there was no appreciable difference in consistency between subjects' flashbulb memories of the terrorist attacks and their everyday memories over time. The consistency between participants' original reports and their retest reports declined over time at about the same rate for both types of memories (see **Figure 7.11**). In contrast, after six weeks, participants viewed their flashbulb memories as being more vivid than their everyday memories, and they had more confidence in the accuracy of their flashbulb memories.

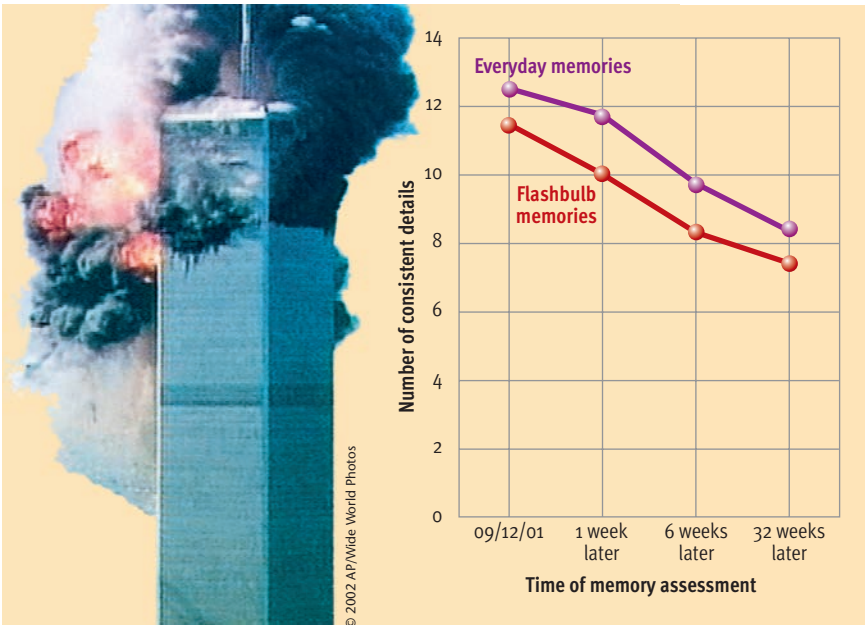
Discussion

The authors conclude that flashbulb memories fade gradually over time, even though people subjectively feel that these memories are especially vivid and accurate. They interpret their findings as undermining the notion that flashbulb memories have special characteristics that make them less vulnerable to forgetting than ordinary memories. They further suggest that the "true

mystery” for future research is to explain “why people are so confident for so long in the accuracy of their flashbulb memories.”

Comment

This research was featured because it examined a timely question and because it demonstrated that human memory is not as reliable as we assume it to be, a conclusion that will be echoed throughout this chapter. When it comes to the fallibility of human memory, no one is immune. When asked to recall his reactions to the 9/11 attacks, even President George W. Bush has shown quite a bit of inconsistency across three separate interviews—and he has TV recordings to remind him how he reacted (Greenberg, 2004). And, like many people, President Bush has reported recollections that cannot possibly be accurate. For instance, he has said that on the morning of 9/11 he saw video footage of the first plane hitting the World Trade Center, when, in reality, this video did not surface until later (Greenberg, 2004). Although some of the President’s critics have made a big deal out of these inconsistencies and mistakes, they are not the least bit unusual. As you will see in the upcoming pages, many lines of research have shown repeatedly that human



memory is more malleable and less accurate than generally appreciated.

Figure 7.11
Accuracy of flashbulb memories. Talarico and Rubin (2003) estimated the accuracy of participants’ flashbulb memories of the 9/11 terrorist attacks (and their selected everyday memories) by comparing the details of their original memories against their memories reported 1, 6, or 32 weeks later. This graph shows that the number of consistent details in subjects’ flashbulb memories and everyday memories declined at the same pace, suggesting that flashbulb memories are not more accurate or longer lasting than other memories. (Data from Talarico & Rubin, 2003)

Returning to the question at hand, the results of our Featured Study clearly conflict with the hypothesis that memory storage is permanent. Although the possibility cannot be ruled out completely, there is no convincing evidence that memories are stored away permanently and that forgetting is all a matter of retrieval failure (Payne & Blackwell, 1998; Schacter, 1996).

Are Short-Term Memory and Long-Term Memory Really Separate?

The partitioning of memory into the sensory, short-term, and long-term stores has dominated thinking about memory for many decades, but over the years

some theorists have expressed doubts about whether there really are separate memory stores. A handful of theorists have questioned the concept of sensory memory on the grounds that it may be nothing more than a perceptual “echo,” rather than memory. A larger number of theorists have questioned the concept of short-term memory on the grounds that it really isn’t all that different from long-term memory (Crowder, 1993; Healy & McNamara, 1996; Nairne, 1996). The view of short-term memory and long-term memory as independent systems was originally based, in part, on the belief that they depended on different types of encoding and were subject to different mechanisms of forgetting. STM was thought to depend on *phonemic* encoding (based on sound), whereas LTM encoding was thought to be largely *semantic* (based on meaning). Information loss from STM was

concept check 7.1

Comparing the Memory Stores

Check your understanding of the three memory stores by filling in the blanks in the table below. The answers can be found in the back of the book in Appendix A.

Feature	Sensory memory	Short-term memory	Long-term memory
Main encoding format	<i>copy of input</i>		<i>largely semantic</i>
Storage capacity	<i>limited</i>		
Storage duration		<i>up to 20 seconds</i>	

believed to be due to time-related *decay*, whereas *interference* was viewed as the principal mechanism of LTM forgetting. However, decades of research have shown that these distinctions are not absolute, as both semantic encoding and interference effects have been found in research on short-term memory (Meiser & Klauer, 1999; Walker & Hulme, 1999).

How do theorists who doubt the existence of separate memory stores view the structure of memory? Their views vary considerably (Nairne, 2002). One perspective is to view short-term memory as a tiny and constantly changing portion of long-term memory that happens to be in a heightened state of activation (Cowan, 1995, 1999). Other, more radical views assert that there is a single, unitary, “generic” memory store that is governed by one set of rules and processes (Nairne, 2001). The outcome of the debate about whether there are separate memory stores is difficult to predict. At present, the multiple stores viewpoint remains dominant, but alternative approaches are becoming increasingly influential.

How Is Knowledge Represented and Organized in Memory?



Over the years, memory researchers have wrestled endlessly with another major question relating to memory storage: How is knowledge represented and organized in memory? In other words, what forms do mental representations of information take? Most theorists seem to agree that our mental representations probably take a variety of forms, depending on the nature of the material that needs to be tucked away in memory. For example, memories of visual scenes, of how to perform actions (such as typing or hitting a backhand stroke in tennis), and of factual information (such as definitions or dates in history) are probably represented and organized in very dif-

ferent ways. Most of the theorizing to date has focused on how factual knowledge may be represented in memory. In this section, we’ll look at a small sample of the organizational structures that have been proposed for semantic information.

Clustering and Conceptual Hierarchies



People spontaneously organize information into categories for storage in memory. This reality was apparent in a study by Bousfield (1953), who asked subjects to memorize a list of 60 words. Although presented in a scrambled order, each of the words in the list fit into one of four categories: animals, men’s names, vegetables, or professions. Bousfield showed that subjects recalling this list engage in *clustering*—the tendency to remember similar or related items in groups. Even though the words were not presented in organized groups, participants tended to remember them in bunches that belonged in the same category. Thus, when applicable, factual information is routinely organized into simple categories.

Similarly, when possible, factual information may be organized into conceptual hierarchies. A *conceptual hierarchy* is a multilevel classification system based on common properties among items. A conceptual hierarchy that a person might construct for minerals can be found in Figure 7.12. According to Gordon Bower (1970), organizing information into a conceptual hierarchy can improve recall dramatically.

Schemas



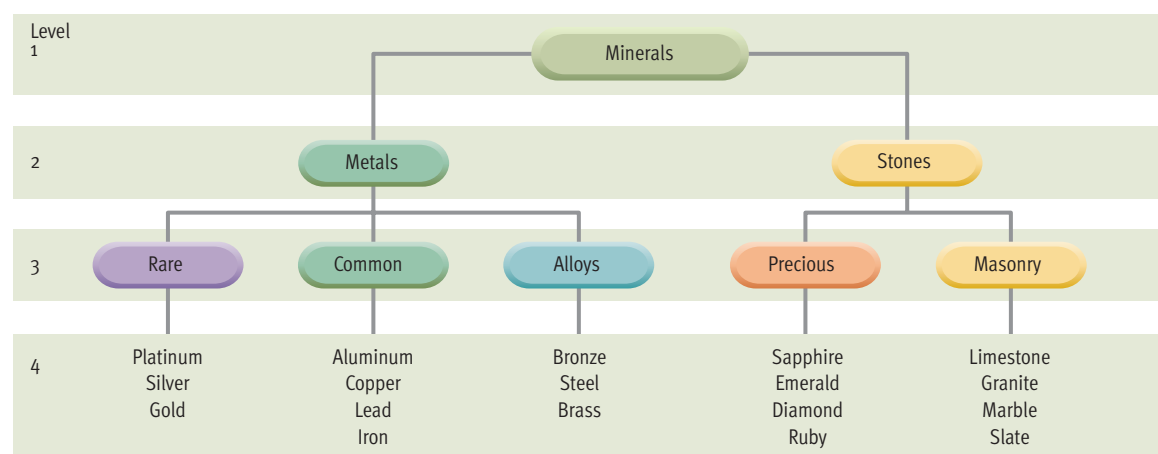
Imagine that you’ve just visited Professor Smith’s office, which is shown in the photo on the next page. Take a brief look at the photo and then cover it up. Now pretend that you want to describe the office to a friend. Write down what you saw in the office.

After you finish, compare your description with the picture. Chances are, your description will include

Figure 7.12
Conceptual hierarchies and long-term memory.

Some types of information can be organized into a multilevel hierarchy of concepts, like the one shown here, which was studied by Bower and others (1969). They found that subjects remember more information when they organize it into a conceptual hierarchy.

Source: Adapted from Bower, G. (1970). Organizational factors in memory. *Cognitive Psychology*, 1 (1), 18–46. Copyright © 1970 Elsevier Science USA, reproduced with permission from the publisher.



elements—books or filing cabinets, for instance—that were *not* in the office. This common phenomenon demonstrates how *schemas* can influence memory.

A **schema** is an organized cluster of knowledge about a particular object or event abstracted from previous experience with the object or event. For example, college students have schemas for what professors' offices are like. When Brewer and Treyens (1981) tested the recall of 30 subjects who had briefly visited the office shown in the photo, most subjects recalled the desks and chairs, but few recalled the wine bottle or the picnic basket, which aren't part of a typical office schema. Moreover, nine subjects in the Brewer and Treyens study falsely recalled that the office contained books. Perhaps you made the same mistake.

These results suggest that *people are more likely to remember things that are consistent with their schemas than things that are not*. Although this principle seems applicable much of the time, the inverse is also true: *People sometimes exhibit better recall of things that violate their schema-based expectations* (Koriat, Goldsmith, & Pansky, 2000). If information really clashes with a schema, it may attract extra attention and deeper processing and thus become more memorable. In short, the impact of schemas on memory can be difficult to predict, but either way it is apparent that information stored in memory is often organized around schemas.

Semantic Networks



Of course, not all information fits neatly into conceptual hierarchies or schemas. Much knowledge seems to be organized into less systematic frameworks, called semantic networks (Collins & Loftus, 1975). A **semantic network** consists of nodes representing concepts, joined together by pathways that link related concepts. A small semantic network is shown in Figure 7.13 on the next page. The ovals are the nodes, and the words inside the ovals are the interlinked concepts. The lines connecting the nodes are the pathways. The length of each pathway represents the degree of association between two concepts. Shorter pathways imply stronger associations.

Semantic networks have proven useful in explaining why thinking about one word (such as *butter*) can make a closely related word (such as *bread*) easier to remember (Meyer & Schvaneveldt, 1976). According to Collins and Loftus (1975), when people think about a word, their thoughts naturally go to related words. These theorists call this process *spreading activation* within a semantic network. They assume that activation spreads out along the pathways of the semantic network surrounding the word. They also theorize that the strength of this activation decreases as it



Courtesy of W. F. Brewer

Professor Smith's office is shown in this photo. Follow the instructions in the text to learn how Brewer and Treyens (1981) used it in a study of memory.

travels outward, much as ripples decrease in size as they radiate outward from a rock tossed into a pond. Consider again the semantic network shown in Figure 7.13. If subjects see the word *red*, words that are closely linked to it (such as *orange*) should be easier to recall than words that have longer links (such as *sunrises*).

Connectionist Networks and Parallel Distributed Processing (PDP) Models

Instead of taking their cue from how computers process information, *connectionist models* of memory take their inspiration from how neural networks appear to handle information. As we noted in our discussion of visual perception in Chapter 4, the human brain appears to depend extensively on *parallel distributed processing*—that is, simultaneous processing of the same information that is spread across networks of neurons. Based on this insight and basic findings about how neurons operate, **connectionist or parallel distributed processing (PDP) models** assume that cognitive processes depend on patterns of activation in highly interconnected computational networks that resemble neural networks (McClelland, 2000; McClelland & Rogers, 2003; McClelland & Rumelhart, 1985). A PDP system consists of a large network of interconnected computing units, or *nodes*, that operate much like neurons. These nodes may be inactive or they may send either excitatory or in-

Web Link 7.2



Memory Principles

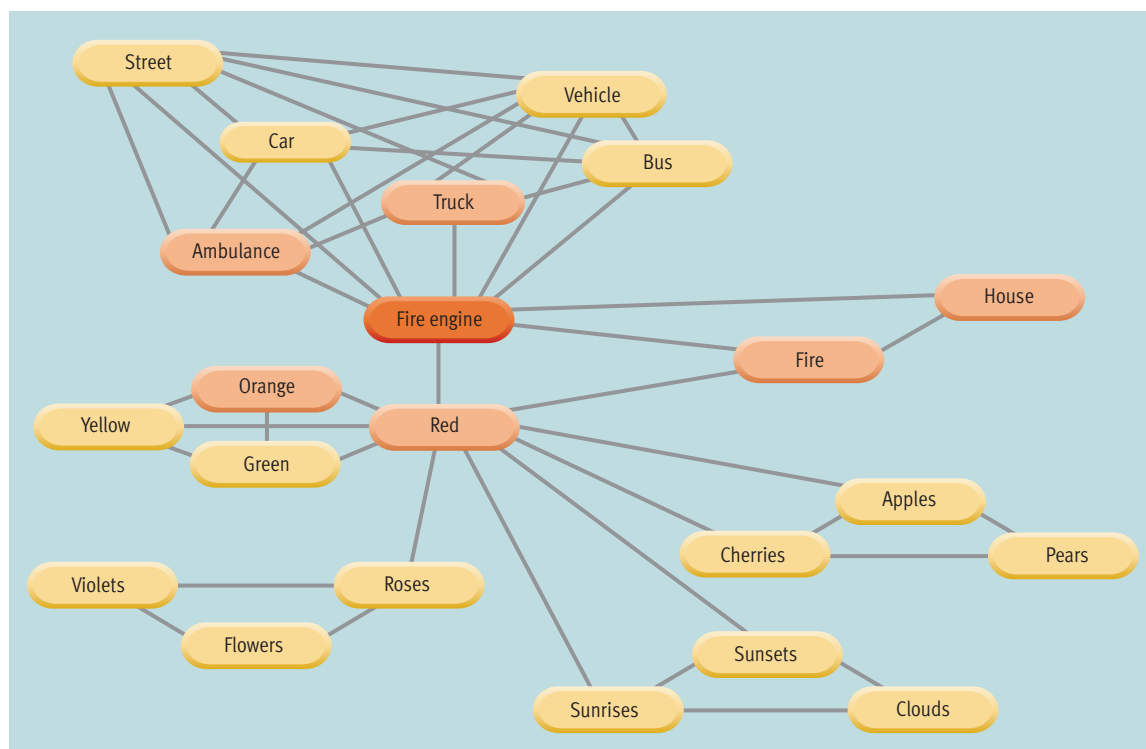
This brief overview of practical guidelines for improving recall of academic material is maintained by Carolyn Hopper at Middle Tennessee State University. Ten basic principles are outlined succinctly. Elsewhere at this site you will find other worthwhile materials intended to help students improve their study techniques.

Figure 7.13

A semantic network.

Much of the organization of long-term memory depends on networks of associations among concepts. In this highly simplified depiction of a fragment of a semantic network, the shorter the line linking any two concepts, the stronger the association between them. The coloration of the concept boxes represents activation of the concepts. This is how the network might look just after a person hears the words *fire engine*.

Source: Adapted from Collins, A. M., & Loftus, E. F. (1975). A spreading activation theory of semantic processing. *Psychological Review*, 82, 407–428. Copyright © 1975 by the American Psychological Association. Adapted by permission of the publisher and authors.



hibitory signals to other units. Like an individual neuron, a specific node's level of activation reflects the weighted balance of excitatory and inhibitory inputs from many other units. Given this framework, *PDP models assert that specific memories correspond to particular patterns of activation in these networks* (McClelland, 1992). Connectionist networks bear some superficial resemblance to semantic networks, but there is a crucial difference. In semantic networks, specific nodes represent specific concepts or pieces of knowledge. In connectionist networks, a piece of knowledge is represented by a particular *pattern* of activation across an entire network. Thus, the information lies in the strengths of the *connections*, which is why the PDP approach is called “connectionism.”

What are the strengths of the PDP approach? For one thing, connectionist models provide a highly plausible account for how mental structures may be derived from neural structures. In other words, they make sense in light of what research has revealed about neurophysiology. Another strength is that the emphasis on parallel processing seems to explain the blazing speed of humans' cognitive functioning more persuasively than alternative models do. You may not always *feel* like your mental processes are blazingly fast, but the reality is that a routine act like recognizing a complex visual stimulus typically takes a scant 300 milliseconds. Most other models implicitly assume that thinking involves *serial processing*, which requires executing operations in a single sequence. However, serial processing seems much too slow to

account for how the brain fires millions of neural impulses to accomplish simple actions.

➤ REVIEW OF KEY POINTS

- Information-processing theories of memory assert that people have three kinds of memory stores: a sensory memory, a short-term memory, and a long-term memory. The sensory store preserves information in its original form, probably for only a fraction of a second. Short-term memory has a limited capacity of about seven chunks of information. STM can maintain unrehearsed information for up to about 20 seconds.
- Short-term memory appears to involve more than a simple rehearsal loop and has been reconceptualized as working memory. According to Baddeley, working memory includes the phonological loop, the visuospatial sketchpad, a central executive system, and an episodic buffer.
- Long-term memory is an unlimited capacity store that may hold information indefinitely. Penfield's ESB research and the existence of flashbulb memories suggest that LTM storage may be permanent, but the evidence is not convincing. Our Featured Study showed that flashbulb memories are not as accurate as claimed. Some theorists have questioned the distinction between short-term and long-term memory.
- Information in long-term memory can be organized in simple categories or multilevel classification systems called conceptual hierarchies. A schema is an organized cluster of knowledge about a particular object or event.
- Semantic networks consist of concepts joined by pathways. Research suggests that activation spreads along the paths of semantic networks to activate closely associated words. Parallel distributed processing models of memory assert that specific memories correspond to particular patterns of activation in connectionist networks.

> Retrieval: Getting Information out of Memory

Storing information in long-term memory is a worthy goal, but it's insufficient if you can't get the information back out again when you need it. Some theorists maintain that understanding retrieval is the key to understanding human memory (Roediger, 2000).

Using Cues to Aid Retrieval

At the beginning of this chapter we discussed the *tip-of-the-tongue phenomenon*—the temporary inability to remember something you know, accompanied by a feeling that it's just out of reach. The tip-of-the-tongue phenomenon is a common experience that is typically triggered by a name that one can't quite recall. Most people experience this temporary frustration about once a week, although its occurrence increases with age (A. Brown, 1991; Burke & Shafto, 2004). The tip-of-the-tongue phenomenon clearly constitutes a failure in retrieval. However, the exact mechanisms underlying this failure are the subject of debate, as a host of explanations have been proposed for this phenomenon (B. L. Schwartz, 1999).

Fortunately, memories can often be jogged with *retrieval cues*—stimuli that help gain access to memories. This was apparent when Roger Brown and David McNeill (1966) studied the tip-of-the-tongue phenomenon. They gave subjects definitions of obscure words and asked them to come up with the words. Our example at the beginning of the chapter (the definition for *nepotism*) was taken from their study. Brown and McNeill found that subjects groping for obscure words were correct in guessing the first letter of the missing word 57% of the time. This figure far exceeds chance and shows that partial recollections are often headed in the right direction.

Reinstating the Context of an Event

Let's test your memory: What did you have for breakfast two days ago? If you can't immediately answer, you might begin by imagining yourself sitting at the breakfast table. Trying to recall an event by putting yourself back in the context in which it occurred involves working with *context cues* to aid retrieval.

Context cues often facilitate the retrieval of information (Smith, 1988). Most people have experienced the effects of context cues on many occasions. For instance, when people return after a number of years to a place where they used to live, they are typically flooded with long-forgotten memories. Or consider

how often you have gone from one room to another to get something (scissors, perhaps), only to discover that you can't remember what you were after. However, when you return to the first room (the original context), you suddenly recall what it was ("Of course, the scissors!"). These examples illustrate the potentially powerful effects of context cues on memory.

The technique of reinstating the context of an event has been used effectively in legal investigations to enhance eyewitness recall (Chandler & Fisher, 1996). The eyewitness may be encouraged to retrieve information about a crime by replaying the sequence of events. The value of reinstating the context of an event may account for how hypnosis occasionally stimulates eyewitness recall (Meyer, 1992). The hypnotist usually attempts to reinstate the context of the event by telling the witness to imagine being at the scene of the crime once again. Unfortunately, research suggests that hypnosis often increases subjects' tendencies to report *incorrect* information (Lynn, Neuschatz, & Fite, 2002; McConkey, Barnier, & Sheehan, 1998). Concerns about the accuracy of hypnosis-aided recall have led courts to be extremely cautious about allowing hypnosis-aided recollections as admissible testimony.

Reconstructing Memories and the Misinformation Effect

When you retrieve information from long-term memory, you're not able to pull up a "mental videotape" that provides an exact replay of the past. To some extent, your memories are sketchy *reconstructions* of the past that may be distorted and may include details that did not actually occur (Roediger, Wheeler, & Rajaram, 1993). The reconstructive nature of memory was first highlighted many years ago by Sir Frederic Bartlett, a prominent English psychologist. Bartlett (1932) had his subjects read the tale "War of the Ghosts," reproduced in **Figure 7.14** on the next page. Subjects read the story twice and waited 15 minutes. Then they were asked to write down the tale as best they could recall it.

What did Bartlett find? As you might expect, subjects condensed the story, leaving out boring details. Of greater interest was Bartlett's discovery that subjects frequently *changed* the tale to some extent. The canoe became a boat or the two young men were hunting beavers instead of seals. Subjects often introduced entirely *new elements* and twists. For instance,

PREVIEW QUESTIONS

- What does the tip-of-the-tongue phenomenon reveal about memory?
- Why does reinstating the context of an event aid in its recall?
- What are the misinformation effect and imagination inflation?
- How can source-monitoring errors shed light on eyewitness suggestibility and inadvertent plagiarism?
- What is reality monitoring?

Web Link 7.3



Mind Tools—Tools for Improving Your Memory
The Mind Tools site details practical techniques to help people improve their cognitive efficiency in many areas. The subpage dedicated to memory functioning offers an excellent collection of suggestions for ways to enhance memory.

Figure 7.14

A story used in a study of reconstructive memory by Bartlett (1932).

As explained in your text, subjects recalling the story shown here tended to change details and to “remember” elements not in the original at all.

Source: Excerpt from Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. New York: Cambridge University Press, p. 65. Copyright © 1932. Reprinted with the permission of Cambridge University Press.

Figure Not Available

in one case, the death at the end was attributed to fever and the character was described as “foaming at the mouth” (instead of “something black came out of his mouth”). Bartlett concluded that the distortions in recall occurred because subjects reconstructed the tale to fit with their established schemas. Modern schema theories also emphasize the reconstructive nature of memory (Hirt, McDonald, & Markman, 1998). These theories propose that part of what people recall about an event is the details of that particular event and part is a reconstruction of the event based on their schemas.

Research by Elizabeth Loftus (1979, 1992) and others on the *misinformation effect* has shown that

reconstructive distortions show up frequently in eyewitness testimony. The *misinformation effect* occurs when participants’ recall of an event they witnessed is altered by introducing misleading postevent information. For example, in one study Loftus and Palmer (1974) showed subjects a videotape of an automobile accident. Participants were then “grilled” as if they were providing eyewitness testimony, and biasing information was introduced. Some subjects were asked, “How fast were the cars going when they *hit* each other?” Other subjects were asked, “How fast were the cars going when they *smashed into* each other?” A week later, subjects’ recall of the accident was tested and they were asked whether they remembered seeing any broken glass in the accident (there was none). Subjects who had earlier been asked about the cars *smashing into* each other were more likely to “recall” broken glass. Why would they add this detail to their reconstructions of the accident? Probably because broken glass is consistent with their schema for cars *smashing* together (see Figure 7.15). The misinformation effect has been replicated in numerous studies by Loftus and other researchers (Ayers & Reder, 1998; Loftus, 2003). Indeed, the effect is difficult to escape, as even subjects who have been forewarned can be swayed by postevent misinformation (Koriat et al., 2000).

Presenting misinformation is only one way to produce memory distortions. Another method simply involves asking people to vividly imagine experiencing a childhood event (one that they previously indicated they had *not* experienced), such as breaking a window with their hand or getting in trouble for calling 911. A few moments of imagination can significantly increase many subjects’ belief that they’ve actually had an experience similar to the imagined event (Garry & Polaschek, 2000). The surprising impact on memory of imagining an experience has been called *imagination inflation*. Studies show that even

Figure 7.15

The misinformation effect. In an experiment by Loftus and Palmer (1974), participants who were asked leading questions in which cars were described as *hitting* or *smashing* each other were prone to recall the same accident differently one week later, demonstrating the reconstructive nature of memory.

Leading question asked during witness testimony

“About how fast were the cars going when they hit each other?”

“About how fast were the cars going when they smashed into each other?”

Possible schemas activated

Response of subjects asked one week later, “Did you see any broken glass?” (There was none.)

“Yes”—14%

“Yes”—32%



imagining *another person* experiencing an event can inflate your confidence that the same event happened to you (Garry, Frame, & Loftus, 1999).

In a related line of research, Loftus and colleagues showed that simple print advertisements can distort some people's recollections of their personal past (Braun, Ellis, & Loftus, 2002). Exposing subjects to a nostalgic ad for Disney World—which presumably led the subjects to imagine being there in the past—increased their confidence that they had once shaken hands with Mickey Mouse as a child visiting a Disney park. Of course, the ad could have revived a genuine memory in some of the participants. To rule out this possibility, the researchers demonstrated that a similar ad featuring Bugs Bunny increased subjects' belief that they had once met Bugs at a Disney Park—an event that would be impossible, since Bugs is a Warner Bros. character who would never be encountered at a Disney park. Paradoxically, in some cases even *accurate* information can lead to inaccurate memories. A recent study showed that informing older adults that a consumer claim (such as “Aspirin destroys tooth enamel”) is *false* can, after a few days, lead many subjects to misremember the claim as *true* (Braun, Ellis, & Loftus, 2002). Obviously, this finding suggests that the many warnings issued to older people about bogus products or scams may often backfire. In any event, as you can see, human memory is more reconstructive and malleable than widely appreciated.

Source Monitoring and Reality Monitoring

The misinformation effect and similar memory distortions appear to be due, *in part*, to the unreliability of a retrieval process called *source monitoring* (Mitchell & Johnson, 2000). **Source monitoring involves making attributions about the origins of memories.** Marcia Johnson and her colleagues maintain that source monitoring is a crucial facet of memory retrieval that contributes to many of the mistakes that people make in reconstructing their experiences (Johnson, 1996; Johnson, Hashtroudi, & Lindsay, 1993). According to Johnson, memories are not tagged with labels that specify their sources. Thus, when people pull up specific memory records, they have to make decisions *at the time of retrieval* about where the memories came from (example: “Did I read that in the *New York Times* or *Rolling Stone*?”). Much of the time, these decisions are so easy and automatic, people make them without being consciously aware of the source-monitoring process. In other instances, however, they may consciously struggle to pinpoint

the source of a memory. **A source-monitoring error occurs when a memory derived from one source is misattributed to another source.** For example, you might attribute a remark from your roommate to your psychology professor, or something you heard on *Oprah* to your psychology textbook. Inaccurate memories that reflect source-monitoring errors may seem quite compelling, and people often feel quite confident about their authenticity even though the recollections really are inaccurate (Lampinen, Neuschatz, & Payne, 1999).

Source-monitoring errors appear to be commonplace and may shed light on many interesting memory phenomena. For instance, in studies of eyewitness suggestibility, some subjects have gone so far as to insist that they “remember” seeing something that was only verbally suggested to them. Most theories have a hard time explaining how people can have memories of events that they never actually saw or experienced, but this paradox doesn't seem all that perplexing when it is explained as a source-monitoring error (Lindsay et al., 2004). The source-monitoring approach can also make sense of *cryptomnesia*—inadvertent plagiarism that occurs when people come up with an idea that they think is original when they were actually exposed to it earlier (Bredart, Lampinen, & Defeldre, 2003). Source-monitoring errors also appear to underlie the common tendency for people to mix up fictional information from novels and movies with factual information from news reports and personal experiences (Marsh, Meade, & Roediger, 2003).

Marcia Johnson's source-monitoring theory has built and expanded on an earlier concept that she called *reality monitoring*, which she now views as a subtype of source monitoring. **Reality monitoring refers to the process of deciding whether memories are based on external sources (one's perceptions of actual events) or internal sources (one's thoughts and imaginations).** People engage in reality monitoring when they reflect on whether something actually happened or they only thought about



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In recent years, Doris Kearns Goodwin (shown at left) and several other prominent historians have been accused of plagiarizing the work of others. We can only speculate, but perhaps these incidents involved cryptomnesia—inadvertent plagiarism that occurs when people come up with an idea that they think is original, when they really were exposed to it earlier. Cryptomnesia may occur because of source-monitoring errors in retrieval.



Image Not Available

ELIZABETH LOFTUS

“One reason most of us, as jurors, place so much faith in eyewitness testimony is that we are unaware of how many factors influence its accuracy.”



Image Not Available

MARCIA K. JOHNSON

“Our long-term goal is to develop ways of determining which aspects of mental experience create one's sense of a personal past and one's conviction (accurate or not) that memories, knowledge, beliefs, attitudes, and feelings are tied to reality in a veridical fashion.”

it happening. This dilemma may sound like an odd problem that would arise only infrequently, but it isn't. People routinely ponder questions like "Did I pack the umbrella or only think about packing it?" "Did I take my morning pill or only intend to do so?" Studies indicate that people focus on several types of clues in making their reality-monitoring decisions (Johnson & Raye, 1981; Johnson, Kahan, & Raye, 1984; Kahan et al., 1999). When memories are rich in sensory information (you can recall the feel of shoving the umbrella into your suitcase) or contextual information (you can clearly see yourself in the hallway packing your umbrella), or when memories can be retrieved with little effort, one is more likely to infer that the event really happened. In contrast, one is more likely to infer that an event did *not* actually occur when memories of it lack sensory or contextual details or are difficult to retrieve.

➤ REVIEW OF KEY POINTS

- The tip-of-the-tongue phenomenon shows that recall is often guided by partial information about a word. Reinstating the context of an event can facilitate recall. This factor may account for cases in which hypnosis appears to aid recall of previously forgotten information. However, hypnosis seems to increase people's tendency to report incorrect information.
- Memories are not exact replicas of past experiences. As Bartlett showed many years ago, memory is partially reconstructive. Research on the misinformation effect shows that information learned after an event can alter one's memory of it. Merely imagining an event can increase your confidence that it happened to you.
- Source monitoring is the process of making attributions about the origins of memories. Source-monitoring errors appear to be common and may explain why people sometimes "recall" something that was only suggested to them or something they only imagined. Reality monitoring involves deciding whether memories are based on perceptions of actual events or on just thinking about the events.

➤ Forgetting: When Memory Lapses

PREVIEW QUESTIONS

- What did Ebbinghaus discover about how quickly people forget?
- What are the three methods for measuring retention?
- What is the difference between the decay and interference explanations of forgetting?
- When are retrieval failures likely to occur?
- Why do some experts believe that recovered memories of childhood sexual abuse are mostly genuine, while other experts are skeptical?

Why do people forget information—even information they would like to remember? Many theorists believe that there isn't one simple answer to this question. They point to the complex, multifaceted nature of memory and assert that forgetting can be caused by deficiencies in encoding, storage, retrieval, or some combination of these processes.

How Quickly We Forget: Ebbinghaus's Forgetting Curve



The first person to conduct scientific studies of forgetting was Hermann Ebbinghaus. He published a series of insightful memory studies way back in 1885. Ebbinghaus studied only one subject—himself. To give himself lots of new material to memorize, he invented **nonsense syllables—consonant-vowel-consonant arrangements that do not correspond to words** (such as BAF, XOF, VIR, and MEQ). He wanted to work with meaningless materials that would be uncontaminated by his previous learning.

Ebbinghaus was a remarkably dedicated researcher. For instance, in one study he went through over 14,000 practice repetitions, as he tirelessly memorized 420 lists of nonsense syllables (Slamecka, 1985). He tested his memory of these lists after various time intervals. **Figure 7.16** shows what he found. This diagram, called a **forgetting curve, graphs retention and forgetting over time**. Ebbinghaus's forgetting curve

shows a precipitous drop in retention during the first few hours after the nonsense syllables were memorized. Thus, he concluded that most forgetting occurs very rapidly after learning something.

That's a depressing conclusion. What is the point of memorizing information if you're going to forget it all right away? Fortunately, subsequent research showed that Ebbinghaus's forgetting curve was unusually steep (Postman, 1985). Forgetting isn't usually quite as swift or as extensive as Ebbinghaus thought. One problem was that he was working with such meaningless material. When subjects memorize more meaningful material, such as prose or poetry, forgetting curves aren't nearly as steep. Studies of how well people recall their high school classmates suggest that forgetting curves for autobiographical information are even shallower (Bahrick, 2000). Also, different methods of measuring forgetting yield varied estimates of how quickly people forget. This variation underscores the importance of the methods used to measure forgetting, the matter we turn to next.

Measures of Forgetting

To study forgetting empirically, psychologists need to be able to measure it precisely. Measures of forgetting inevitably measure retention as well. **Retention refers to the proportion of material retained (remembered)**. In studies of forgetting, the results may be reported in terms of the amount forgotten or the

amount retained. In these studies, the *retention interval* is the length of time between the presentation of materials to be remembered and the measurement of forgetting. The three principal methods used to measure forgetting are recall, recognition, and re-learning (Lockhart, 1992).

Who is the current U.S. secretary of state? What movie won the Academy Award for best picture last year? These questions involve recall measures of retention. **A recall measure of retention requires subjects to reproduce information on their own without any cues.** If you were to take a recall test on a list of 25 words you had memorized, you would simply be told to write down as many of the words as you could remember.

In contrast, in a recognition test you might be shown a list of 100 words and asked to choose the 25 words that you had memorized. **A recognition measure of retention requires subjects to select previously learned information from an array of options.** Subjects not only have cues to work with, they have the answers right in front of them. In educational testing, essay questions and fill-in-the-blanks questions are recall measures of retention. Multiple-choice, true-false, and matching questions are recognition measures.

If you're like most students, you probably prefer multiple-choice tests over essay tests. This preference is understandable, because evidence shows that recognition measures tend to yield higher scores than recall measures of memory for the same information (Lockhart, 2000). This reality was demonstrated many decades ago by Luh (1922), who measured subjects' retention of nonsense syllables with both a recognition test and a recall test. As **Figure 7.17** shows, subjects' performance on the recognition measure was far superior to their performance on the recall measure. There are two ways to look at this disparity between recall and recognition tests. One is to see recognition tests as especially *sensitive* measures of retention. The other is to see recognition tests as excessively *easy* measures of retention.

Actually, there is no guarantee that a recognition test will be easier than a recall test. This tends to be the case, but the difficulty of a recognition test can vary greatly, depending on the number, similarity, and plausibility of the options provided as possible answers. To illustrate, see whether you know the answer to the following multiple-choice question:

The capital of Washington is:

- a. Seattle
- b. Spokane
- c. Tacoma
- d. Olympia

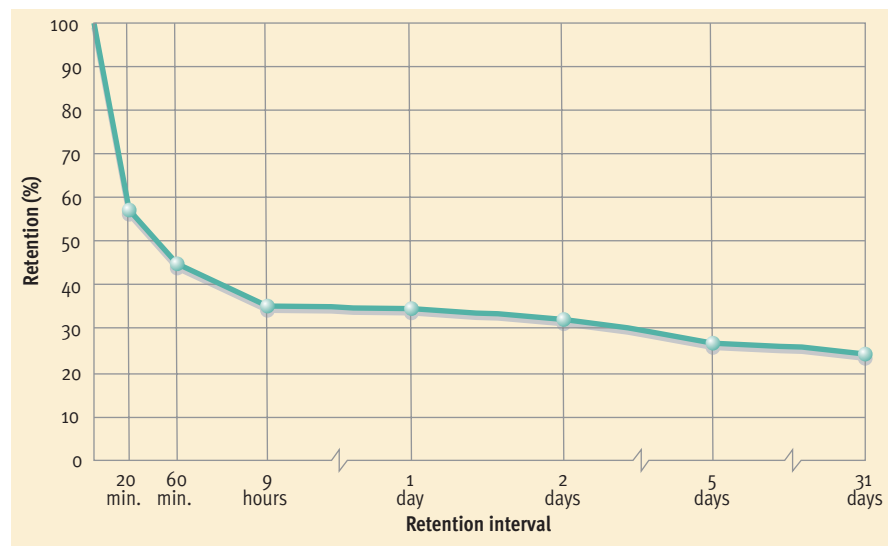


Figure 7.16

Ebbinghaus's forgetting curve for nonsense syllables. From his experiments on himself, Ebbinghaus concluded that forgetting is extremely rapid immediately after the original learning and then levels off. Although this generalization remains true, subsequent research has shown that forgetting curves for nonsense syllables are unusually steep. (Data from Ebbinghaus, 1885)

Most students who aren't from Washington find this a fairly difficult question. The answer is Olympia. Now take a look at the next question:

The capital of Washington is:

- a. London
- b. New York
- c. Tokyo
- d. Olympia

Virtually anyone can answer this question because the incorrect options are readily dismissed. Although this illustration is a bit extreme, it shows that two recognition measures of the same information can vary dramatically in difficulty.

The third method of measuring forgetting is re-learning. **A relearning measure of retention requires**



HERMANN EBBINGHAUS

"Left to itself every mental content gradually loses its capacity for being revived. . . . Facts crammed at examination time soon vanish."

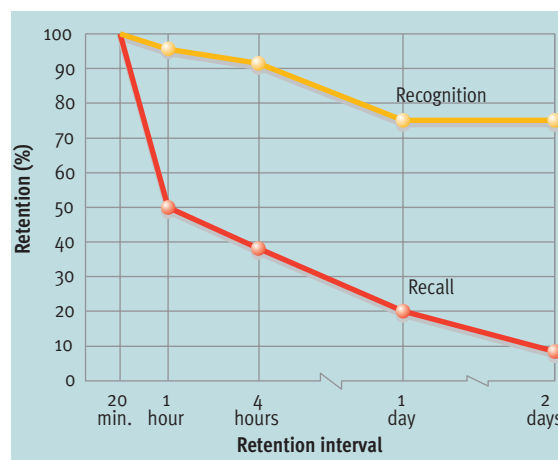


Figure 7.17

Recognition versus recall in the measurement of retention. Luh (1922) had participants memorize lists of nonsense syllables and then measured their retention with either a recognition test or a recall test at various intervals up to two days. As you can see, the forgetting curve for the recall test was quite steep, whereas the recognition test yielded much higher estimates of subjects' retention. (Data from Luh, 1922)

a subject to memorize information a second time to determine how much time or how many practice trials are saved by having learned it before. Subjects' *savings scores* provide an estimate of their retention. Relearning measures can detect retention that is overlooked by recognition tests (Crowder & Greene, 2000).

Why We Forget



Measuring forgetting is only the first step in the long journey toward explaining why forgetting occurs. In this section, we explore the possible causes of forgetting, looking at factors that may affect encoding, storage, and retrieval processes.

Ineffective Encoding



A great deal of forgetting may only *appear* to be forgetting. The information in question may never have been inserted into memory in the first place. Since you can't really forget something you never learned, this phenomenon is sometimes called *pseudoforgetting*. We opened the chapter with an example of pseudoforgetting. People usually assume that they know what a penny looks like, but most have actually failed to encode this information. Pseudoforgetting is usually due to *lack of attention*.

Even when memory codes *are* formed for new information, subsequent forgetting may be the result of ineffective or inappropriate encoding (Brown & Craik, 2000). The research on levels of processing shows that some approaches to encoding lead to more forgetting than others (Craik & Tulving, 1975). For example, if you're distracted while you read your textbooks, you may be doing little more than saying the words to yourself. This is *phonemic encoding*, which is inferior to *semantic encoding* for retention of verbal material. When you can't remember the information that you've read, your forgetting may be due to ineffective encoding.

Decay



Instead of focusing on encoding, decay theory attributes forgetting to the impermanence of memory *storage*. **Decay theory proposes that forgetting occurs because memory traces fade with time.** The implicit assumption is that decay occurs in the physiological mechanisms responsible for memories. According to decay theory, the mere passage of time produces forgetting. This notion meshes nicely with common-sense views of forgetting.

As we noted earlier, evidence suggests that decay *does* contribute to the loss of information from the sensory and short-term memory stores. However, the

critical task for theories of forgetting is to explain the loss of information from long-term memory. Researchers have *not* been able to reliably demonstrate that decay causes LTM forgetting (Slamecka, 1992).

If decay theory is correct, the principal cause of forgetting should be the passage of time. In studies of long-term memory, however, researchers have repeatedly found that time passage is not as influential as what happens during the time interval. Research has shown that forgetting depends not on the amount of time that has passed since learning but on the amount, complexity, and type of information that subjects have had to assimilate *during* the retention interval. The negative impact of competing information on retention is called *interference*. Although theorists have not given up entirely on the intuitively plausible principle of decay (Altmann & Gray, 2002), research on LTM forgetting has been dominated by the concept of interference.

Interference



Interference theory proposes that people forget information because of competition from other material. Although demonstrations of decay in long-term memory have remained elusive, hundreds of studies have shown that interference influences forgetting (Anderson & Neely, 1996; Bower, 2000). In many of these studies, researchers have controlled interference by varying the *similarity* between the original material given to subjects (the test material) and the material studied in the intervening period. Interference is assumed to be greatest when intervening material is most similar to the test material. Decreasing the similarity should reduce interference and cause less forgetting. This is exactly what McGeoch and McDonald (1931) found in an influential study. They had subjects memorize test material that consisted of a list of two-syllable adjectives. They varied the similarity of intervening learning by having subjects then memorize one of five lists. In order of decreasing similarity to the test material, their lists contained synonyms of the test words, antonyms of the test words, unrelated adjectives, nonsense syllables, and numbers. Later, subjects' recall of the test material was measured. **Figure 7.18** shows that as the similarity of the intervening material decreased, the amount of forgetting also decreased—because of reduced interference.

There are two kinds of interference: *retroactive* interference and *proactive* interference (Jacoby, Hessels, & Bopp, 2001). **Retroactive interference occurs when new information impairs the retention of previously learned information.** Retroactive interference occurs between the original learning and the retest

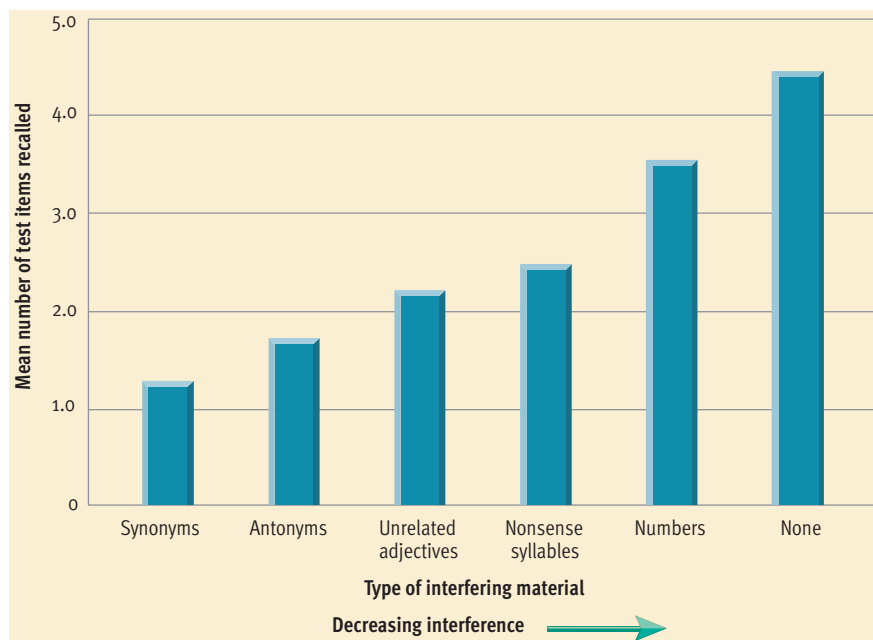


Figure 7.18
Effects of interference. According to interference theory, more interference from competing information should produce more forgetting. McGeoch and McDonald (1931) controlled the amount of interference with a learning task by varying the similarity of an intervening task. The results were consistent with interference theory. The amount of interference is greatest at the left of the graph, as is the amount of forgetting. As interference decreases (moving to the right on the graph), retention improves. (Data from McGeoch & McDonald, 1931)

on that learning, during the retention interval (see **Figure 7.19**). For example, the interference manipulated by McGeoch and McDonald (1931) was retroactive interference. In contrast, **proactive interference occurs when previously learned information interferes with the retention of new information**. Proactive interference is rooted in learning that comes *before* exposure to the test material.

Retrieval Failure



People often remember things that they were unable to recall at an earlier time. This phenomenon may be obvious only during struggles with the tip-of-the-tongue phenomenon, but it happens frequently. In fact, a great deal of forgetting may be due to breakdowns in the process of retrieval.

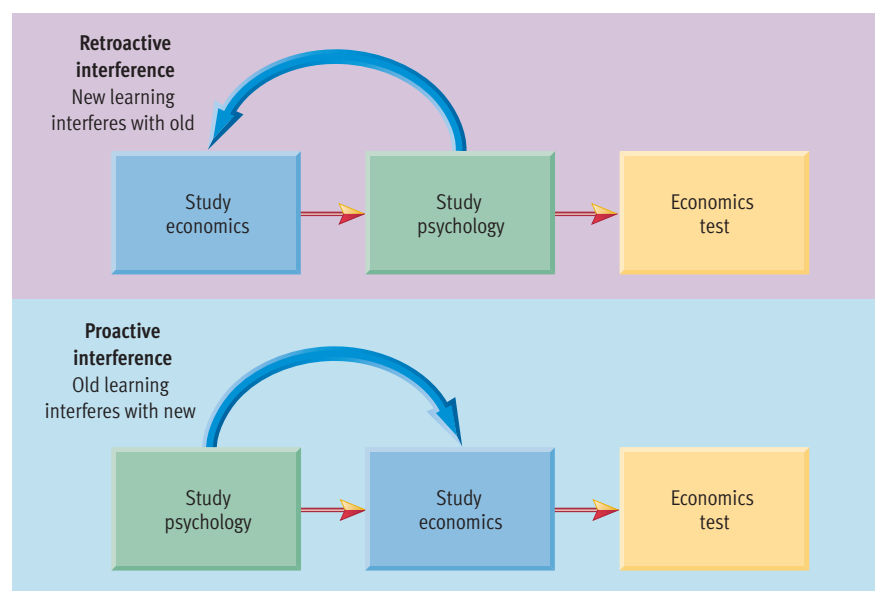
Why does an effort to retrieve something fail on one occasion and succeed on another? That's a tough question. One theory is that retrieval failures may be more likely when a mismatch occurs between retrieval cues and the encoding of the information you're searching for. According to the **encoding specificity principle, the value of a retrieval cue depends on how well it corresponds to the memory code**. This principle provides one explanation for the inconsistent success of retrieval efforts (Tulving & Thomson, 1973).

A related line of research indicates that memory is influenced by the "fit" between the processing during encoding and retrieval. **Transfer-appropriate processing occurs when the initial processing of information is similar to the type of processing required by the subsequent measure of retention**. For exam-

ple, Morris, Bransford, and Franks (1977) gave subjects a list of words and a task that required either semantic or phonemic processing. Retention was measured with recognition tests that emphasized either the meaning or the sound of the words. Semantic processing yielded higher retention when the testing emphasized semantic factors, while phonemic processing

Figure 7.19

Retroactive and proactive interference. Retroactive interference occurs when learning produces a "backward" effect, reducing recall of previously learned material. Proactive interference occurs when learning produces a "forward" effect, reducing recall of subsequently learned material. For example, if you were to prepare for an economics test and then study psychology, the interference from the psychology study would be retroactive interference. However, if you studied psychology first and then economics, the interference from the psychology study would be proactive interference.



yielded higher retention when the testing emphasized phonemic factors. Thus, retrieval failures are more likely when a poor fit occurs between the processing done during encoding and the processing invoked by the measure of retention (Lockhart, 2002; Roediger & Guynn, 1996).

Motivated Forgetting

Many years ago, Sigmund Freud (1901) came up with an entirely different explanation for retrieval failures. As we noted in Chapter 1, Freud asserted that people often keep embarrassing, unpleasant, or painful memories buried in their unconscious. For example, a person who was deeply wounded by perceived slights at a childhood birthday party might suppress all recollection of that party. In his therapeutic work with patients, Freud recovered many such buried memories. He theorized that the memories were there all along, but their retrieval was blocked by unconscious avoidance tendencies.

The tendency to forget things one doesn't want to think about is called *motivated forgetting*, or to use Freud's terminology, *repression*. In Freudian theory, **repression refers to keeping distressing thoughts and feelings buried in the unconscious** (see Chapter 12). Although it is difficult to demonstrate the operation of repression in laboratory studies (Holmes, 1990), a number of experiments suggest that people don't remember anxiety-laden material as readily as emotionally neutral material, just as Freud proposed (Guenther, 1988; Reisner, 1998). Thus, when you forget unpleasant things such as a dental appointment, a promise to help a friend move, or a term paper deadline, motivated forgetting *may* be at work.



The Recovered Memories Controversy



Although the concept of repression has been around for a century, interest in this phenomenon has surged in recent years, thanks to a spate of prominent reports involving the return of individuals' long-lost memories of sexual abuse and other traumas during childhood. The media have been flooded with reports of adults accusing their parents, teachers, and neighbors of horrific child abuse decades earlier, based on previously repressed memories of these travesties. For the most part, these parents, teachers, and neighbors have denied the allegations. Many of them have seemed genuinely baffled by the accusations, which have torn some previously happy families apart (Gudjonsson, 2001; Wylie, 1998). In an effort to make sense of the charges, some accused parents have argued that their children's recollections are false memories created inadvertently by well-intentioned therapists through the power of suggestion.

The controversy surrounding recovered memories of abuse is complex and difficult to sort out. The crux of the problem is that child abuse usually takes place behind closed doors. In the absence of corroborative evidence, there is no way to reliably distinguish genuine recovered memories from false ones. A handful of recovered memory incidents have been substantiated by independent witnesses or belated admissions of guilt from the accused (Brewin, 2003; Bull, 1999; Reisner, 1998; Shobe & Schooler, 2001). But in the vast majority of cases, the allegations of abuse have been vehemently denied, and independent corroboration has not been available. What do psychologists and psychiatrists have to say about the authenticity of repressed memories? They are sharply divided on the issue.

Support for Recovered Memories

Many psychologists and psychiatrists, especially clinicians involved in the treatment of psychological disorders, largely accept recovered memories of abuse at face value (Banyard & Williams, 1999; Briere & Conte, 1993; Herman, 1994; Skinner, 2001; Terr, 1994; Whitfield, 1995). For example, in a survey of British clinicians, 44% reported that they believed that recovered memories are always or usually genuine (Andrews, 2001). Clinicians who believe in recovered memories assert that sexual abuse in childhood is far more widespread than most people realize. For example, one large-scale survey (MacMillan et al., 1997), using a random sample of 9953 residents of Ontario, found that 12.8% of the females and 4.3% of the males reported that they had been victims of sexual abuse dur-

concept check 7.2



Figuring Out Forgetting

Check your understanding of why people forget by identifying the probable causes of forgetting in each of the following scenarios. Choose from (a) motivated forgetting (repression), (b) decay, (c) ineffective encoding, (d) proactive interference, (e) retroactive interference, or (f) retrieval failure. You will find the answers in Appendix A.

1. Ellen can't recall the reasons for the Webster-Ashburton Treaty because she was daydreaming when it was discussed in history class.
2. Rufus hates his job at Taco Heaven and is always forgetting when he is scheduled to work.
3. Ray's new assistant in the shipping department is named John Cocker. Ray keeps calling him Joe, mixing him up with the rock singer Joe Cocker.
4. Tania studied history on Sunday morning and sociology on Sunday evening. It's Monday, and she's struggling with her history test because she keeps mixing up prominent historians with influential sociologists.

ing childhood (see **Figure 7.20**). They further assert that there is ample evidence that it is common for people to repress traumatic incidents in their unconscious (DeMonte, 2000; Wilsnack et al., 2002). For instance, in one widely cited study, L. M. Williams (1994) followed up on 129 female children who had been brought to a hospital emergency room for treatment of sexual abuse. When interviewed approximately 17 years later about a variety of things, including their history of sexual abuse, 38% of the women failed to report the original incident, which Williams largely attributed to amnesia for the incident. In a recent study of psychiatric patients hospitalized for post-traumatic or dissociative disorders (see Chapter 14), one-third of those who reported childhood sexual abuse said that they experienced complete amnesia for the abuse at some point in their lives (Chu et al., 1999). According to Freyd (1996, 2001), sexual abuse by a parent evokes coping efforts that attempt to block awareness of the abuse because that awareness would interfere with normal attachment processes. The clinicians who accept the authenticity of recovered memories of abuse attribute the recent upsurge in recovered memories to therapists' and clients' increased sensitivity to an issue that people used to be reluctant to discuss.

Skepticism Regarding Recovered Memories

In contrast, many other psychologists, especially memory researchers, have expressed skepticism about the recent upsurge of recovered memories of abuse (Kihlstrom, 2004; Loftus, 1998, 2003; Lynn & Nash, 1994; McNally, 2003). They point out that the women in the Williams (1994) study may have failed to report their earlier sexual abuse for a variety of reasons besides amnesia, including embarrassment, poor rapport with the interviewer, normal forgetfulness, or a conscious preference not to revisit painful experiences from the past (Loftus, Garry & Feldman, 1998; Pope & Hudson, 1998). Many memory researchers are also skeptical about retrospective self-reports of amnesia—such as those seen in the Chu et al. (1999) study—because self-assessments of personal memory are often distorted and because it is difficult to distinguish between a period when a memory was not *accessed* versus a period when a memory was not *available* because of repression (Belli et al., 1998; Schooler, 1999). As McNally (2004) notes, “Not thinking about one’s abuse is not the same thing as being unable to remember it” (p. 99).

The skeptics do *not* say that people are lying about their previously repressed memories. Rather, they maintain that some suggestible people wrestling with emotional problems have been convinced by persuasive therapists that their emotional problems must

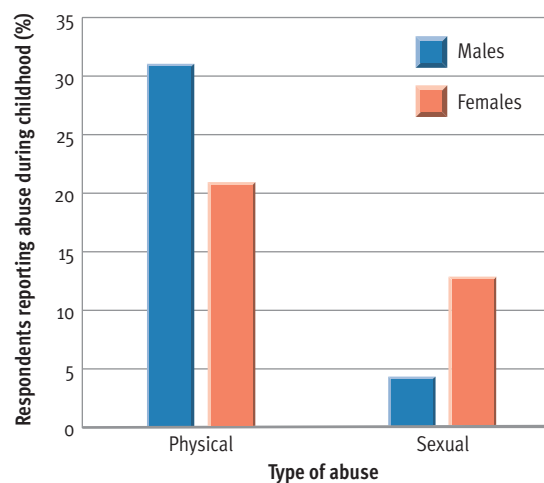


Figure 7.20

Estimates of the prevalence of childhood physical and sexual abuse. In one of the better efforts to estimate the prevalence of child abuse, MacMillan and her colleagues (1997) questioned a random sample of almost 10,000 adults living in the province of Ontario, Canada, about whether they were abused during childhood. As you can see, males were more likely to have experienced physical abuse and females were more likely to have suffered sexual abuse. The data support the assertion that millions of people have been victimized by childhood sexual abuse, which is far from rare. (Based on data from MacMillan et al., 1997)

be the result of abuse that occurred years before. Critics blame a minority of therapists who presumably have good intentions but who operate under the dubious assumption that virtually all psychological problems are attributable to childhood sexual abuse (Lindsay & Read, 1994; Spanos, 1994). Using hypnosis, guided imagery, dream interpretation, and leading questions, they apparently prod and probe patients until they inadvertently create the memories of abuse that they are searching for (Lynn et al., 2003). Consistent with this view, Yapko (1994) reviews evidence that some therapists are (1) overly prone to see signs of abuse where none has occurred, (2) unsophisticated about the extent to which memories can be distorted, and (3) naive about how much their expectations and beliefs can influence their patients' efforts to achieve self-understanding.

Psychologists who doubt the authenticity of repressed memories support their analysis by pointing to discredited cases of recovered memories (Brown, Goldstein, & Bjorklund, 2000). For example, with the help of a church counselor, one woman recovered memories of how her minister father had repeatedly raped her, got her pregnant, and then aborted the pregnancy with a coat-hanger; however, subsequent evidence revealed that the woman was still a virgin and that her father had had a vasectomy years before (Loftus, 1997; Testa, 1996). The skeptics also point to published case histories that clearly involved sug-

Web Link 7.4



False Memory Syndrome Foundation (FMSF) Online
This site marshals evidence that recovered memories of childhood abuse are often false, therapist induced, and grounded in shoddy and nonobjective scientific claims. Dealing with perhaps the most bitterly contested topic in current psychology, the FMSF has elicited fierce opposition.

Tom Rutherford (shown here with his wife, Joyce) received a \$1 million settlement in a suit against a church therapist and a Springfield, Missouri, church in a false memory case. Under the church counselor's guidance, the Rutherfords' daughter, Beth, had "recalled" childhood memories of having been raped repeatedly by her minister father, gotten pregnant, and undergone a painful coat-hanger abortion. Her father lost his job and was ostracized. After he later revealed he'd had a vasectomy when Beth was age 4, and a physical exam revealed that at age 23 she was still a virgin, the memories were shown to be false.



gestive questioning and to cases in which patients have recanted recovered memories of sexual abuse (see **Figure 7.21**) after realizing that these memories were created by their therapists (Loftus, 1994; Shobe & Schooler, 2001).

Those who question the accuracy of repressed memories also point to findings on the misinformation effect, imagination inflation, the tendency to confuse real and imagined memories (reality-monitoring errors), and other studies that demonstrate the relative ease of creating "memories" of events that never happened (Lindsay et al., 2004; Loftus, 2003).

For example, working with college students, Ira Hyman and his colleagues have managed to implant recollections of fairly substantial events (such as spilling a punch bowl at a wedding, being in a grocery store when the fire sprinkler system went off, being hospitalized for an earache) in about 25% of their subjects, just by asking them to elaborate on events supposedly reported by their parents (Hyman, Husband, & Billings, 1995; Hyman & Kleinknecht, 1999). Other studies have succeeded in implanting false memories of nearly drowning (Heaps & Nash, 2001) and of being attacked by a vicious animal (Porter, Yuille, & Lehman, 1999) in many participants. Moreover, subjects in these studies often feel very confident about their false memories, which frequently generate strong emotional reactions and richly detailed "recollections" (Loftus & Bernstein, 2005).

In a similar vein, Roediger and McDermott (1995, 2000) have devised a simple laboratory paradigm involving the learning of word lists that is remarkably reliable at producing memory illusions. In this paradigm, a series of lists of 15 words are presented to participants, who are asked to recall the words immediately after each list is presented and are given a recognition measure of their retention at the end of the session. The trick is that each list consists of a set of words (such as *bed, rest, awake, tired*) that are strongly associated with another target word that is not on the list (in this case, *sleep*). When subjects *recall* the words on each list, they remember the non-presented target word over 50% of the time, and when they are given the final *recognition* test, they typically indicate that about 80% of the nonstudied target words were presented in the lists (see **Figure 7.22**).

The trivial memory illusions created in this experiment may seem a far cry from the vivid, detailed recollections of previously forgotten sexual abuse that have generated the recovered memories controversy. But these false memories can be reliably created in normal, healthy participants in a matter of minutes, with little effort and no pressure or misleading information. Thus, the Roediger and McDermott paradigm provides a dramatic demonstration of how easy it is to get people to remember that they saw something they really didn't see. The simplicity and reliability of the paradigm are also permitting investigators to explore personal correlates of the tendency to falsely remember target words. For example, researchers who have used this paradigm have found an elevated rate of false recollections among women who have reported recovering memories of abuse (Clancy et al., 2000), among victims of emotional trauma (Zoellner et al., 2000), and among people who report memories of being abducted by aliens (Clancy et al., 2002).

Figure 7.21

A case of recovered memories recanted. Revelations of repressed memories of sexual abuse are viewed with skepticism in some quarters. One reason is that some people who have recovered previously repressed recollections of child abuse have subsequently realized that their "memories" were the product of suggestion. A number of case histories, such as the one summarized here (from Jaroff, 1993), have demonstrated that therapists who relentlessly search for memories of child abuse in their patients sometimes instill the memories they are seeking.

Source: Jaroff, L. (1993, November 29). Lies of the mind. *Time*, pp. 52–59. Copyright © 1993 Time Inc. Reprinted by permission.

Figure Not Available

Skepticism about the validity of recovered memories of abuse has also been fueled by the following observations and research findings:

- Many repressed memories of abuse have been recovered under the influence of hypnosis. However, an extensive body of research indicates that hypnosis tends to increase memory distortions while paradoxically making people feel more confident about their recollections (Lynn et al., 2002; Whitehouse et al., 1988).
- Many repressed memories of abuse have been recovered through therapists' dream interpretations. But as you learned in Chapter 5, dream interpretation depends on highly subjective guesswork that cannot be verified. Moreover, research shows that bogus dream interpretations can lead normal subjects to believe that they actually experienced the events suggested in the dream analyses (Loftus, 2000; Loftus & Mazzoni, 1998).
- Some recovered memories have described incidents of abuse that occurred before the victim reached age 3 and even when the victim was still in the womb (Taylor, 2004). However, when adults are asked to recall their earliest memories, their oldest recollections typically don't go back past age 2 or 3 (Bruce, Dolan, & Phillips-Grant, 2000; Eacott & Crawley, 1998).

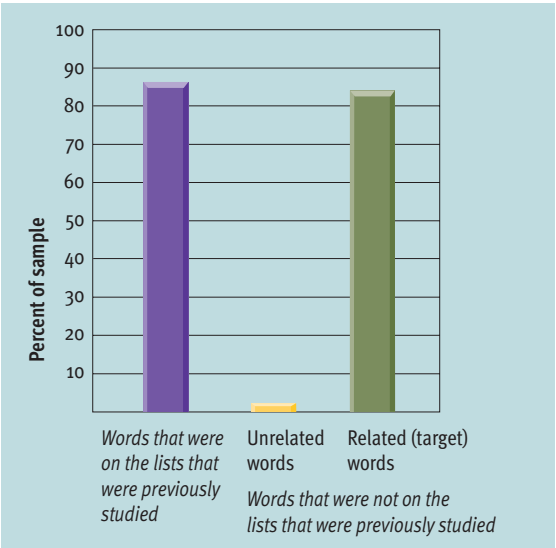


Figure 7.22
The prevalence of false memories observed by Roediger and McDermott (1995). The graph shown here summarizes the recognition test results in Study 1 conducted by Roediger and McDermott (1995). Participants correctly identified words that had been on the lists that they had studied 86% of the time and only misidentified unrelated words that had not been on the lists 2% of the time, indicating that they were paying careful attention to the task. Nonetheless, they mistakenly reported that they “remembered” related target words that were *not* on the lists 84% of the time—a remarkably high prevalence of false memories. (Data from Roediger & McDermott, 1995)

Image Not Available

Rebuttals to the Skeptics

Of course, those who believe in recovered memories have mounted rebuttals to the numerous arguments raised by the skeptics. For example, Kluft (1999) argues that a recantation of a recovered memory of abuse does not prove that the memory was false. Gleaves (1994) points out that individuals with a history of sexual abuse often vacillate between denying and accepting that the abuse occurred. Harvey (1999) argues that laboratory demonstrations that it is easy to create false memories have involved insignificant memory distortions that do not resemble the emotionally wrenching recollections of sexual abuse that have been recovered in therapy. Olio (1994) concludes, "The possibility of implanting entire multiple scenarios of horror that differ markedly from the individual's experience, such as memories of childhood abuse in an individual who does not have a trauma history, remains an unsubstantiated hypothesis" (p. 442). Moreover, even if one accepts the assertion that therapists *can* create false memories of abuse in their patients, some critics have noted that there is virtually no direct evidence on how often this occurs and no empirical basis for the claim that there has been an *epidemic* of such cases (Berliner & Briere, 1999; Leavitt, 2001; Wilsnack et al., 2002). Other rebuttals have focused on the sociopolitical repercussions of denying the existence of recovered memories, arguing that this position is intended to undermine the credibility of abused women and silence their accusations (Raitt & Zeedyk, 2003). Finally, many critics argue that contrived, artificial laboratory studies of memory and hypnosis may have limited relevance to the complexities of recovered memories in the real world (Brown, Schefflin, & Hammond, 1998; Gleaves et al., 2004).

Conclusions

Although both sides seem genuinely concerned about the welfare of the people involved, the debate about recovered memories of sexual abuse has grown increasingly bitter and emotionally charged. So, what can we conclude about the recovered memories controversy? It seems pretty clear that therapists can unknowingly create false memories in their patients and that a significant portion of recovered memories of abuse are the product of suggestion. But it also seems likely that some cases of recovered memories are authentic. At this point, we don't have adequate data to estimate what proportion of recovered memories of abuse fall in each category (Lindsay & Read, 2001). Thus, the matter needs to be addressed with great caution. On the one hand, people should be extremely careful about accepting recovered memo-

ries of abuse in the absence of some corroboration. On the other hand, recovered memories of abuse cannot be summarily dismissed, and it would be tragic if the repressed memories controversy made people overly skeptical about the all-too-real problem of childhood sexual abuse.

The repressed memories controversy deserves one last comment regarding its impact on memory research and scientific conceptions of memory. The controversy has helped inspire a great deal of research that has increased our understanding of just how fragile, fallible, malleable, and subjective human memory is. It is presumptuous to trust memory—whether recovered or not—to provide accurate recollections of the past. Moreover, the implicit dichotomy underlying the repressed memories debate—that some memories are true, whereas others are false—is misleading and oversimplified. Research demonstrates that all our memories are imperfect reconstructions of the past that are subject to many types of distortion. Although Schacter (1999) has argued convincingly that the imperfections of memory may be adaptive in the long run, the fact remains that memory is surprisingly unreliable.

➤ REVIEW OF KEY POINTS

- Ebbinghaus's early studies of nonsense syllables suggested that people forget very rapidly. Subsequent research showed that Ebbinghaus's forgetting curve was exceptionally steep.
- Forgetting can be measured by asking people to recall, recognize, or relearn information. Different methods of measuring retention often produce different estimates of forgetting. Recognition measures tend to yield higher estimates of retention than recall measures.
- Some forgetting, including pseudoforgetting, is due to ineffective encoding of information. Decay theory proposes that forgetting occurs spontaneously with the passage of time. It has proven difficult to show that decay occurs in long-term memory.
- Interference theory proposes that people forget information because of competition from other material. Proactive interference occurs when old learning interferes with new information. Retroactive interference occurs when new learning interferes with old information.
- Forgetting may also be a matter of retrieval failure. According to the encoding specificity principle, the effectiveness of a retrieval cue depends on how well it corresponds to the memory code that represents the stored item.
- Repression involves the motivated forgetting of painful or unpleasant memories. Recent years have seen a surge of reports of recovered memories of sexual abuse in childhood. The authenticity of these repressed memories is the subject of controversy because empirical studies have demonstrated that it is not all that difficult to create false memories.
- The evidence suggests that therapists can unknowingly create false memories in their patients and that a significant portion of recovered memories of abuse are the product of suggestion. But it also seems likely that some cases of recovered memories are authentic.

Web Link 7.5



The Recovered Memory Project

Directed by Professor Russ Cheit (Brown University), this site takes issue with the point of view that most recovered memories of abuse are false memories. It provides descriptions of "corroborated" cases of recovered memories and links to scientists and research articles that are sympathetic to those who believe in repressed memories.

> In Search of the Memory Trace: The Physiology of Memory

For decades, neuroscientists have ventured forth in search of the physiological basis for memory, often referred to as the “memory trace.” On several occasions scientists have been excited by new leads, only to be led down blind alleys. For example, as we noted earlier, Wilder Penfield’s work with electrical stimulation of the brain during surgery suggested that the cortex houses exact tape recordings of past experiences (Penfield & Perot, 1963). At the time, scientists believed that this was a major advance. Ultimately, it was not.

Similarly, James McConnell rocked the world of science when he reported that he had chemically transferred a specific memory from one flatworm to another. McConnell (1962) created a conditioned reflex (contraction in response to light) in flatworms and then transferred RNA (a basic molecular constituent of all living cells) from trained worms to untrained worms. The untrained worms showed evidence of “remembering” the conditioned reflex. McConnell boldly speculated that in the future, chemists might be able to formulate pills containing the information for Physics 201 or History 101! Unfortunately, the RNA transfer studies proved difficult to replicate (Rilling, 1996). Today, 45 years after McConnell’s “breakthrough,” we are still a long way from breaking the chemical code for memory.

Investigators continue to explore a variety of leads about the physiological bases for memory. In light of past failures, these lines of research should probably be viewed with guarded optimism, but we’ll look at some of the more promising approaches. You may want to consult Chapter 3 if you need to refresh your memory about the physiological processes and structures discussed in this section.

The Biochemistry of Memory



One line of research suggests that memory formation results in *alterations in synaptic transmission* at specific sites. According to this view, specific memories depend on biochemical changes that occur at specific synapses. Like McConnell, Eric Kandel (2001) and his colleagues have studied conditioned reflexes in a simple organism—a sea slug. In research that earned a Nobel prize for Kandel, they showed that reflex learning in the sea slug produces changes in the strength of specific synaptic connections by enhancing the availability and release of neurotransmitters at these synapses (Kandel & Schwartz, 1982;

Kennedy, Hawkins, & Kandel, 1992). Kandel believes that durable changes in synaptic transmission may be the neural building blocks of more complex memories as well. Of course, critics point out that it’s risky to generalize from marine mollusks to humans.

Manipulations that alter hormone levels shortly after an organism has learned a new response can affect memory storage in a variety of animals. For example, adrenal hormones can facilitate memory formation (McGaugh & Roozendaal, 2002). James McGaugh (2002, 2004) theorizes that *adrenal hormones affect memory storage by modulating activity in the amygdala*, which then influences activity in a variety of neurotransmitter systems in the brain. Other animal studies suggest that *adequate protein synthesis is necessary for the formation of memories* (Dudai, 2004; Luft et al., 2005). For example, the administration of drugs that interfere with protein synthesis impairs long-term memory storage in animals.

The Neural Circuitry of Memory



Richard F. Thompson (1989, 1992, 2005) and his colleagues have shown that specific memories may depend on *localized neural circuits* in the brain. In other words, memories may create unique, reusable pathways in the brain along which signals flow. Thompson has traced the pathway that accounts for a rabbit’s memory of a conditioned eyeblink response. The key link in this circuit is a microscopic spot in the *cerebellum*, a structure in the hindbrain (see **Figure 7.23** on the next page). When this spot is destroyed, the conditioned stimulus no longer elicits the eyeblink response, even though the unconditioned stimulus still does (Steinmetz, 1998). This finding does *not* mean that the cerebellum is the key to all memory. Other memories presumably create entirely different pathways in other areas of the brain. The key implication of this work is that it may be possible to map out specific neural circuits that correspond to at least some types of specific memories.

Evidence on *long-term potentiation* also supports the idea that memory traces consist of specific neural circuits. **Long-term potentiation (LTP) is a long-lasting increase in neural excitability at synapses along a specific neural pathway.** Researchers produce LTP artificially by sending a burst of high-frequency electrical stimulation along a neural pathway, but theorists suspect that natural events produce the same sort of potentiated neural circuit when a memory is

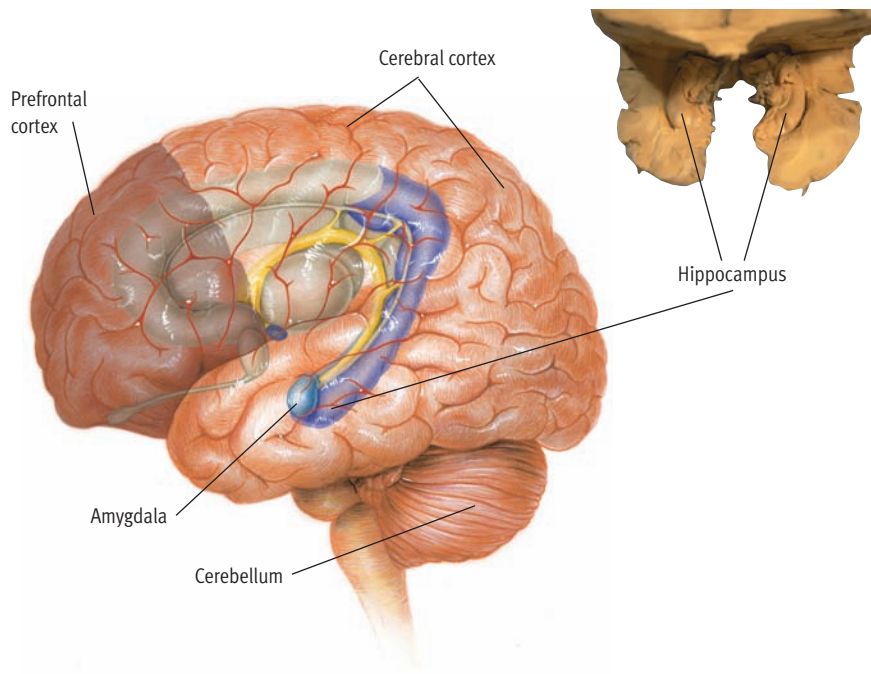
PREVIEW QUESTIONS

- What do synaptic transmission and hormonal fluctuations have to do with memory?
- How can memory be explained in terms of localized neural circuits?
- Which brain structures appear to be involved in memory?



ERIC KANDEL

“Learning results from changes in the strength of the synaptic connections between precisely interconnected cells.”



Wadsworth collection

Figure 7.23

The anatomy of memory. All the brain structures identified here have been implicated in efforts to discover the anatomical structures involved in memory. The hippocampus is the hub of the medial temporal lobe memory system, which is thought to play a critical role in the consolidation of long-term memories.

formed (Martinez, Barea-Rodriguez, & Derrick, 1998). LTP appears to involve changes in both presynaptic (sending) and postsynaptic (receiving) neurons in neural circuits in the hippocampus (refer to Figure 7.23) (Malenka & Nicoll, 1999). The opposite of LTP, a durable *decrease* in synaptic excitability along a neural pathway, has also been observed and is called *long-term depression (LTD)*. This process may shed light on how forgetting occurs at the level of the synapse (Rosenzweig, Barnes, & McNaughton, 2002; Villarreal et al., 2002).

The Anatomy of Memory



Cases of *organic amnesia*—extensive memory loss due to head injury—are another source of clues about the physiological bases of memory. There are two basic types of amnesia: retrograde and anterograde (see Figure 7.24). **Retrograde amnesia involves the loss of memories for events that occurred prior to the onset of amnesia.** For example, a 25-year-old gymnast who sustains a head trauma might find the prior three years, or seven years, or her entire lifetime erased. **Anterograde amnesia involves the loss of memories for events that occur after the onset of amnesia.** For instance, after her accident, the injured gymnast might suffer impaired ability to remember people she meets, where she has parked her car, and so on.

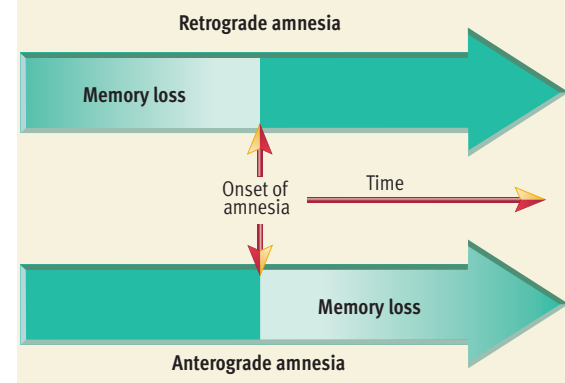
The study of anterograde amnesia has proven to be an especially rich source of information about the brain and memory. One well-known case, that of a

man referred to as H. M., has been followed by Brenda Milner and her colleagues since 1953 (Corkin, 1984, 2002; Milner, Corkin, & Teuber, 1968; Scoville & Milner, 1957). H. M. had surgery to relieve debilitating epileptic seizures. Unfortunately, the surgery inadvertently wiped out most of his ability to form long-term memories. H. M.'s short-term memory is fine, but he has no recollection of anything that has happened since 1953 (other than about the most recent 20–30 seconds of his life). He doesn't recognize the doctors treating him, and he can't remember routes to and from places. He can read a magazine story over and over, thinking he is reading it for the first time each time. He can't remember what he did yesterday, let alone what he has done for the last 50 years. He doesn't even recognize a current photo of himself, as aging has changed his appearance considerably.

H. M.'s memory losses were originally attributed to the removal of his *hippocampus* (see Figure 7.23), although theorists eventually realized that other nearby structures that were removed also contributed to H. M.'s dramatic memory deficits (Delis & Lucas, 1996). Based on decades of additional research, scientists now believe that the entire *hippocampal region* (including the hippocampus, dentate gyrus, subiculum, and entorhinal cortex) and adjacent areas in the cortex are critical for many types of long-term memory (Zola & Squire, 2000). Many scientists now refer to this broader memory complex as the *medial temporal lobe memory system* (Broadbent et al., 2002). Given its apparent role in long-term memory, it is interesting to note that the hippocampal region is one of the first areas of the brain to sustain significant damage in the course of Alzheimer's disease, which produces severe memory impairment in

Figure 7.24

Retrograde versus anterograde amnesia. In retrograde amnesia, memory for events that occurred prior to the onset of amnesia is lost. In anterograde amnesia, memory for events that occur subsequent to the onset of amnesia suffers.



BRENDA MILNER

"Some effects of temporal lobe lesions in man are hard to reconcile with any unitary-process theory of memory."

many people, typically after age 65 (Albert & Moss, 2002).

Do these findings mean that memories are stored in the hippocampal region and adjacent areas? Probably not. Many theorists believe that the medial temporal lobe memory system plays a key role in the *consolidation* of memories (Dudai, 2004). **Consolidation is a hypothetical process involving the gradual conversion of information into durable memory codes stored in long-term memory.** According to this view, memories are consolidated in the hippocampal region and then stored in diverse and widely distributed areas of the cortex (Markowitsch, 2000). This setup allows new memories to become independent of the hippocampal region and to gradually be integrated with other memories already stored in various areas of the cortex (Frankland & Bontempi, 2005).

Theorists who have been influenced by parallel distributed processing (PDP) models of memory have come up with a slightly different take on the hippocampal region's contribution to memory. They suggest that the hippocampal area functions to *bind together* a specific memory's individual elements, which are stored in widely distributed areas of the cortex (Cohen et al., 1999; Nadel & Jacobs, 1998). For example, your memory of attending a baseball game might include a variety of elements—such as when and where it occurred, the final score, certain key plays, the location of your seat, who went with you, and the weather—that are stored in dispersed brain modules. The hippocampal complex may provide a mechanism for bringing these disaggregated elements of a memory together by activating certain ensembles of neurons. In other words, the hippocampal area may play a key role in organizing neural networks that represent specific memories. This analysis is not entirely incompatible with the notion that the hippocampal region handles the consolidation of long-term memories.

Neuroscientists continue to forge ahead in their efforts to identify the anatomical bases of memory. One recent advance has been the demonstration that the *amygdala seems to be critical to the formation of memories for learned fears* (Armony & LeDoux, 2000). This subcortical structure, which is a close neighbor of the hippocampus (see Figure 7.23), may also contribute to the consolidation of other emotional memories (McGaugh, 2004).

Researchers exploring the anatomy of memory have traditionally focused on the anatomical bases of *long-term memory*. However, recent years have brought progress in understanding the neural correlates of *working memory*. Various lines of research suggest that

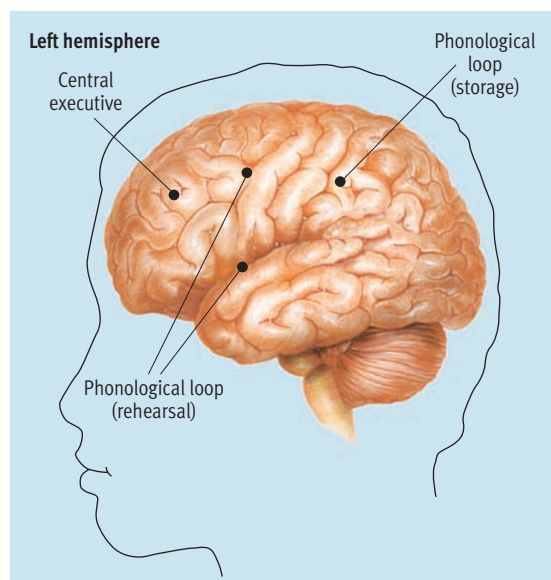


Figure 7.25
Anatomical bases of selected features of working memory. Efforts to identify the brain areas that handle specific components of working memory are in their infancy (in comparison to the work on long-term memory), but some progress had been made. According to Baddeley (2003), the areas shown here in the left hemisphere are associated with the operation of the central executive and the phonological loop. The central executive is also represented in the right hemisphere (not shown), where four areas associated with the visuospatial sketchpad have been pinpointed. (Adapted from Baddeley, 2003)

areas in the prefrontal cortex contribute to working memory (Runyan & Dash, 2005; E. Smith, 2000). Alan Baddeley (2003) suggests that the *central executive* component of working memory may be localized in the prefrontal cortex, whereas other components of working memory may be housed elsewhere. For example, the storage and rehearsal facets of the *phonological loop* are thought to be localized in several cortical areas in the left hemisphere, as shown in Figure 7.25. The *visuospatial sketchpad* is thought to depend on activity in several areas of the right hemisphere. These conclusions remain tentative, but even working memory depends on interactions among a constellation of neural structures.

As you can see, a variety of biochemical processes, neural circuits, and anatomical structures have been implicated as playing a role in memory. Looking for the physiological basis for memory is only slightly less daunting than looking for the physiological basis for thought itself.

➤ REVIEW OF KEY POINTS

- Memory traces may reflect alterations in neurotransmitter release at specific locations. Manipulations of hormone levels and protein synthesis can affect memory.
- Thompson's research suggests that memory traces may consist of localized neural circuits. Memories may also depend on long-term potentiation, which is a durable increase in neural excitability at synapses along a specific neural pathway.
- In retrograde amnesia, a person loses memory for events prior to the amnesia. In anterograde amnesia, a person shows memory deficits for events subsequent to the onset of the amnesia. Studies of amnesia and other research suggests that the medial temporal lobe memory system is involved in the consolidation of memories.

> Systems and Types of Memory

PREVIEW QUESTIONS

- What is the difference between declarative and procedural memory?
- Which type of memory is like an encyclopedia and which is like an autobiography?
- What is prospective memory?

Some theorists believe that evidence on the physiology of memory is confusing because investigators are unwittingly probing into several distinct memory systems that may have different physiological bases. The various memory systems are distinguished primarily by the types of information they handle.

Declarative Versus Procedural Memory



The most basic division of memory into distinct systems contrasts *declarative memory* with *nondeclarative* or *procedural memory* (Squire, 2004; see **Figure 7.26**). **The declarative memory system handles factual information.** It contains recollections of words, definitions, names, dates, faces, events, concepts, and ideas. **The nondeclarative memory system houses memory for actions, skills, conditioned responses, and emotional responses.** It contains *procedural memories* of how to execute perceptual-motor skills, such as riding a bike, typing, and tying one's shoes. To illustrate the distinction, if you know the rules of tennis (the number of games in a set, scoring, and such),

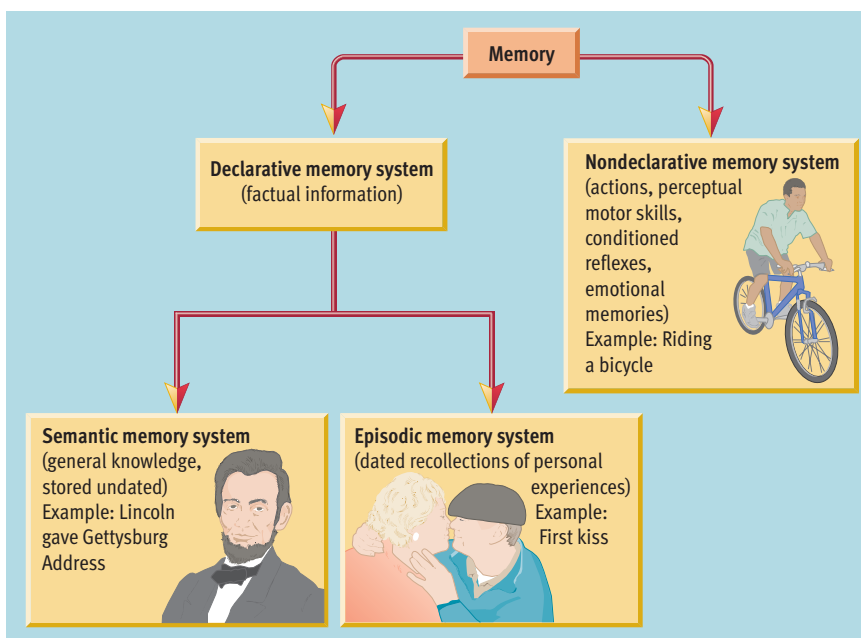
this factual information is stored in declarative memory. If you remember how to hit a serve and swing through a backhand, these are procedural memories that are part of the nondeclarative system. The nondeclarative system also includes the memory base for conditioned reflexes and emotional reactions based on previous learning, such as a person's tensing up in response to the sound of a dental drill.

Support for the distinction between declarative and nondeclarative memory comes from evidence that the two systems seem to operate somewhat differently (Squire, Knowlton, & Musen, 1993). For example, the recall of factual information generally depends on conscious, effortful processes, whereas memory for conditioned reflexes is largely automatic, and memories for skills often require little effort and attention (Johnson, 2003). People execute perceptual-motor tasks such as playing the piano or typing with little conscious awareness of what they're doing. In fact, performance on such tasks sometimes deteriorates if people think too much about what they're doing. Another disparity is that the memory for skills (such as typing and bike riding) doesn't decline much over long retention intervals, while declarative memory appears more vulnerable to forgetting.

Although much remains to be learned, researchers have made some progress toward identifying the neural bases of declarative versus nondeclarative memory. Declarative memory appears to be handled by the *medial temporal lobe* memory system and the far-flung areas of the cortex with which it communicates (Eichenbaum, 2003). It has proven more difficult to pinpoint the neural bases of nondeclarative memory because it consists of more of a hodgepodge of memory functions; however, structures such as the cerebellum and amygdala appear to contribute (Delis & Lucas, 1996; Squire, 2004).

Figure 7.26

Theories of independent memory systems. Theorists have distinguished between declarative memory, which handles facts and information, and nondeclarative memory, which handles motor skills, conditioned responses, and emotional memories. Declarative memory is further subdivided into semantic memory (general knowledge) and episodic memory (dated recollections of personal experiences). The extent to which nondeclarative memory can be usefully subdivided remains the subject of debate, although many theorists view procedural memory, which handles actions and perceptual-motor skills, as an independent subsystem.



Semantic Versus Episodic Memory

Endel Tulving (1986, 1993, 2002) has further subdivided declarative memory into episodic and semantic memory (see **Figure 7.26**). Both contain factual information, but episodic memory contains *personal facts* and semantic memory contains *general facts*. **The episodic memory system is made up of chronological, or temporally dated, recollections of personal experiences.** Episodic memory is a record of things you've done, seen, and heard. It includes information about *when* you did these things, saw them,

or heard them. It contains recollections about being in a ninth-grade play, visiting the Grand Canyon, attending a Norah Jones concert, or going to a movie last weekend. Tulving (2001) emphasizes that the function of episodic memory is “time travel”—that is, to allow one to reexperience the past. He also speculates that episodic memory may be unique to humans.

The semantic memory system contains general knowledge that is not tied to the time when the information was learned. Semantic memory contains information such as Christmas is December 25, dogs have four legs, and Phoenix is located in Arizona. You probably don’t remember when you learned these facts. Such information is usually stored undated. The distinction between episodic and semantic memory can be better appreciated by drawing an analogy to books: Episodic memory is like an autobiography, while semantic memory is like an encyclopedia.

Some studies suggest that episodic and semantic memory may have distinct neural bases (Schacter, Wagner, & Buckner, 2000, Tulving, 2002). For instance, some amnesiacs forget mostly personal facts, while their recall of general facts is largely unaffected (Wood, Ebert, & Kinsbourne, 1982). However, debate continues about the neural substrates of episodic and semantic memory (Barba et al., 1998; Wiggs, Weisberg, & Martin, 1999).

Prospective Versus Retrospective Memory

A 1984 paper with a clever title, “Remembering to Do Things: A Forgotten Topic” (Harris, 1984), introduced yet another distinction between types of memory: *prospective memory* versus *retrospective memory* (see **Figure 7.27**). This distinction does not refer to independent *memory systems*, but rather to fundamentally different types of *memory tasks*. **Prospective memory involves remembering to perform actions in the future.** Examples of prospective memory tasks include remembering to walk the dog, to call someone,

to grab the tickets for the big game, and to turn off your lawn sprinkler. In contrast, **retrospective memory involves remembering events from the past or previously learned information.** Retrospective memory is at work when you try to recall who won the Super Bowl last year, when you reminisce about your high school days, or when you try to recall what your professor said in a lecture last week. Prospective memory has been a “forgotten” topic in that it has been the subject of relatively little study. But that has begun to change, as research on prospective memory has increased in recent years (Einstein & McDaniel, 1996).

Researchers interested in prospective memory argue that the topic merits far more study because it plays such a pervasive role in everyday life (Graf & Uttil, 2001). Think about it—a brief trip to attend class at school can be saturated with prospective memory tasks. You may need to remember to pack your notebook, take your umbrella, turn off your coffeemaker, and grab your parking card before you even get out the door. Unfortunately, experiments demonstrate that it is easy to forget these kinds of intentions, especially when confronted by interruptions and distractions (Einstein et al., 2003). People vary considerably in their ability to successfully carry out prospective memory tasks (Searleman, 1996). Individuals who appear deficient in prospective memory are often characterized as “absent-minded.”

Much remains to be learned about the factors that influence prospective memory. *Habitual tasks*, such as remembering to pick up your mail, appear to be easier to remember than *infrequent tasks*, such as remembering to stop your mail delivery for an upcoming vacation (Searleman, 1996). Another key factor appears to be whether a prospective memory task is tied to some sort of cue. *Event-based tasks* involve future actions that should be triggered by a specific cue. For example, remembering to give a message to a friend is cued by seeing the friend, or remembering to take medication with one’s meal is cued by the meal. *Time-based tasks* require that an action be performed



ENDEL TULVING

“Memory systems constitute the major subdivisions of the overall organization of the memory complex. . . . An operating component of a system consists of a neural substrate and its behavioral or cognitive correlates.”

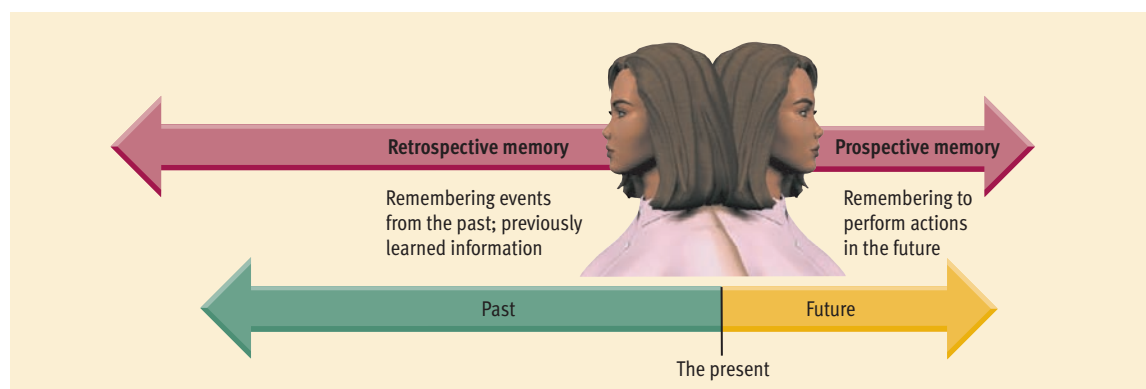


Figure 7.27

Retrospective versus prospective memory. Most memory research has explored the dynamics of *retrospective memory*, which focuses on recollections from the past. However, *prospective memory*, which requires people to remember to perform actions in the future, also plays an important role in everyday life.



Recognizing Various Types of Memory

Check your understanding of the various types of memory discussed in this chapter by matching the definitions below with the following: (a) sensory memory, (b) short-term memory, (c) long-term memory, (d) declarative memory, (e) nondeclarative memory, (f) episodic memory, (g) semantic memory, (h) retrospective memory, and (i) prospective memory. The answers can be found in Appendix A.

- _____ 1. Memory for factual information.
- _____ 2. An unlimited capacity store that can hold information over lengthy periods of time.
- _____ 3. The preservation of information in its original sensory form for a brief time, usually only a fraction of a second.
- _____ 4. Chronological, or temporally dated, recollections of personal experiences.
- _____ 5. The repository of memories for actions, skills, operations, and conditioned responses.
- _____ 6. General knowledge that is not tied to the time when the information was learned.
- _____ 7. Remembering to perform future actions.
- _____ 8. A limited-capacity store that can maintain unrehearsed information for about 20 seconds.

at a certain time or after a certain length of time has elapsed. For example, you might want to start your video recorder at a specific time to tape an interesting show, or you might need to remember to turn off the oven after an hour of baking. Evidence suggests that the cues available in event-based prospective memory tasks make these tasks easier to remember than time-based tasks (Einstein & McDaniel, 1996). Age appears to be another factor that influences the functioning of prospective memory. Older adults seem to be somewhat more vulnerable to problems with prospective memory than younger people are (McDaniel et al., 2003).

REVIEW OF KEY POINTS

- Declarative memory is memory for facts, whereas nondeclarative memory is memory for actions, skills, and conditioned responses. Declarative memory depends more on conscious attention and is more vulnerable to forgetting.
- Declarative memory can be subdivided into episodic memory, for temporally dated personal facts, and semantic memory, for general facts. Theorists have also distinguished between retrospective memory (remembering past events) and prospective memory (remembering to do things in the future).

Reflecting on the Chapter's Themes

Subjectivity of Experience



Theoretical Diversity



Multifactorial Causation



One of our integrative themes—the idea that people's experience of the world is subjective—stood head and shoulders above the rest in this chapter. Let's briefly review how the study of memory has illuminated this idea and then examine two other themes that are relevant.

First, our discussion of attention as inherently selective should have shed light on why people's experience of the world is subjective. To a great degree, what you see in the world around you depends on where you focus your attention. This is one of the main reasons that two people can be exposed to the “same” events and walk away with entirely different perceptions. Second, the reconstructive nature of memory should further explain people's tendency to view the world with a subjective slant. When you observe an event, you don't store an exact copy of the event in your memory. Instead, you store a rough,

“bare bones” approximation of the event that may be reshaped as time goes by.

A second theme that was apparent in our discussion of memory is psychology's theoretical diversity. We saw illuminating theoretical debates about the nature of memory storage, the causes of forgetting, and the existence of multiple memory systems. Finally, the multifaceted nature of memory demonstrated once again that behavior is governed by multiple causes. For instance, your memory of a specific event may be influenced by your attention to it, your level of processing, your elaboration, your exposure to interference, how you search your memory store, how you reconstruct the event, and so forth. Given the multifaceted nature of memory, it should come as no surprise that there are many ways to improve memory. We discuss a variety of strategies in the Personal Application section.

PERSONAL Application

Improving Everyday Memory

Answer the following “true” or “false.”

- ___ 1 Memory strategies were recently invented by psychologists.
- ___ 2 Overlearning of information leads to poor retention.
- ___ 3 Outlining what you read is not likely to affect retention.
- ___ 4 Massing practice in one long study session is better than distributing practice across several shorter sessions.

Mnemonic devices are strategies for enhancing memory. They have a long and honorable history. In fact, one of the mnemonic devices covered in this Application—the method of loci—was described in Greece as early as 86–82 B.C. (Yates, 1966). Actually, mnemonic devices were even more crucial in ancient times than they are today. In ancient Greece and Rome, for instance, writing instruments were not readily available for people to write down things they needed to remember, so they had to depend heavily on mnemonic devices.

Are mnemonic devices the key to improving one’s everyday memory? No. Mnemonic devices can clearly be helpful in some situations (Wilding & Valentine, 1996), but they are not a cure-all. They can be hard to use and hard to apply to many everyday situations. Most books and training programs designed to improve memory probably overemphasize mnemonic techniques (Searleman & Herrmann, 1994). Although less exotic strategies such as increasing rehearsal, engaging in deeper processing, and organizing material are more crucial to everyday memory, we will discuss some popular mnemonics as we proceed through this Application. Along the way, you’ll learn that all of our opening true-false statements are false.

In this Application, we will focus primarily (although not exclusively) on how to use memory principles to *enhance performance in academic pursuits*. Obviously, this is only one aspect of everyday memory. You may also want to improve your memory of phone numbers, passwords, addresses, others’ names

and faces, errands that you need to run, where you filed things, what you said to certain people, and so forth. For more advice on these diverse everyday memory tasks you may want to consult a couple of very practical books: *Memory Fitness* by Einstein and McDaniel (2004) and *Improving Memory and Study Skills* by Hermann, Raybeck, and Gruneberg (2002) (which has *much* broader coverage than its title suggests).

Engage in Adequate Rehearsal



Practice makes perfect, or so you’ve heard. In reality, practice is not likely to guarantee perfection, but it usually leads to improved retention. Studies show that retention improves with increased rehearsal (Greene, 1992a). This improvement presumably occurs because rehearsal helps to transfer information into long-term memory. Although the benefits of practice are well known, people have a curious tendency to overestimate their knowledge of a topic and how well they will perform on a subsequent memory test of this knowledge (Koriat & Bjork, 2005). That’s why it is a good idea to informally test yourself on information that you think you have mastered before confronting a real test (for example, by taking the Practice Tests in this text or additional tests available on the website for the book).

Another possible remedy for overconfidence is trying to overlearn material (Driskell, Willis, & Copper, 1992). **Overlearning refers to continued rehearsal of material after you first appear to have mastered it.** In one study, after subjects had mastered a list of nouns (they recited the list without error), Krueger (1929) required them to continue rehearsing for 50% or 100% more trials. Measuring retention at intervals up to 28 days, Krueger found that greater overlearning was related to better recall of the list. Modern studies have also shown that overlearning can enhance performance on an

exam that occurs within a week, although the evidence on its long-term benefits (months later) is inconsistent (Peladeau, Forget, & Gagne, 2003; Rohrer et al., 2005).

One other point related to rehearsal is also worth mentioning. If you are memorizing some type of list, be aware of the serial-position effect, which is often observed when subjects are tested on their memory of lists (Murdoch, 2001). **The serial-position effect occurs when subjects show better recall for items at the beginning and end of a list than for items in the middle** (see Figure 7.28 on the next page). The reasons for the serial-position effect are complex and need not concern us, but its pragmatic implications are clear: If you need to memorize a list of say, cranial nerves or past presidents, allocate extra practice trials to items in the middle of the list and check your memorization of those items very carefully.

Schedule Distributed Practice and Minimize Interference

Let’s assume that you need to study 9 hours for an exam. Should you “cram” all your studying into one 9-hour period (massed practice)? Or would it be better to distribute your study among, say, three 3-hour periods on successive days (distributed practice)? The evidence indicates that retention tends to be greater after distributed practice than after massed practice (Payne & Wenger, 1996; Seabrook, Brown, & Solity, 2005). This advantage is especially apparent if the intervals between practice periods are fairly long, such as 24 hours (Zechmeister & Nyberg, 1982). For instance, Underwood (1970) studied children (ages 9 to 14) who practiced a list of words four times, either in one long session or in four separate sessions. He found that distributed practice led to better recall than a similar amount of massed practice. The superiority of distributed practice suggests that cramming is an ill-advised ap-

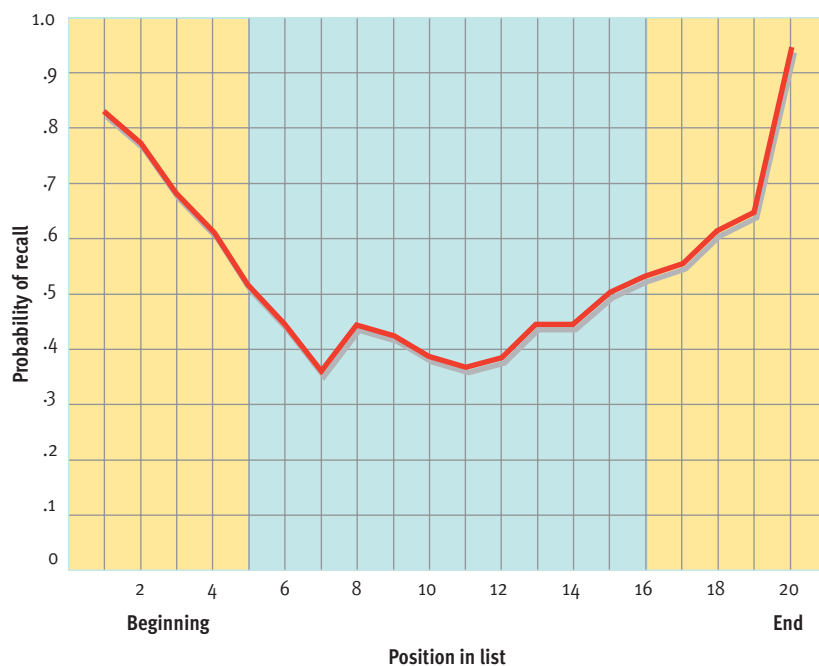


Figure 7.28

The serial-position effect. After learning a list of items to remember, people tend to recall more of the items from the beginning and the end of the list than from the middle, producing the characteristic U-shaped curve shown here. This phenomenon is called the serial-position effect.

Source: Adapted from Rundus, D. (1971). Analysis of rehearsal processes in free recall. *Journal of Experimental Psychology*, 89, 63–77. Copyright © 1971 by the American Psychological Association. Adapted by permission of the publisher and author.

proach to studying for exams (Dempster, 1996).

Because interference is a major cause of forgetting, you'll probably want to think about how you can minimize it. This issue is especially important for students, because memorizing information for one course can interfere with the retention of information for another course. Thus, the day before an exam in a course, you should study for that course only—if possible. If demands in other courses make that plan impossible, you should study the test material last.

Engage in Deep Processing and Organize Information

Research on levels of processing suggests that how *often* you go over material is less critical than the *depth* of processing that you engage in (Craik & Tulving, 1975). If you expect to remember what you read, you have to fully comprehend its meaning (Einstein & McDaniel, 2004). Many students could probably benefit if they spent less time on rote repetition and devoted more effort to actually paying attention to and analyzing

the meaning of their reading assignments. In particular, it is useful to make material *personally* meaningful. When you read your textbooks, try to relate information to your own life and experience. For example, when you read about classical conditioning, try to think of your own responses that are attributable to classical conditioning.

It is also important to understand that retention tends to be greater when information is well organized (Einstein & McDaniel, 2004). Gordon Bower (1970) has shown that hierarchical organization is particularly helpful when it is applicable. Thus, it may be a good idea to *outline* reading assignments for school, since outlining forces you to organize material hierarchically. Consistent with this reasoning, there is some empirical evidence that outlining material from textbooks can enhance retention of the material (McDaniel, Waddill, & Shakesby, 1996).

Enrich Encoding with Verbal Mnemonics

Although it's often helpful to make information personally meaningful, it's not al-

Word lists

Bird
Costume
Mailbox
Head
River
Nurse
Theater
Wax
Eyelid
Furnace

Stories

A man dressed in a *Bird Costume* and wearing a *Mailbox* on his *Head* was seen leaping into the *River*. A *Nurse* ran out of a nearby *Theater* and applied *Wax* to his *Eyelids*, but her efforts were in vain. He died and was tossed into the *Furnace*.

Rustler
Penthouse
Mountain
Sloth
Tavern
Fuzz
Gland
Antler
Pencil
Vitamin

A *Rustler* lived in a *Penthouse* on top of a *Mountain*. His specialty was the three-toed *Sloth*. He would take his captive animals to a *Tavern* where he would remove *Fuzz* from their *Glands*. Unfortunately, all this exposure to sloth fuzz caused him to grow *Antlers*. So he gave up his profession and went to work in a *Pencil* factory. As a precaution he also took a lot of *Vitamin E*.

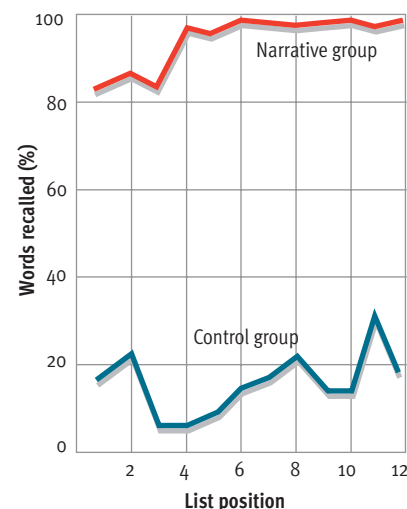


Figure 7.29

Narrative methods of remembering. Bower and Clark (1969) presented participants with 12 lists of words. Subjects in the “narrative group” were asked to recall the words by constructing a story out of them (like the two stories shown here). Subjects in the control group were given no special instructions. Recoding the material in story form dramatically improved recall, as the graph clearly shows.

Source: Adapted from Bower, G. H., & Clark, M. C. (1969). Narrative stories as mediators of serial learning. *Psychonomic Science*, 14, 181–182. Copyright © 1969 by the Psychonomic Society. Adapted by permission of the Psychonomic Society and the author.

ways easy to do so. For instance, when you study chemistry you may have a hard time relating to polymers at a personal level. Thus, many mnemonic devices—such as acrostics, acronyms, and narrative methods—are designed to make abstract material more meaningful.

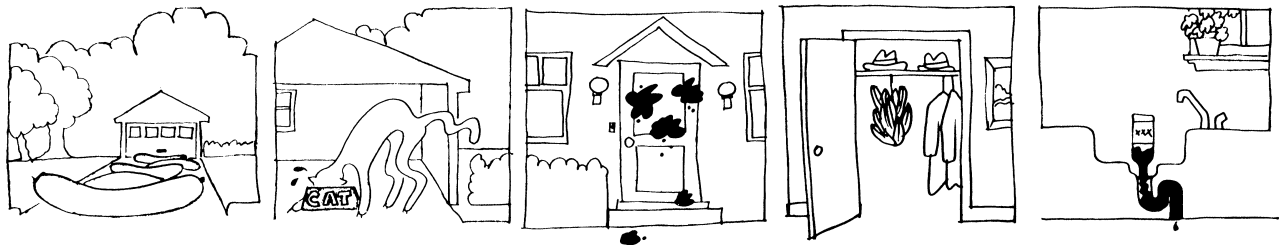
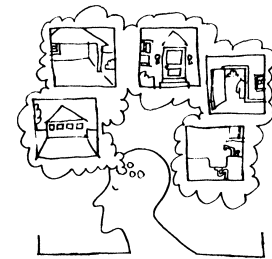


Figure 7.30

The method of loci. In this example from Bower (1970), a person about to go shopping pairs items to remember with familiar places (loci) arranged in a natural sequence: (1) hot dogs/driveway; (2) cat food/garage interior; (3) tomatoes/front door; (4) bananas/coat closet shelf; (5) whiskey/kitchen sink. The shopper then uses imagery to associate the items on the shopping list with the loci, as shown in the drawing: (1) giant hot dog rolls down a driveway; (2) a cat noisily devours cat food in the garage; (3) ripe tomatoes are splattered on the front door; (4) bunches of bananas are hung from the closet shelf; (5) the contents of a bottle of whiskey gurgles down the kitchen sink. As the last panel shows, the shopper recalls the items by mentally touring the loci associated with them.

Source: From Bower, G. H. (1970). Analysis of a mnemonic device. *American Scientist*, 58, 496–499. Copyright © 1970 by Scientific Research Society. Reprinted by permission.



Acrostics and Acronyms

Acrostics are phrases (or poems) in which the first letter of each word (or line) functions as a cue to help you recall information to be remembered. For instance, you may remember the order of musical notes with the saying “Every good boy does fine.” A slight variation on acrostics is the *acronym*—a word formed out of the first letters of a series of words. Students memorizing the order of colors in the light spectrum often store the name “Roy G. Biv” to remember red, orange, yellow, green, blue, indigo, and violet. Notice that this acronym also takes advantage of the principle of chunking. Acrostics and acronyms that individuals create for themselves can be effective memory tools (Herrmann et al., 2002).

Narrative Methods

Another useful way to remember a list of words is to create a story that includes the words in the appropriate order. The narrative both increases the meaningfulness of the words and links them in a specific order. Examples of this technique can be seen in **Figure 7.29**. Bower and Clark (1969) found that this procedure greatly enhanced subjects’ recall of lists of unrelated words.

Rhymes

Another verbal mnemonic that people often rely on is rhyming. You’ve probably repeated, “I before E except after C . . .” thousands of times. Perhaps you also remember the

number of days in each month with the old standby, “Thirty days hath September . . .” Rhyming something to remember it is an old and useful trick.

Enrich Encoding with Visual Mnemonics



Memory can be enhanced by the use of visual imagery. As you may recall, Allan Paivio (1986) believes that visual images create a second memory code and that two codes are better than one. Many popular mnemonic devices depend on visual imagery, including the link method and the method of loci.

Link Method



The link method involves forming a mental image of items to be remembered in a way that links them together. For instance, suppose that you need to remember some items to pick up at the drugstore: a news magazine, shaving cream, film, and pens. To remember these items, you might visualize a public figure on the magazine cover shaving with a pen while being photographed. The more bizarre you make your image, the more helpful it is likely to be (McDaniel & Einstein, 1986).

Method of Loci



The method of loci involves taking an imaginary walk along a familiar path where images of items to be remembered

are associated with certain locations. The first step is to commit to memory a series of loci, or places along a path. Usually these loci are specific locations in your home or neighborhood. Then envision each thing you want to remember in one of these locations. Try to form distinctive, vivid images. When you need to remember the items, imagine yourself walking along the path. The various loci on your path should serve as cues for the retrieval of the images that you formed (see **Figure 7.30**). Evidence suggests that the method of loci can be effective in increasing retention (Moe & De Beni, 2004). Moreover, this method ensures that items are remembered in their *correct order* because the order is determined by the sequence of locations along the pathway.

REVIEW OF KEY POINTS

- Mnemonic devices are methods used to increase the recall of information. Rehearsal, even when it involves overlearning, facilitates retention, although one should be wary of the serial-position effect. Distributed practice tends to be more efficient than massed practice.
- It is wise to plan study sessions so as to minimize interference and maximize deep processing. Evidence also suggests that organization enhances retention, so outlining texts may be valuable.
- Meaningfulness can be enhanced through the use of verbal mnemonics such as acrostics, acronyms, and narrative methods. The link method and the method of loci are mnemonic devices that depend on the value of visual imagery.

CRITICAL THINKING Application

Understanding the Fallibility of Eyewitness Accounts

A number of years ago, the Wilmington, Delaware, area was plagued by a series of armed robberies committed by a perpetrator who was dubbed the “gentleman bandit” by the press because he was an unusually polite and well-groomed thief. The local media published a sketch of the gentleman bandit, and eventually an alert resident turned in a suspect who resembled the sketch. Much to everyone’s surprise, the accused thief was a Catholic priest named Father Bernard Pagano—who vigorously denied the charges. Unfortunately for Father Pagano, his denials and alibis were unconvincing and he was charged with the crimes. At the trial, seven eyewitnesses confidently identified Father Pagano as the gentleman bandit. The prosecution was well on its way to a conviction when there was a stunning turn of events—another man, Ronald Clouser, confessed to the police that he was the culprit. The authorities dropped the charges against Father Pagano, and the relieved priest was able to return to his normal existence (Rodgers, 1982).

This bizarre tale of mistaken identity—which sounds like it was lifted from a movie script—raises some interesting questions about memory. How could seven people “remember” seeing Father Pagnano commit armed robberies that he had nothing to do with? How could they mistake him for Ronald Clouser, when the two really didn’t look very similar (see the adjacent photos)? How could they be so confident when they were so wrong? Perhaps you’re thinking that this is just one case and it must be unrepresentative (which would be sound critical thinking). Well, yes, it is a rather extreme example of eyewitness fallibility, but researchers have compiled mountains of evidence that eyewitness testimony is not nearly as reliable or as accurate as widely assumed (Kassin et al., 2001; Wells & Olson, 2003). This finding is ironic in that people are most confident about their assertions when they can say, “I saw it with my own eyes.” Television news shows like to use the title “Eyewitness News”

to create the impression that they chronicle events with great clarity and accuracy. And our legal system accords special status to eyewitness testimony because it is considered much more dependable than hearsay or circumstantial evidence.

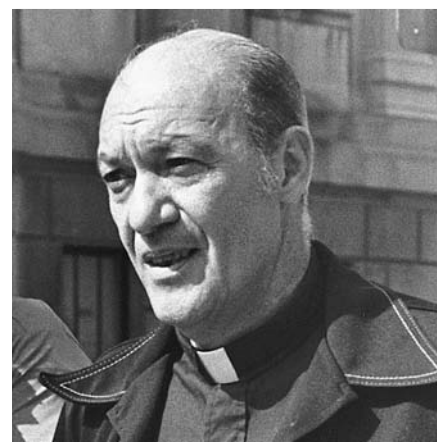
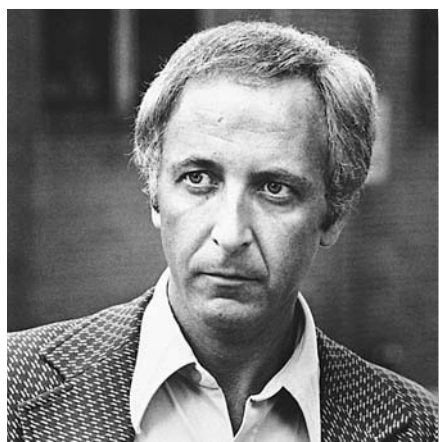
So, why are eyewitness accounts surprisingly inaccurate? Well, many factors and processes contribute to this inaccuracy. We’ll briefly review some of the relevant processes that were introduced in the main body of the chapter; then we’ll focus on two common errors in thinking that also contribute.

Can you think of any memory phenomena described in the chapter that seem likely to undermine eyewitness accuracy? You could point to the fact that *memory is a reconstructive process*, and eyewitness recall is likely to be distorted by the schemas that people have for various events. A second consideration is that *witnesses sometimes make source-monitoring errors* and get confused about where they saw a face. For example, one rape victim mixed up her assailant with a guest on a TV show that she was watching when she was attacked. Fortunately, the falsely accused suspect had an airtight alibi, as he could demonstrate that he was on live

television when the rape occurred (Schacter, 1996). Perhaps the most pervasive factor is the misinformation effect (Loftus, 1993). *Witnesses’ recall of events is routinely distorted by information introduced after the event* by police officers, attorneys, news reports, and so forth. In addition to these factors, eyewitness inaccuracy is fueled by the *hindsight bias* and *overconfidence effects*.

The Contribution of Hindsight Bias

The hindsight bias is the tendency to mold one’s interpretation of the past to fit how events actually turned out. When you know the outcome of an event, this knowledge slants your recall of how the event unfolded and what your thinking was at the time. With the luxury of hindsight, people have a curious tendency to say, “I knew it all along” when explaining events that objectively would have been difficult to foresee. The tendency to exhibit the hindsight bias is normal, pervasive, and surprisingly strong (Guilbault et al., 2004). With regard to eyewitnesses, their recollections may often be



Although he doesn’t look that much like the real “gentleman bandit,” who is shown on the left, seven eyewitnesses identified Father Pagnano (right) as the gentleman bandit, showing just how unreliable eyewitness accounts can be.

distorted by knowing that a particular person has been arrested and accused of the crime in question. For example, Wells and Bradfield (1998) had simulated eyewitnesses select a perpetrator from a photo lineup. The eyewitnesses' confidence in their identifications tended to be quite modest, which made sense given that the actual perpetrator was not even in the lineup. But when some subjects were told, "Good, you identified the actual suspect," they became highly confident about their identifications, which obviously were incorrect. In another study, participants read identical scenarios about a couple's first date that either had no ending or ended in a rape (described in one additional sentence). The subjects who received the rape ending reconstructed the story to be more consistent with their stereotypes of how rapes occur (Carli, 1999).

The Contribution of Overconfidence

Another flaw in thinking that contributes to inaccuracy in eyewitness accounts is people's tendency to be overconfident about the reliability of their memory. When tested for their memory of information, people tend to overestimate their accuracy (Koriat & Bjork, 2005; Lichtenstein, Fischhoff, & Phillips, 1982). In studies of eyewitness recall, participants also tend to be overconfident about their recollections. Although jurors are likely to be more convinced by eyewitnesses who appear confident, the evidence indicates that only a modest correlation is found between eyewitness confidence and eyewitness accuracy (Bornstein & Zickafoose, 1999). Thus, many convictions of innocent people have been attributed to the impact of testimony from highly confident but mistaken eyewitnesses (Wells, Olson, & Charman, 2002).

Strategies to Reduce Overconfidence

Can you learn to make better judgments of the accuracy of your recall of everyday events? Yes, with effort you can get better at making accurate estimates of how likely you are to be correct in the recall of some fact or event. One reason that people tend to be

Image Not Available

Although courts give special credence to eyewitness testimony, scientific evidence indicates that eyewitness accounts are less reliable than widely assumed.

overconfident is that if they can't think of any reasons that they might be wrong, they assume they must be right. Thus, overconfidence is fueled by yet another common error in thinking—the failure to seek disconfirming evidence. Even veteran scientists fall prey to this weakness, as most people don't seriously consider reasons that they might be wrong about something (Mynatt, Doherty, & Tweney, 1978).

Thus, to make more accurate assessments of what you know and don't know, it helps to engage in a deliberate process of considering why you might be wrong. Here is an example. Based on your reading of Chapter 1, write down the schools of thought associated with the following major theorists: William James, John B. Watson, and Carl Rogers. After you provide your answers, rate your confidence that the information you just provided

is correct. Now, write three reasons that your answers might be wrong and three reasons they might be right. Most people will balk at this exercise, arguing that they cannot think of any reasons why they might be wrong, but after some resistance, they can come up with several. Such reasons might include "I was half asleep when I read that part of the chapter" or "I might be confusing Watson and James." Reasons that you think you're right could include "I distinctly recall discussing this with my friend" or "I really worked on those names in Chapter 1." After listing reasons that you might be right and reasons that you might be wrong, rate your confidence in your accuracy once again. Guess what? Most people are less confident after going through such an exercise than they were before (depending, of course, on the nature of the topic).

The new confidence ratings tend to be more realistic than the original ratings (Koriat, Lichtenstein, & Fischhoff, 1980). Why? Because this exercise forces you to think more deeply about your answers and to search your memory for related information. Most people stop searching their memory as soon as they generate an answer they believe to be correct. Thus, the process of considering reasons that you might be wrong about something—a process that people rarely engage in—is a useful critical thinking skill that can reduce overconfidence effects. Better assessment of what you know and don't know can be an important determinant of the quality of the decisions you make and the way you solve problems and reason from evidence.

Table 7.1 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding the limitations and fallibility of human memory	The critical thinker appreciates that memory is reconstructive and that even eyewitness accounts may be distorted or inaccurate.
Recognizing the bias in hindsight analysis	The critical thinker understands that knowing the outcome of events biases our recall and interpretation of the events.
Recognizing overconfidence in human cognition	The critical thinker understands that people are frequently overconfident about the accuracy of their projections for the future and their recollections of the past.
Understanding the need to seek disconfirming evidence	The critical thinker understands the value of thinking about how or why one might be wrong about something.

CHAPTER 7 *Recap*

Key Ideas

Encoding: Getting Information into Memory

- The multifaceted process of memory begins with encoding. Attention, which facilitates encoding, is inherently selective and has been compared to a filter.
- According to levels-of-processing theory, the kinds of memory codes people create depend on which aspects of a stimulus are emphasized; deeper processing results in better recall of information. Structural, phonemic, and semantic encoding represent progressively deeper and more effective levels of processing.
- Elaboration enriches encoding by linking a stimulus to other information. Visual imagery may work in much the same way, creating two memory codes rather than just one. Encoding that emphasizes personal self-reference may be especially useful in facilitating retention.

Storage: Maintaining Information in Memory

- Sensory memory preserves information in its original form, for only a fraction of a second. Short-term memory has a limited capacity (capable of holding about seven chunks of information) and can maintain unrehearsed information for up to about 20 seconds. Baddeley has reconceptualized short-term memory as working memory, which consists of four modules: the phonological loop, visuospatial sketchpad, central executive, and episodic buffer.
- Long-term memory is an unlimited capacity store that may hold information indefinitely. Certain lines of evidence, such as the existence of flashbulb memories, suggest that LTM storage may be permanent, but the evidence is not convincing. Some theorists have raised doubts about whether short-term and long-term memory are really separate.
- Information in LTM can be organized in simple categories, conceptual hierarchies, or semantic networks. A schema is an organized cluster of knowledge about a particular object or event. PDP models of memory assert that specific memories correspond to particular patterns of activation in connectionist networks.

Retrieval: Getting Information out of Memory

- Reinstating the context of an event can facilitate recall. This factor may account for cases in which hypnosis appears to aid recall. Memories are not exact replicas of past experiences. Bartlett showed long ago that memory is partially reconstructive.
- Research by Loftus on the misinformation effect shows that information learned after an event can alter one's memory of it. Source-monitoring and reality-monitoring errors may explain why people sometimes "recall" something that was only suggested to them or something they only imagined.

Forgetting: When Memory Lapses

- Ebbinghaus's early studies of nonsense syllables suggested that people forget very rapidly. Subsequent research showed that Ebbinghaus's forgetting curve was exceptionally steep. Forgetting can be measured by asking people to recall, recognize, or relearn information.
- Decay theory proposes that forgetting occurs spontaneously with the passage of time. It has proven difficult to show that decay occurs in long-term memory. Interference theory proposes that people forget information because of competition from other material.
- Repression involves the motivated forgetting of painful or unpleasant memories. Recent years have seen a surge of reports of repressed memories of sexual abuse in childhood. The authenticity of these recovered memories is the subject of enormous controversy. Skeptics argue that in many cases therapists have inadvertently created false memories of abuse in their patients. The recovered memories debate has demonstrated that memory is more fallible and malleable than widely realized.

In Search of the Memory Trace: The Physiology of Memory

- Kandel's research suggests that memory traces may reflect alterations in the strength of synaptic connections at specific locations. Memory traces may also consist of localized neural circuits that undergo long-term potentiation. The study of amnesia and other research has implicated the hippocampal region as a key player in memory processes. The medial temporal lobe memory system may be responsible for the consolidation of memories.

Systems and Types of Memory

- Declarative memory is memory for facts and information, whereas non-declarative memory is memory for actions, skills, and conditioned responses. Declarative memory can be subdivided into episodic memory, for temporally dated personal facts, and semantic memory, for general facts. Theorists have also distinguished between retrospective and prospective memory, which govern different types of memory tasks.

Reflecting on the Chapter's Themes

- Our discussion of attention and memory enhances understanding of why people's experience of the world is highly subjective. Work in this area also highlights the field's theoretical diversity and shows that behavior is governed by multiple causes.

PERSONAL APPLICATION • Improving Everyday Memory

- Rehearsal, even when it involves overlearning, facilitates retention, although one should be wary of the serial-position effect. Distributed practice tends to be more efficient than massed practice. It is wise to plan study sessions so as to minimize interference. Processing during rehearsal should be deep.
- Meaningfulness can be enhanced with verbal mnemonics such as acrostics, acronyms, and narrative methods. The link method and the method of loci are mnemonic devices that depend on visual imagery.

CRITICAL THINKING APPLICATION • Understanding the Fallibility of Eyewitness Accounts

- Research indicates that eyewitness memory is not nearly as reliable or as accurate as widely believed. Two common errors in thinking that contribute to this situation are the hindsight bias and overconfidence effects. The hindsight bias is the tendency to reshape one's interpretation of the past to fit with known outcomes.

Key Terms

Anterograde amnesia (p. 286)
Attention (p. 260)
Chunk (p. 266)
Conceptual hierarchy (p. 270)
Connectionist models (p. 271)
Consolidation (p. 287)
Decay theory (p. 278)
Declarative memory system (p. 288)
Dual-coding theory (p. 262)
Elaboration (p. 262)
Encoding (p. 260)
Encoding specificity principle (p. 279)
Episodic memory system (p. 288)
Flashbulb memories (p. 267)
Forgetting curve (p. 276)
Hindsight bias (p. 294)
Interference theory (p. 278)
Levels-of-processing theory (pp. 261–262)
Link method (p. 293)
Long-term memory (LTM) (p. 267)
Long-term potentiation (LTP) (p. 285)
Method of loci (p. 293)
Misinformation effect (p. 274)
Mnemonic devices (p. 291)
Nondeclarative memory system (p. 288)
Nonsense syllables (p. 276)
Overlearning (p. 291)
Parallel distributed processing (PDP) models (p. 271)
Proactive interference (p. 279)
Prospective memory (p. 289)
Reality monitoring (p. 275)
Recall (p. 277)

Recognition (p. 277)
Rehearsal (p. 264)
Relearning (pp. 277–278)
Repression (p. 280)
Retention (p. 276)
Retrieval (p. 260)
Retroactive interference (p. 278)
Retrograde amnesia (p. 286)
Retrospective memory (p. 289)
Schema (p. 271)
Self-referent encoding (p. 263)
Semantic memory system (p. 289)
Semantic network (p. 271)
Sensory memory (p. 264)
Serial-position effect (p. 291)
Short-term memory (STM) (p. 264)
Source monitoring (p. 275)
Source-monitoring error (p. 275)
Storage (p. 260)
Tip-of-the-tongue phenomenon (p. 273)
Transfer-appropriate processing (p. 279)

Key People

Alan Baddeley (p. 266)
Frederic Bartlett (p. 273)
Fergus Craik and Robert Lockhart (p. 261)
Hermann Ebbinghaus (pp. 276–277)
Marcia Johnson (p. 275)
Eric Kandel (p. 285)
Elizabeth Loftus (pp. 274–275)
George Miller (p. 266)
Brenda Milner (p. 286)
Richard Thompson (p. 285)
Endel Tulving (pp. 288–289)

CHAPTER 7 Practice Test

- Getting information into memory is called _____; getting information out of memory is called _____.
A. storage; retrieval
B. encoding; storage
C. encoding; retrieval
D. storage; encoding
- The word *big* is flashed on a screen. A mental picture of the word *big* represents a _____ code; the definition "large in size" represents a _____ code; "sounds like pig" represents a _____ code.
A. structural; phonemic; semantic
B. phonemic; semantic; structural
C. structural; semantic; phonemic
D. phonemic; structural; semantic
- Miles is listening as his mother rattles through a list of 15 or so things that he needs to remember to pack for an upcoming trip. According to George Miller, if Miles doesn't write the items down as he hears them, he will probably remember:
A. fewer than 5 items from the list.
B. about 10 to 12 items from the list.
C. all the items from the list.
D. 5 to 9 items from the list.
- Which statement best represents current evidence on the durability of long-term storage?
A. All forgetting involves breakdowns in retrieval.
B. LTM is like a barrel of marbles in which none of the marbles ever leaks out.
C. There is no convincing evidence that all one's memories are stored away permanently.
D. All long-term memories gradually decay at a constant rate.
- An organized cluster of knowledge about a particular object or event is called a:
A. semantic network.
B. conceptual hierarchy.
C. schema.
D. retrieval cue.
- The tip-of-the-tongue phenomenon:
A. is a temporary inability to remember something you know, accompanied by a feeling that it's just out of reach.
B. is clearly due to a failure in retrieval.
C. reflects a permanent loss of information from LTM.
D. is both a and b.
- Roberto is telling Rachel about some juicy gossip when she stops him and informs him that she is the one who passed this gossip on to him about a week ago. In this example, Roberto has:
A. been fooled by the misinformation effect.
B. made a reality-monitoring error.
C. made a source-monitoring error.
D. made a prospective memory error.
- If decay theory is correct:
A. information can never be permanently lost from long-term memory.
B. forgetting is simply a case of retrieval failure.
C. the principal cause of forgetting should be the passage of time.
D. all of the above.
- Bulldog McRae was recently traded to a new football team. He is struggling to remember the plays for his new team because he keeps mixing them up with the plays from his previous team. Bulldog's problem illustrates the operation of:
A. retroactive interference.
B. proactive interference.
C. transfer-inappropriate processing.
D. parallel distributed processing.
- Research suggests that the *consolidation* of memories depends on activity in the:
A. cerebellum.
B. prefrontal cortex.
C. medial temporal lobe.
D. corpus callosum.
- Your memory of how to ride a bicycle is contained in your _____ memory.
A. declarative
B. procedural
C. structural
D. episodic
- Your knowledge that birds fly, that the sun rises in the east, and that $2 + 2 = 4$ is contained in your _____ memory.
A. structural
B. procedural
C. implicit
D. semantic
- Dorothy memorized her shopping list. When she got to the store, however, she found she had forgotten many of the items from the middle of the list. This is an example of:
A. inappropriate encoding.
B. retrograde amnesia.
C. proactive interference.
D. the serial-position effect.
- Overlearning:
A. refers to continued rehearsal of material after the point of apparent mastery.
B. promotes improved recall.
C. should not be done, since it leads to increased interference.
D. does both a and b.
- The tendency to mold one's interpretation of the past to fit how events actually turned out is called:
A. the overconfidence effect.
B. selective amnesia.
C. retroactive interference.
D. the hindsight bias.

1 C pp. 259-260	6 D p. 273	11 B p. 288	15 D p. 294
2 C p. 261	7 C p. 275	12 D p. 289	16 D p. 291
3 D p. 266	8 C p. 278	13 D pp. 291-292	17 D p. 291
4 C pp. 267-269	9 B pp. 278-279		
5 C p. 270	10 C pp. 286-287		

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/

Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



Language and Thought



Language: Turning Thoughts into Words

- What Is Language?
- The Structure of Language
- Milestones in Language Development
- Learning More Than One Language: Bilingualism
- Can Animals Develop Language?
- Language in Evolutionary Context
- Theories of Language Acquisition
- Culture, Language, and Thought

Problem Solving: In Search of Solutions

- Types of Problems
- Barriers to Effective Problem Solving
- Approaches to Problem Solving
- Culture, Cognitive Style, and Problem Solving

Decision Making: Choices and Chances

- Making Choices: Selecting an Alternative
- Taking Chances: Factors Weighed in Risky Decisions
- Heuristics in Judging Probabilities
- The Tendency to Ignore Base Rates
- The Conjunction Fallacy
- The Alternative Outcomes Effect

FEATURED STUDY • Even Objective Probabilities Are Subjective

- Evolutionary Analyses of Flaws in Human Decision Making
- Fast and Frugal Heuristics

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Understanding Pitfalls in Reasoning About Decisions

- The Gambler's Fallacy
- Overestimating the Improbable
- Confirmation Bias
- The Overconfidence Effect
- The Effects of Framing

CRITICAL THINKING APPLICATION • Shaping Thought with Language: "Only a Naive Moron Would Believe That"

- Semantic Slanting
- Name Calling

Recap

Practice Test

Mr. Watson—Mr. Sherlock Holmes,” said Stamford, introducing us.

“How are you?” he said, cordially, gripping my hand with a strength for which I should hardly have given him credit. “You have been in Afghanistan, I perceive.”

“How on earth did you know that?” I asked, in astonishment.

(From *A Study in Scarlet* by Arthur Conan Doyle)

If you’ve ever read any Sherlock Holmes stories, you know that the great detective continually astonished his stalwart companion, Dr. Watson, with his extraordinary deductions. Obviously, Holmes could not arrive at his conclusions without a chain of reasoning. Yet to him even an elaborate reasoning process was a simple, everyday act. Consider his feat of knowing at once, on first meeting Watson, that the doctor had been in Afghanistan. When asked, Holmes explained his reasoning as follows:

“I knew you came from Afghanistan. From long habit the train of thought ran so swiftly through my mind that I arrived at the conclusion without being conscious of the intermediate steps. There were such steps, however. The train of reasoning ran: ‘Here is a gentleman of a medical type, but with the air of a military man. Clearly an army doctor, then. He has just come from the tropics, for his face is dark, and that is not the natural tint of his skin, for his wrists are fair. He has undergone hardship and sickness, as his haggard face says clearly. His left arm has been injured. He holds it in a stiff and unnatural manner. Where in the tropics could an English army doctor have seen much hardship and got his arm wounded? Clearly in Afghanistan.’ The whole train of thought did not occupy a second.”

Admittedly, Sherlock Holmes’s deductive feats are fictional. But even to read about them appreciatively—let alone imagine them, as Sir Arthur Conan Doyle did—is a remarkably complex mental act. Our everyday thought processes seem ordinary to us only because we take them for granted, just as Holmes saw nothing extraordinary in what to him was a simple deduction.

In reality, everyone is a Sherlock Holmes, continually performing magical feats of thought. Even elementary perception—for instance, watching a football game or a ballet—involves elaborate cognitive processes. People must sort through distorted, constantly shifting perceptual inputs and deduce what they see out there in the real world. Imagine, then, the complexity of thought required to read a book, fix an

automobile, or balance a checkbook. Of course, all this is not to say that human thought processes are flawless or unequaled. You probably own a \$10 calculator that can run circles around you when it comes to computing square roots. As we’ll see, some of the most interesting research in this chapter focuses on ways in which people’s thinking can be limited, simplistic, or illogical.

In any event, as we have noted before, in psychology, **cognition refers broadly to mental processes or thinking**. When psychology first emerged as an independent science in the 19th century, it focused on the mind. Mental processes were explored through *introspection*—analysis of one’s own conscious experience (see Chapter 1). Unfortunately, early psychologists’ study of mental processes ran aground, as the method of introspection yielded unreliable results. Psychology’s empirical approach depends on observation, and private mental events proved difficult to observe. Furthermore, during the first half of the 20th century, the study of cognition was actively discouraged by the theoretical dominance of behaviorism. Herbert Simon, a pioneer of cognitive psychology, recalls that “you couldn’t use a word like *mind* in a psychology journal—you’d get your mouth washed out with soap” (Holden, 1986).

Although it wasn’t fully recognized until much later, the 1950s brought a “cognitive revolution” in psychology (Baars, 1986). Renegade theorists, such as Herbert Simon, began to argue that behaviorists’ exclusive focus on overt responses was doomed to yield an incomplete understanding of human functioning. More important, creative new approaches to research on cognitive processes led to exciting progress. For example, in his book on the cognitive revolution, Howard Gardner (1985) notes that three major advances were reported at a watershed 1956 conference—in just one day! First, Herbert Simon and Allen Newell described the first computer program to successfully simulate human problem solving. Second, Noam Chomsky outlined a new model that changed the way psychologists studied language. Third, George Miller delivered the legendary paper that we discussed in Chapter 7, arguing that the capacity of short-term memory is seven (plus or minus two) items. Since then, cognitive science has grown into a robust, interdisciplinary enterprise (Simon, 1992). Besides memory (which we covered in Chapter 7), cognitive psychologists investigate the complexities of language, problem solving, decision making, and reasoning. We’ll look at all these topics in this chapter, beginning with language.



HERBERT SIMON

“You couldn’t use a word like *mind* in a psychology journal—you’d get your mouth washed out with soap.”

> Language: Turning Thoughts into Words

PREVIEW QUESTIONS

- What are the key properties of language?
- How is language structured?
- How do children progress in their use of words and sentences?
- What types of mistakes do they tend to make?
- Does learning two languages at the same time affect language or cognitive development?
- What age is best for learning a second language?

Language obviously plays a fundamental role in human behavior. Indeed, if you were to ask people, “What characteristic most distinguishes humans from other living creatures?” a great many would reply, “Language.” In this section, we’ll discuss the nature, structure, and development of language and related topics, such as bilingualism and whether animals can learn language.

What Is Language?

A language consists of symbols that convey meaning, plus rules for combining those symbols, that can be used to generate an infinite variety of messages. Language systems include a number of critical properties.

First, language is symbolic. People use spoken sounds and written words to represent objects, actions, events, and ideas. The word *lamp*, for instance, refers to a class of objects that have certain properties. The symbolic nature of language greatly expands what people can communicate about. Symbols allow one to refer to objects that may be in another place and to events

that happened at another time (for example, a lamp broken at work yesterday). The symbols used in a language are *arbitrary* in that no built-in relationship exists between the look or sound of words and the objects they stand for. *Lamps* could have been called *books*, for instance, and vice versa.

Second, language is generative. A limited number of symbols can be combined in an infinite variety of ways to *generate* an endless array of novel messages. Everyone has some “stock sayings,” but every day you create sentences that you have never spoken before. You also comprehend many sentences that you have never encountered before (like this one).

Third, language is structured. Although people can generate an infinite variety of sentences, these sentences must be structured in a limited number of ways. Rules govern the arrangement of words into phrases and sentences; some arrangements are acceptable and some are not. For example, you might say, “The swimmer jumped into the pool,” but you would never recombine the same words to say, “Pool the into the jumped swimmer.” The structure of language allows people to be inventive with words and still understand each other. Let’s take a closer look at the structural properties of language.

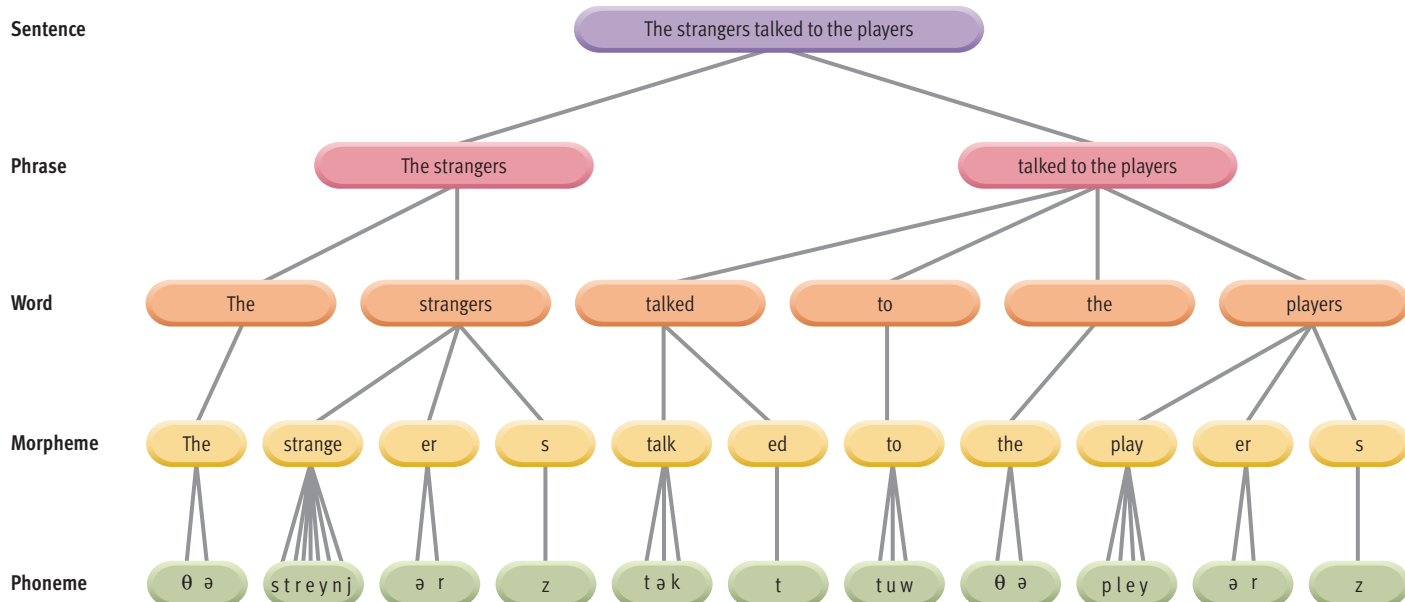
The Structure of Language

Human languages have a hierarchical structure (Ratner, Gleason, & Narasimhan, 1998). As **Figure 8.1** shows, basic sounds are combined into units with

Figure 8.1

An analysis of a simple English sentence. As this example shows, verbal language has a hierarchical structure. At the base of the hierarchy are the *phonemes*, which are units of vocal sound that do not, in themselves, have meaning. The smallest units of meaning in a language are *morphemes*, which include not only root words but such meaning-carrying units as the past-tense suffix *ed* and the plural *s*. Complex rules of syntax govern how the words constructed from morphemes may be combined into phrases, and phrases into meaningful statements, or sentences.

Source: Clarke-Stewart, A., Friedman, S., & Koch, J. (1985). *Child development: A topical approach* (p. 417). New York: Wiley. Reprinted by permission of John Wiley & Sons, Inc.



meaning, which are combined into words. Words are combined into phrases, which are combined into sentences.

Phonemes

At the base of the language hierarchy are *phonemes*, the smallest speech units in a language that can be distinguished perceptually. Considering that an unabridged English dictionary contains more than 450,000 words, you might imagine that there must be a huge number of phonemes. In fact, linguists estimate that humans are capable of recognizing only about 100 such basic sounds. Moreover, no one language uses all of these phonemes. Different languages use different groups of about 20 to 80 phonemes.

For all its rich vocabulary, the English language is composed of about 40 phonemes, corresponding roughly to the 26 letters of the alphabet plus several variations (see Table 8.1). A letter in the alphabet can represent more than one phoneme if it has more than one pronunciation. For example, the letter *a* is pronounced differently in the words *father*, *had*, *call*, and *take*. Each of these pronunciations corresponds to a different phoneme. In addition, some phonemes are represented by combinations of letters, such as *ch* and *th*. Working with this handful of basic sounds, people can understand and generate all the words in the English language—and invent new ones besides.

Morphemes and Semantics

Morphemes are the smallest units of meaning in a language. There are approximately 50,000 English morphemes, which include root words as well as prefixes and suffixes. Many words, such as *fire*, *guard*, and *friend*, consist of a single morpheme. Many others represent combinations of morphemes. For example, the word *unfriendly* consists of three morphemes: the root word *friend*, the prefix *un*, and the suffix *ly*. Each of the morphemes contributes to the meaning of the entire word. *Semantics is the area of language concerned with understanding the meaning of words and word combinations.* Learning about semantics entails learning about the infinite variety of objects and actions that words refer to. A word's meaning may consist of both its *denotation*, which is its dictionary definition, and its *connotation*, which includes its emotional overtones and secondary implications.

Syntax

Of course, most utterances consist of more than a single word. As we've already noted, people don't combine words randomly. *Syntax is a system of rules that specify how words can be arranged into sen-*

Table 8.1 Phonemic Symbols for the Sounds of American English

Consonants						Vowels			
/p/	pill	/t/	toe	/g/	gill	/i/	beet	/i/	bit
/b/	bill	/d/	doe	/ŋ/	ring	/e/	bait	/ɛ/	bet
/m/	mill	/n/	no	/h/	hot	/u/	boot	/u/	foot
/f/	fine	/s/	sink	/ʔ/	uh-oh	/o/	boat	/ɔ/	caught
/v/	vine	/z/	zinc	/l/	low	/æ/	bat	/a/	pot
/θ/	thigh	/ʃ/	choke	/r/	row	/ʌ/	but	/ə/	sofa
/ð/	thy	/j/	joke	/y/	you	/aɪ/	bite	/au/	out
/ʃ/	shoe	/k/	kill	/w/	win	/ɔɪ/	boy		
/ʒ/	treasure								

Source: Hoff, E. (2001). *Language development*. Belmont, CA: Wadsworth. Reprinted by permission.

tences. A simple rule of syntax is that a sentence must have both a *noun phrase* and a *verb phrase*. Thus, "The sound of cars is annoying" is a sentence. However, "The sound of cars" is not a sentence, because it lacks a verb phrase.

Rules of syntax underlie all language use, even though you may not be aware of them. Thus, although they may not be able to verbalize the rule, virtually all English speakers know that an *article* (such as *the*) comes before the word it modifies. For example, you would never say *swimmer the* instead of *the swimmer*. How children learn the complicated rules of syntax is one of the major puzzles investigated by psychologists interested in language. Like other aspects of language development, children's acquisition of syntax seems to progress at an amazingly rapid pace. Let's look at how this remarkable development unfolds.

Milestones in Language Development

Learning to use language requires learning a number of skills that become important at various points in a child's development (Siegler, 1998). We'll examine this developmental sequence by looking first at how children learn to pronounce words, then at their use of single words, and finally at their ability to combine words to form sentences (see Table 8.2 on the next page).

Moving Toward Producing Words

Three-month-old infants display a surprising language-related talent: They can distinguish phonemes from all the world's languages, including phonemes that they do not hear in their environment. In contrast, adults cannot readily discriminate phonemes that are not used in their native language. Actually,

Web Link 8.1



John Lawler's Homepage (Linguistics & Language)
University of Michigan linguistics professor John Lawler has constructed a seemingly endless guide to Net resources for the study of linguistics and language, a field allied with psychology. His homepage is a goldmine of references and guides.

Table 8.2 Overview of Typical Language Development

Age	General Characteristics
Months	
1–5	<i>Reflexive communication:</i> Vocalizes randomly, coos, laughs, cries, engages in vocal play, discriminates language from nonlanguage sounds
6–18	<i>Babbling:</i> Verbalizes in response to speech of others; responses increasingly approximate human speech patterns
10–13	<i>First words:</i> Uses words; typically to refer to objects
12–18	<i>One-word sentence stage:</i> Vocabulary grows slowly; uses nouns primarily; overextensions begin
18–24	<i>Vocabulary spurt:</i> Fast-mapping facilitates rapid acquisition of new words
Years	
2	<i>Two-word sentence stage:</i> Uses telegraphic speech; uses more pronouns and verbs
2.5	<i>Three-word sentence stage:</i> Modifies speech to take listener into account; overregularizations begin
3	Uses complete simple active sentence structure; uses sentences to tell stories that are understood by others; uses plurals
3.5	<i>Expanded grammatical forms:</i> Expresses concepts with words; uses four-word sentences
4	Uses imaginary speech; uses five-word sentences
5	<i>Well-developed and complex syntax:</i> Uses more complex syntax; uses more complex forms to tell stories
6	Displays metalinguistic awareness

Note: Children often show individual differences in the exact ages at which they display the various developmental achievements outlined here.

neither can 1-year-old children, as this curious ability gradually disappears between 4 months and 12 months of age (Werker & Desjardins, 1995). The exact mechanisms responsible for this transition are not understood, but it is clear that long before infants utter their first words, they are making remarkable progress in learning the sound structure of their native language. Progress toward understanding words also occurs during the first year. By 7.5 months, infants begin to recognize common word forms (Jusczyk & Hohne, 1997), and by 8 months many show the first signs of understanding the meanings of familiar words (Fenson et al., 1994).

During the first six months of life, a baby's vocalizations are dominated by crying, cooing, and laughter, which have limited value as a means of communication. Soon, infants are *babbling*, producing a wide variety of sounds that correspond to phonemes and, eventually, many repetitive consonant-vowel combinations, such as “lalalalalala.” Babbling gradually becomes more complex and increasingly resembles the language spoken by parents and others in the child's environment (De Boysson-Bardies & Vihman, 1991). These trends probably reflect ongoing neural development and the maturation of the infant's vocal apparatus (Sachs, 1985), as well as the impact of experience

(Kuhl & Meltzoff, 1997). Babbling lasts until around 18 months, continuing even after children utter their first words.

At around 10 to 13 months of age, most children begin to utter sounds that correspond to words. Most infants' first words are similar in phonetic form and meaning—even in different languages (Gleason & Ratner, 1998). The initial words resemble the syllables that infants most often babble spontaneously. For example, words such as *dada*, *mama*, and *papa* are names for parents in many languages because they consist of sounds that are easy to produce.

Using Words

After children utter their first words, their vocabulary grows slowly for the next few months (Barrett, 1995). Toddlers typically can say between 3 and 50 words by 18 months. However, their *receptive vocabulary* is larger than their *productive vocabulary*. That is, they can comprehend more words spoken by others than they can actually produce to express themselves (Dan & Gleason, 2001). Thus, toddlers can *understand* 50 words months before they can *say* 50 words. Toddlers' early words tend to refer most often to *objects* and secondarily to familiar *actions* (Menyuk, Liebergott, & Schultz, 1995). Children generally acquire nouns before verbs because the meanings of nouns, which often refer to distinct, concrete objects, tend to be easier to encode than the meanings of verbs, which often refer to more abstract relationships (Gentner & Rattermann, 1991). However, this generalization may not apply to all languages (Bates, Devescovi, & Wulfeck, 2001).

Youngsters' vocabularies soon begin to grow at a dizzying pace, as a *vocabulary spurt* often begins at around 18–24 months (Bates & Carnevale, 1993; see **Figure 8.2**). By the first grade, the average child has a vocabulary of approximately 10,000 words, which builds to an astonishing 40,000 words by the fifth grade (Anglin, 1993; see **Figure 8.3**). In building these impressive vocabularies, some 2-year-olds learn as many as 20 new words every week. *Fast mapping* appears to be one factor underlying this rapid growth of vocabulary (Markman, Wasow, & Hansen, 2003). **Fast mapping is the process by which children map a word onto an underlying concept after only one exposure.** Thus, children often add words like *tank*, *board*, and *tape* to their vocabularies after their first encounter with objects that illustrate these concepts. The vocabulary spurt may be attributable to children's improved articulation skills, improved understanding of syntax, underlying cognitive development, or some combination of these factors (MacWhinney, 1998).

Of course, these efforts to learn new words are not flawless. Toddlers often make errors, such as over-

extensions and underextensions (Dan & Gleason, 2001). **An overextension occurs when a child incorrectly uses a word to describe a wider set of objects or actions than it is meant to.** For example, a child might use the word *ball* for anything round—oranges, apples, even the moon. Overextensions usually appear in children’s speech between ages 1 and 2½. Specific overextensions typically last up to several months. Toddlers also tend to be guilty of **underextensions, which occur when a child incorrectly uses a word to describe a narrower set of objects or actions than it is meant to.** For example, a child might use the word *doll* to refer only to a single, favorite doll. Overextensions and underextensions show that toddlers are actively trying to learn the rules of language—albeit with mixed success.

Combining Words

Children typically begin to combine words into sentences near the end of their second year. Early sentences are characterized as “telegraphic” because they resemble old-fashioned telegrams, which omitted nonessential words (senders were charged by the word). **Telegraphic speech consists mainly of content words; articles, prepositions, and other less critical words are omitted.** Thus, a child might say, “Give doll” rather than “Please give me the doll.” Although not unique to the English language, telegraphic speech is not cross-culturally universal, as once thought (de Villiers & de Villiers, 1992).

Researchers sometimes track language development by keeping tabs on subjects’ **mean length of utterance (MLU)—the average length of youngsters’ spoken statements (measured in morphemes).** As children grow and begin to combine words, their vocal expressions gradually become longer (Hoff, 2005).

By the end of their third year, most children can express complex ideas such as plurals or past tense. However, their efforts to learn the rules of language continue to make revealing mistakes. **Overregularizations occur when grammatical rules are incorrectly generalized to irregular cases where they do not apply.** For example, children will say things like “The girl goed home” or “I hitted the ball.” Cross-cultural research suggests that these overregularizations occur in all languages (Slobin, 1985). Most theorists believe that overregularizations demonstrate that children are working actively to master the *rules* of language (Marcus, 1996). These efforts pay off gradually, however, as specific overregularizations often linger in a child’s speech even though the child has heard the correct constructions many times (Maslen et al., 2004). Children don’t learn the fine points of grammar and usage in a single leap but gradually acquire them in small steps.

Figure Not Available

Figure 8.2

The vocabulary spurt. Children typically acquire their first 10–15 words very slowly, but they soon go through a *vocabulary spurt*—a period during which they rapidly acquire many new words. The vocabulary spurt usually begins at around 18–24 months, but children vary, as these graphs of three toddlers’ vocabulary growth show.

Source: Adapted from Goldfield, B. A., & Resnick, J. S. (1990). Early lexical acquisition: Rate, content, and the vocabulary spurt. *Journal of Child Language*, 17, 171–183. Copyright © 1990 by Cambridge University Press. Adapted by permission. Photo: Courtesy of Wayne Weiten

Refining Language Skills

Youngsters make their largest strides in language development in their first 4 to 5 years. However, they continue to refine their language skills during their school-age years. They generate longer and more complicated sentences as they receive formal training in written language.

As their language skills develop, school-age children begin to appreciate ambiguities in language. They can, for instance, recognize two possible meanings in sentences such as “Visiting relatives can be bothersome.” This interest in ambiguities indicates

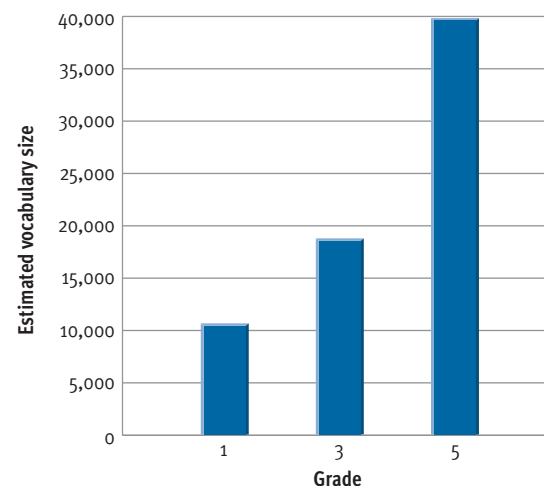


Figure 8.3

The growth of school children’s vocabulary. Vocabulary growth is rapid during the early years of grade school. Youngsters’ estimated vocabulary doubles about every two years between first grade and fifth grade.

Source: Anglin, J. M. (1993). Vocabulary development: A morphological analysis. *Child Development*, 58, Serial 238. Copyright © 1993 The Society for Research in Child Development. Reprinted by permission.

that they're developing *metalinguistic awareness*—**the ability to reflect on the use of language**. As metalinguistic awareness grows, children begin to recognize that statements may have a *literal meaning* and an *implied meaning*. They begin to make more frequent and sophisticated use of metaphors, such as "We were packed in the room like sardines" (Gentner, 1988).

Between the ages of 6 and 8 most children begin to appreciate irony and sarcasm (Creusere, 1999). *Irony* involves conveying an implied meaning that is the opposite of a statement's literal meaning (on learning that he got a D on an exam, a student says, "Oh, that's just great"). *Sarcasm* is a variation on irony in which there is a caustic element directed at a particular person (commenting on a blunder by her husband a woman says, "My husband, the genius"). Understanding sarcasm requires appreciating the subtleties of an utterance's social and cultural context (Katz, Blasko, & Kazmerski, 2004). Interestingly, although language processing is generally handled by the left hemisphere of the brain (see Chapter 3), the right hemisphere appears to play a key role in the understanding of sarcasm (Shamay-Tsoory, Tomer, & Aharon-Peretz, 2005).

Learning More Than One Language: Bilingualism

Given the complexities involved in acquiring one language, you may be wondering about the ramifications of being asked to learn *two* languages. ***Bilingualism is the acquisition of two languages that use different speech sounds, vocabulary, and grammatical rules.*** Although not the norm in the United States, bilingualism is quite common in Europe and

many other regions, and nearly half of the world's population grows up bilingual (Hakuta, 1986; Snow, 1998). Moreover, bilingualism is far from rare even in the English-dominated United States, where roughly 6 million children speak a language other than English at home. Bilingualism has sparked considerable controversy in the United States, as a host of new laws and court rulings have reduced the availability of bilingual educational programs in many school systems (Hakuta, 1999). These laws are based on the implicit assumption that bilingualism hampers language development and has a negative impact on youngsters' educational progress. But does the empirical evidence support this assumption? Let's take a look at the research on bilingualism.

Does Learning Two Languages in Childhood Slow Down Language Development?

If youngsters are learning two languages simultaneously, does one language interfere with the other so that the acquisition of both is impeded? Given the far-reaching sociopolitical implications of this question, you might guess that many relevant studies have been conducted, but in reality there is only a modest body of research. Some studies *have* found that bilingual children have smaller vocabularies in each of their languages than monolingual children have in their one language (Umbel et al., 1992). But when their two overlapping vocabularies are added, their total vocabulary is similar or slightly superior to that of children learning a single language (Oller & Pearson, 2002). Taken as a whole, the available evidence suggests that bilingual and monolingual children are largely similar in the course and rate of their language development (de Houwer, 1995; Nicoladis & Genesee, 1997). Learning two languages simultaneously may not be as easy as learning just one, but there is little empirical support for the belief that bilingualism has serious negative effects on language development (Hoff, 2005).

Does Bilingualism Affect Cognitive Processes and Skills?

Does knowing two languages make thinking more difficult, or could bilingualism enhance thought processes? Once again the evidence is mixed, depending on the variables measured and the exact nature of the subject populations that are compared. When middle-class bilingual subjects who are fluent in both languages are studied, they tend to score somewhat *higher* than monolingual subjects on measures of cognitive flexibility, analytical reasoning, selective atten-

concept check 8.1



Tracking Language Development

Check your understanding of how language skills progress in youngsters. Number the utterances below to indicate the developmental sequence in which they would probably occur. The answers can be found in Appendix A in the back of the book.

- _____ 1. "Doggie," while pointing to a cow.
- _____ 2. "The dogs runned away."
- _____ 3. "Doggie run."
- _____ 4. "The dogs ran away."
- _____ 5. "Doggie," while pointing to a dog.
- _____ 6. "Tommy thinks like his head is full of mashed potatoes."

tion, and metalinguistic awareness (Bialystok, 1999, 2001; Campbell & Sais, 1995). However, on some types of tasks, bilinguals may have a slight disadvantage in terms of raw language-processing *speed* (Taylor & Taylor, 1990). Nonetheless, when researchers control for the effects of social class, they do not find significant cognitive deficits in bilingual youngsters.

What Factors Influence the Acquisition of a Second Language?

A great many bilingual individuals do not learn their two languages simultaneously. Rather, they learn their native language first and then learn a second language later. Do any key considerations influence the learning of a second language? Yes, the evidence clearly indicates that *age* is a significant correlate of how effectively people can acquire a second language—and younger is better. For example, **Figure 8.4**, from a study by Johnson and Newport (1989), maps out the relationship between immigrants' age of arrival in the U.S. and their subsequent mastery of English grammar. As you can see, people who started learning English at an early age achieved greater mastery than those who began later. For reasons that are not well understood, language learning unfolds more effectively when initiated at younger ages. Research indicates that a steady, gradual decline occurs in the successfulness of second-language acquisition with increasing age that continues into middle age (Hakuta, Bialystok, & Wiley, 2003). Older children and adults can certainly become proficient in a second language, but only a small minority become as proficient as native speakers are (Birdsong, 1999). The other major factor that influences the acquisition of a second language is *acculturation*—the degree to which a person is socially and psychologically integrated into a new culture. As you might guess, greater acculturation facilitates more rapid acquisition of the new culture's language (Schumann, 1978, 1993). This finding highlights the fact that language learning is more than a purely cognitive process. Language is a communication tool that is used in varied social contexts. Moreover, language lies at the very core of a nation's culture, which is probably why the debate about bilingualism has been so vigorous. In any event, we turn next to another vigorous debate about language acquisition—the debate over whether animals can learn language.

REVIEW OF KEY POINTS

- During the first half of the 20th century, the study of cognition was largely suppressed by the theoretical dominance of behaviorism. However, the 1950s brought a cognitive



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revolution in psychology, as Simon, Chomsky, Miller, and many others reported major advances in the study of mental processes.

- Languages are symbolic, generative, and structured. Human languages are structured hierarchically. At the bottom of the hierarchy are the basic sound units, called phonemes. At the next level are morphemes, the smallest units of meaning.
- The initial vocalizations by infants are similar across languages, but their babbling gradually begins to resemble the sounds from their surrounding language. Children typically utter their first words around their first birthday. Vocabulary growth is slow at first, but a vocabulary spurt often begins at around 18–24 months.
- Most children begin to combine words by the end of their second year. Their early sentences are telegraphic, in that they omit many nonessential words. Over the next several years, children gradually learn the complexities of syntax and develop metalinguistic awareness.
- Research does not support the assumption that bilingualism has a negative effect on language development or on cognitive development. The learning of a second language is facilitated by starting at a younger age and by acculturation.

The utility of bilingual education programs has been a hotly debated local issue across the United States and Canada. Critics argue that bilingualism has a negative effect on children's language and cognitive development, but there is relatively little empirical support for this assertion.

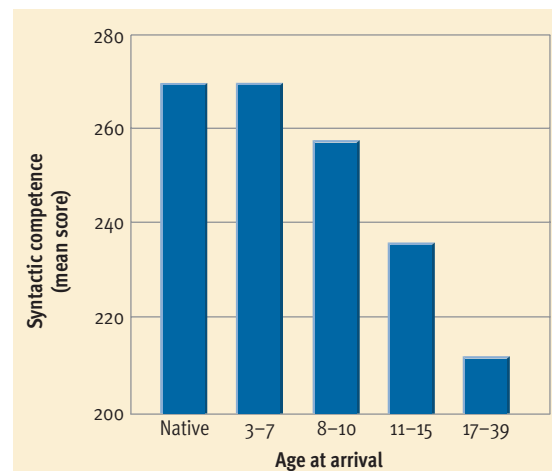


Figure 8.4

Age and second-language learning. In a study of how well immigrants to the United States master English as a second language, Johnson and Newport (1989) examined the relationship between the subjects' age of arrival and their mastery of syntax. As you can see, it was advantageous to start learning English at an earlier age. (Data from Johnson & Newport, 1989)

PREVIEW QUESTIONS

- What kind of progress has been made in teaching animals language?
- What is the evolutionary significance of language?
- Do humans have an innate facility for learning language?
- Does language shape thought?

Web Link 8.2



Chimpanzee and Human Communication Institute Maintained at Central Washington University, this site focuses on efforts to train Washoe and other chimps in American Sign Language. It houses a great deal of information on this line of research and other issues related to animal welfare.

Kanzi, a pygmy chimpanzee, has learned to communicate with his caretakers in surprisingly sophisticated ways via computer-controlled symbol boards, thus raising some doubt about whether language is unique to humans.

Can Animals Develop Language?

Can other species besides humans develop language? Although this issue does not have the practical, sociopolitical repercussions of the debate about bilingualism, it has intrigued researchers for many decades and has led to some fascinating research. Scientists have taught some language-like skills to a number of species, including dolphins (Herman, Kuczaj, & Holder, 1993), sea lions (Schusterman & Gisiner, 1988), and an African gray parrot (Pepperberg, 1993, 2002), but their greatest success has come with the chimpanzee, an intelligent primate widely regarded as humans' closest cousin.

In early studies, researchers tried training chimps to use a nonoral human language: American Sign Language (ASL). ASL is a complex language of hand gestures and facial expressions used by thousands of deaf people in the United States. With extensive training, a chimp named Washoe acquired a sign vocabulary of roughly 160 words and learned to combine these words into simple sentences, such as "Gimme flower" (Gardner & Gardner, 1969). Although these accomplishments were impressive, critics expressed doubts about whether Washoe and other chimps that learned ASL had really acquired *rules* of language. According to Terrace (1986), the chimps' sentences were the products of imitation and operant conditioning, rather than *generative* creations based on linguistic rules.

In more recent years, Sue Savage-Rumbaugh and her colleagues have reported some striking advances with *bonobo pygmy chimpanzees* that have fueled additional debate (Savage-Rumbaugh, 1991; Savage-

Rumbaugh, Shanker, & Taylor, 1998; Lyn & Savage-Rumbaugh, 2000). In this line of research, the bonobos have been trained to communicate with their caretakers by touching geometric symbols representing words on a computer-monitored keyboard. Savage-Rumbaugh's star pupil has been a chimp named Kanzi, although many of his feats have been duplicated by his younger sister, Panbanisha. Kanzi has acquired hundreds of words and has used them in thousands of combinations. Many of these combinations have been spontaneous and seem to follow rules of language. For example, to specify whether he wanted to chase or be chased, Kanzi had to differentiate between symbol combinations in a way that appeared to involve the use of grammatical rules. As the years went by, Kanzi's trainers noticed that he often seemed to understand the normal utterances that they exchanged with each other. Hence, they began to systematically evaluate his comprehension of spoken English and found that he could understand hundreds of sentences that directed him to execute simple actions, such as "Put the collar in the water."

How have the linguistics experts reacted to Kanzi's surprising progress in language development? Many remain skeptical. Wynne (2004) has raised questions about the scoring system used to determine whether Kanzi "understood" oral requests, arguing that it was extremely "generous." Wynne and other critics (Budiarsky, 2004; Kako, 1999; Wallman, 1992) also question whether Kanzi's communications demonstrate all the basic properties of a language. So, what can we conclude? Overall, it seems reasonable to assert that the ability to use language—in a very basic, primitive way—may not be entirely unique to humans, as has been widely assumed.

However, make no mistake, there is no comparison between human linguistic abilities and those of apes or other animals. As remarkable as the language studies with apes are, they should make us marvel even more at the fluency, flexibility, and complexity of human language. A normal human toddler quickly surpasses even the most successfully trained chimps. In mastering language, children outstrip chimps the way jet airplanes outrace horse-drawn buggies. Why are humans so well suited for learning language? According to some theorists, this talent for language is a product of evolution. Let's look at their thinking.

Language in Evolutionary Context

All human societies depend on complex language systems. Even primitive cultures use languages that are just as complicated as those used in modern soci-



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eties. The universal nature of language suggests that it is an innate human characteristic. Consistent with this view, Steven Pinker argues that humans' special talent for language is a species-specific trait that is the product of natural selection (Pinker, 1994, 2004; Pinker & Jackendoff, 2005). According to Pinker, language is a valuable means of communication that has enormous adaptive value. As Pinker and Bloom (1992) point out, "There is an obvious advantage in being able to acquire information about the world secondhand . . . one can avoid having to duplicate the possibly time-consuming and dangerous trial-and-error process that won that knowledge" (p. 460). Dunbar (1996) argues that language evolved as a device to build and maintain social coalitions in increasingly larger groups. Although the impetus for the evolution of language remains a matter of speculation, it does not take much imagination to envision how more-effective communication among our ancient ancestors could have aided hunting, gathering, fighting, and mating and the avoidance of poisons, predators, and other dangers.

Although the adaptive value of language seems obvious, some scholars take issue with the assertion that human language is the product of evolution. For example, David Premack (1985) has expressed skepticism that small differences in language skill would influence reproductive fitness in primitive societies where all one had to communicate about was the location of the closest mastadon herd. In an effort to refute this argument, Pinker and Bloom (1992) point out that very small adaptive disparities are sufficient to fuel evolutionary change. For example, they cite an estimate that a 1% difference in mortality rates among overlapping Neanderthal and human populations could have led to the extinction of Neanderthals in just 30 generations. They also note that a trait variation that produces on average just 1% more offspring than its alternative genetic expression would increase in prevalence from 0.1% to 99.9% of the population in 4000 generations. That many generations may seem like an eternity, but in the context of evolution, it is a modest amount of time.

Whether or not evolution gets the credit, language acquisition in humans seems remarkably rapid. As you will see in the next section, this reality looms large in theories of language acquisition.

Theories of Language Acquisition

Since the 1950s, a great debate has raged about the key processes involved in language acquisition. As with arguments we have seen in other areas of psychology, this one centers on the *nature versus nurture*

issue. The debate was stimulated by the influential behaviorist B. F. Skinner (1957), who argued that environmental factors govern language development. His provocative analysis brought a rejoinder from Noam Chomsky (1959), who emphasized biological determinism. Let's examine their views and subsequent theories that stake out a middle ground.

Behaviorist Theories

The behaviorist approach to language was first outlined by Skinner in his book *Verbal Behavior* (1957). He argued that children learn language the same way they learn everything else: through imitation, reinforcement, and other established principles of conditioning. According to Skinner, vocalizations that are not reinforced gradually decline in frequency. The remaining vocalizations are shaped with reinforcers until they are correct. Behaviorists assert that by controlling reinforcement, parents encourage their children to learn the correct meaning and pronunciation of words (Staats & Staats, 1963). For example, as children grow older, parents may insist on closer and closer approximations of the word *water* before supplying the requested drink.

Behavioral theorists also use the principles of imitation and reinforcement to explain how children learn syntax. According to the behaviorists' view, children learn how to construct sentences by imitating the sentences of adults and older children. If children's imitative statements are understood, parents are able to answer their questions or respond to their requests, thus reinforcing their verbal behavior.

Nativist Theories

Skinner's explanation of language acquisition soon inspired a critique and rival explanation from Noam Chomsky (1959, 1965). Chomsky pointed out that there are an infinite number of sentences in a language. It's therefore unreasonable to expect that children learn language by imitation. For example, in English, we add *ed* to the end of a verb to construct past tense. Children routinely overregularize this rule, producing incorrect verbs such as *goed*, *eated*, and *thinked*. Mistakes such as these are inconsistent with Skinner's emphasis on imitation, because most adult speakers don't use ungrammatical words like *goed*. Children can't imitate things they don't hear. According to Chomsky, children learn *the rules of language*, not specific verbal responses, as Skinner proposed.

An alternative theory favored by Chomsky and others is that humans have an inborn or "native" propensity to develop language (Chomsky, 1975, 1986, 1999; Crain, 1991; McNeill, 1970). (Here *native* is a variation on the word *nature* as it's used in the nature versus nurture debate.) *Nativist theory* proposes



Image Not Available



SUE SAVAGE-RUMBAUGH

"What Kanzi tells us is that humans are not the only species that can acquire language if exposed to it at an early age."



Image Not Available



STEVEN PINKER

"If human language is unique in the modern animal kingdom, as it appears to be, the implications for a Darwinian account of its evolution would be as follows: none. A language instinct unique to modern humans poses no more of a paradox than a trunk unique to modern elephants."



NOAM CHOMSKY

"Even at low levels of intelligence, at pathological levels, we find a command of language that is totally unattainable by an ape."

that humans are equipped with a **language acquisition device (LAD)**—an innate mechanism or process that facilitates the learning of language. According to this view, humans learn language for the same reason that birds learn to fly—because they're biologically equipped for it. The exact nature of the LAD has not been spelled out in nativist theories. It presumably consists of brain structures and neural wiring that leave humans well prepared to discriminate among phonemes, to fast-map morphemes, to acquire rules of syntax, and so on.

Why does Chomsky believe that children have an innate capacity for learning language? One reason is that children seem to acquire language quickly and effortlessly. How could they develop so complex a skill in such a short time unless they have a built-in capacity for it? Another reason is that language development tends to unfold at roughly the same pace for most children, even though children obviously are reared in diverse home environments. This finding suggests that language development is determined by biological maturation more than personal experience. The nativists also cite evidence that the early course of language development is similar across very different cultures (Gleitman & Newport, 1996; Slobin, 1992). They interpret this to mean that children all over the world are guided by the same innate capabilities.

Interactionist Theories

Like Skinner, Chomsky has his critics (Bohannon & Bonvillian, 2001). They ask: What exactly is a language acquisition device? How does the LAD work? What are the neural mechanisms involved? They argue that the LAD concept is awfully vague. Other critics question whether the rapidity of early language development is as exceptional as nativists assume. They assert that it isn't fair to compare the rapid progress of toddlers, who are immersed in their native language, against the struggles of older students, who may devote only 10–15 hours per week to their foreign language course.

The problems apparent in Skinner's and Chomsky's explanations of language development have led some researchers to outline *interactionist theories* of language acquisition. These theories assert that biology and experience *both* make important contributions to the development of language. For example, *emergentist theories* argue that the neural circuits supporting language are not prewired but *emerge* gradually in response to language learning experiences (Bates, 1999; MacWhinney, 2001, 2004). These theories tend to assume that incremental changes in connectionist networks (see Chapter 7) underlie chil-

dren's gradual acquisition of various language skills (Elman, 1999).

Like the nativists, interactionists believe that the human organism is biologically well equipped for learning language. They also agree that much of this learning involves the acquisition of rules. However, like the behaviorists, they believe that social exchanges with parents and others play a critical role in molding language skills. Thus, interactionist theories maintain that a biological predisposition *and* a supportive environment both contribute to language development (see Figure 8.5).

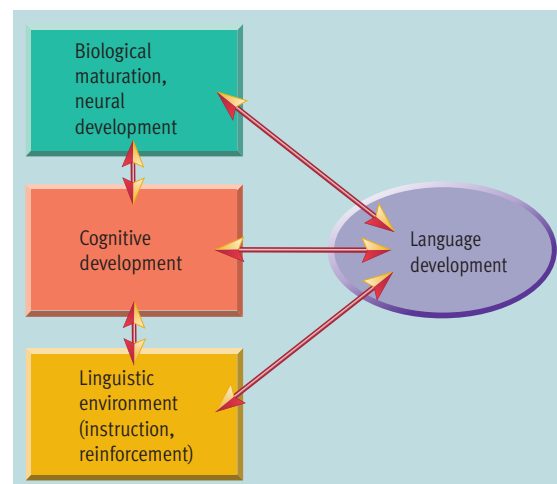
Culture, Language, and Thought

Another long-running controversy in the study of language concerns the relations between culture, language, and thought. Obviously, people from different cultures generally speak different languages. But does your training in English lead you to think about certain things differently than someone who was raised to speak Chinese or French? In other words, does a cultural group's language determine their thought? Or does thought determine language?

Benjamin Lee Whorf (1956) has been the most prominent advocate of **linguistic relativity**, the hypothesis that one's language determines the nature

Figure 8.5

Interactionist theories of language acquisition. The interactionist view is that nature and nurture are both important to language acquisition. Maturation is thought to drive language development directly and to influence it indirectly by fostering cognitive development. Meanwhile, verbal exchanges with parents and others are also thought to play a critical role in molding language skills. The complex bidirectional relations depicted here shed some light on why there is room for extensive debate about the crucial factors in language acquisition.



of one's thought. Whorf speculated that different languages lead people to view the world differently. His classic example compared English and Eskimo views of snow. He asserted that the English language has just one word for snow, whereas the Eskimo language has many words that distinguish among falling snow, wet snow, and so on. Because of this language gap, Whorf argued that Eskimos perceive snow differently than English-speaking people do. However, Whorf's conclusion about these perceptual differences was based on casual observation rather than systematic cross-cultural comparisons of perceptual processes. Moreover, critics subsequently noted that advocates of the linguistic relativity hypothesis had carelessly overestimated the number of Eskimo words for snow, while conveniently ignoring the variety of English words that refer to snow, such as slush and blizzard (Martin, 1986; Pullum, 1991).

In any event, Whorf's hypothesis has been the subject of considerable research and continues to generate spirited debate (Gleitman & Papafragou, 2005). Many studies have focused on cross-cultural comparisons of how people perceive colors, because substantial variations exist among cultures in how colors are categorized with names. For example, some languages have a single color name that includes both blue and green, whereas other languages view light blue and dark blue as fundamentally different colors (Davies, 1998). If a language doesn't distinguish between blue and green, do people who speak that language think about colors differently than people in other cultures do? Early efforts to answer this question suggested that the color categories in a language have relatively little influence on how people perceive and think about colors (Berlin & Kay, 1969; Rosch, 1973). However, a flurry of recent studies have provided new evidence favoring the linguistic relativity hypothesis (Davidoff, 2001, 2004; Roberson et al., 2005). For example, studies of subjects who speak African languages that do not have a boundary between blue and green have found that language affects their color perception, as they have more trouble making quick discriminations between blue and green colors than English-speaking subjects do (Ozgen, 2004). Additional studies using a variety of methods have found that a culture's color categories shape subjects' similarity judgments and groupings of colors (Pilling & Davies, 2004; Roberson, Davies, & Davidoff, 2000). These findings have led Ozgen (2004) to conclude that "it is just possible that what you see when you look at the rainbow depends on the language you speak" (p. 98). Moreover, the new support for linguistic relativity is not limited to the study of color perception. Other studies have



Does the language you speak determine how you think? Yes, said Benjamin Lee Whorf, who argued that the Eskimo language, which has numerous words for snow, leads Eskimos to perceive snow differently than English speakers. Whorf's hypothesis has been the subject of spirited debate.

found that language also has some impact on how people think about motion (Gennari et al., 2002), time (Boroditsky, 2001), and shapes (Roberson, Davidoff, & Shapiro, 2002).

So, what is the status of the linguistic relativity hypothesis? At present, the debate seems to center on whether the new data are sufficient to support the original, "strong" version of the hypothesis—that a given language makes certain ways of thinking obligatory or impossible—or a "weaker" version of the hypothesis—that a language makes certain ways of thinking easier or more difficult. Either way, empirical support for the linguistic relativity hypothesis has increased dramatically in recent years.

➤ REVIEW OF KEY POINTS

- Efforts to teach chimpanzees American Sign Language were impressive, but doubts were raised about whether the chimps learned rules of language. Sue Savage-Rumbaugh's work with Kanzi suggests that chimps are capable of some very basic language acquisition. Many theorists believe that humans' special talent for language is the product of natural selection.
- According to Skinner and other behaviorists, children acquire a language through imitation and reinforcement. Nativist theories assert that humans have an innate capacity to learn language rules. Today, theorists are moving toward interactionist perspectives, which emphasize the role of both biology and experience.
- The theory of linguistic relativity asserts that language determines thought, thus suggesting that people from different cultures may think about the world somewhat differently. Recent studies have provided new support for the linguistic relativity hypothesis.

> Problem Solving: In Search of Solutions

PREVIEW QUESTIONS

- What types of problems have psychologists studied?
- What are some common mistakes that thwart problem-solving efforts?
- What are algorithms and heuristics in problem solving?
- What are some useful problem-solving strategies?
- What is field dependence-independence?
- How is culture related to cognitive style?

Look at the two problems below. Can you solve them?

In the Thompson family there are five brothers, and each brother has one sister. If you count Mrs. Thompson, how many females are there in the Thompson family?

Fifteen percent of the people in Topeka have unlisted telephone numbers. You select 200 names at random from the Topeka phone book. How many of these people can be expected to have unlisted phone numbers?

These problems, borrowed from Sternberg (1986, p. 214), are exceptionally simple, but many people fail to solve them. The answer to the first problem is *two*: The only females in the family are Mrs. Thompson and her one daughter, who is a sister to each of her brothers. The answer to the second problem is *none*—you won't find any people with *unlisted* phone numbers in the phone book.

Why do many people fail to solve these simple problems? You'll learn why in a moment, when we discuss barriers to effective problem solving. But first, let's examine a scheme for classifying problems into a few basic types.

Types of Problems



Problem solving refers to active efforts to discover what must be done to achieve a goal that is not readily attainable. Obviously, if a goal is readily attainable, there isn't a problem. But in problem-solving situations, one must go beyond the information given to overcome obstacles and reach a goal. Jim Greeno (1978) has proposed that problems can be categorized into three basic classes:

1. *Problems of inducing structure* require people to discover the relations among numbers, words, sym-

bols, or ideas. The *series completion problems* and the *analogy problems* in **Figure 8.6** are examples of problems of inducing structure.

2. *Problems of arrangement* require people to arrange the parts of a problem in a way that satisfies some criterion. The parts can usually be arranged in many ways, but only one or a few of the arrangements form a solution. The *string problem* and the *anagrams* in **Figure 8.6** fit in this category.

3. *Problems of transformation* require people to carry out a sequence of transformations in order to reach a specific goal. The *hobbits and orcs problem* and the *water jar problem* in **Figure 8.6** are examples of transformation problems. Transformation problems can be challenging. Even though you know exactly what the goal is, it's often not obvious how the goal can be achieved.

Greeno's list is not an exhaustive scheme for classifying problems, but it provides a useful system for understanding some of the variety seen in problems. Although researchers have recently shown an increased interest in how people solve real-world problems in science, medicine, or law, research in this area has traditionally focused on "generic" problems like those in **Figure 8.6**, which are largely uncontaminated by variations in subjects' knowledge or expertise.

Barriers to Effective Problem Solving



On the basis of their studies of problem solving, psychologists have identified a number of barriers that frequently impede subjects' efforts to arrive at solutions. Common obstacles to effective problem solving include a focus on irrelevant information, func-

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A. Analogy

What word completes the analogy?

Merchant : Sell :: Customer : _____

Lawyer : Client :: Doctor : _____

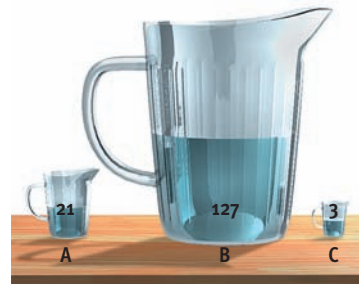
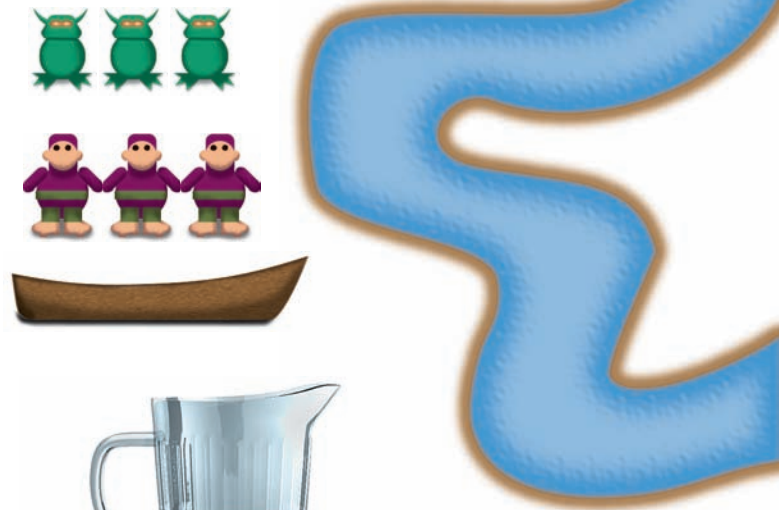
B. String problem

Two strings hang from the ceiling but are too far apart to allow a person to hold one and walk to the other. On the table are a book of matches, a screwdriver, and a few pieces of cotton. How could the strings be tied together?



C. Hobbits and orcs problem

Three hobbits and three orcs arrive at a river bank, and they all wish to cross onto the other side. Fortunately, there is a boat, but unfortunately, the boat can hold only two creatures at one time. Also, there is another problem. Orcs are vicious creatures, and whenever there are more orcs than hobbits on one side of the river, the orcs will immediately attack the hobbits and eat them up. Consequently, you should be certain that you never leave more orcs than hobbits on either river bank. How should the problem be solved? It must be added that the orcs, though vicious, can be trusted to bring the boat back! (From Matlin, 1989, p. 319)



D. Water jar problem

Suppose that you have a 21-cup jar, a 127-cup jar, and a 3-cup jar. Drawing and discarding as much water as you like, you need to measure out exactly 100 cups of water. How can this be done?

E. Anagram

Rearrange the letters in each row to make an English word.

RWAET

KEROJ

F. Series completion

What number or letter completes each series?

1 2 8 3 4 6 5 6 _____

A B M C D M _____

Figure 8.6

Six standard problems used in studies of problem solving. Try solving the problems and identifying which class each belongs to before reading further. The problems can be classified as follows. The *analogy problems* and *series completion problems* are problems of inducing structure. The solutions for the analogy problems are *Buy* and *Patient*. The solutions for the series completion problems are *4* and *E*. The *string problem* and the *anagram problems* are problems of arrangement. To solve the string problem, attach the screwdriver to one string and set it swinging as a pendulum. Hold the other string and catch the swinging screwdriver. Then you need only untie the screwdriver and tie the strings together. The solutions for the anagram problems are *WATER* and *JOKER*. The *hobbits and orcs problem* and the *water jar problem* are problems of transformation. The solutions for these problems are outlined in Figures 8.7 and 8.8.

tional fixedness, mental set, and the imposition of unnecessary constraints.

Irrelevant Information

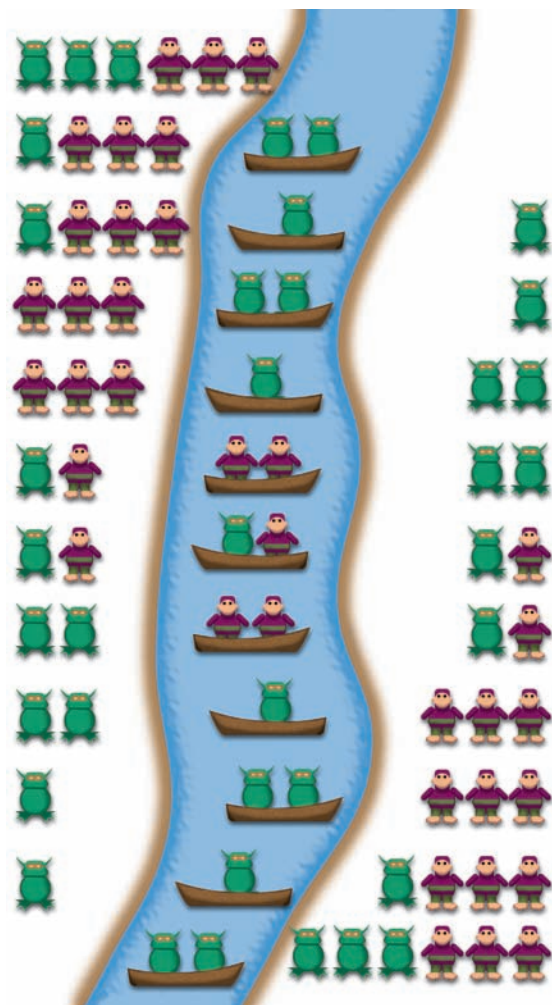


We began our discussion of problem solving with two simple problems that people routinely fail to solve (see page 310). The catch is that these problems contain *irrelevant information* that leads people astray. In the first problem, the number of brothers is irrele-

vant in determining the number of females in the Thompson family. In the second problem, subjects tend to focus on the figures of 15% and 200 names. But this numerical information is irrelevant, since all the names came out of the phone book.

Sternberg (1986) points out that people often incorrectly assume that all the numerical information in a problem is necessary to solve it. They therefore try to figure out how to use quantitative information

Figure 8.7
Solution to the hobbits and orcs problem. This problem is difficult because it is necessary to temporarily work “away” from the goal.



before they even consider whether it’s relevant. Focusing on irrelevant information can have adverse effects on reasoning and problem solving (Gaeth & Shanteau, 2000). Hence, effective problem solving requires that you attempt to figure out what information is relevant and what is irrelevant before proceeding.

Functional Fixedness

Another common barrier to successful problem solving, identified by Gestalt psychologists, is *functional fixedness*—the tendency to perceive an item only in terms of its most common use. Functional fixed-

ness has been seen in the difficulties that people have with the string problem (Maier, 1931). Solving this problem requires finding a novel use for one of the objects: the screwdriver. Subjects tend to think of the screwdriver in terms of its usual functions—turning screws and perhaps prying things open. They have a hard time viewing the screwdriver as a weight. Their rigid way of thinking about the screwdriver illustrates functional fixedness (Dominowski & Bourne, 1994). Ironically, young children appear to be less vulnerable to functional fixedness than older children or adults because they have less knowledge about the conventional uses of various objects (Defeyter & German, 2003).

Mental Set

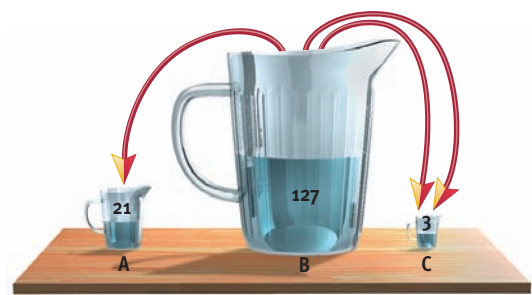
Rigid thinking is also at work when a mental set interferes with effective problem solving. *A mental set exists when people persist in using problem-solving strategies that have worked in the past.* The effects of mental set were seen in a classic study by Gestalt psychologist Abraham Luchins (1942). He asked subjects to work a series of water jar problems, like the one introduced earlier. Six such problems are outlined in **Figure 8.9**, which shows the capacities of the three jars and the amounts of water to be measured out. Try solving these problems.

Were you able to develop a formula for solving these problems? The first four all require the same strategy, which was described in **Figure 8.8**. You have to fill jar B, draw off the amount that jar A holds once, and draw off the amount that jar C holds twice. Thus, the formula for your solution is $B - A - 2C$. Although there is an obvious and much simpler solution ($A - C$) for the fifth problem (see **Figure 8.13** on page 315), Luchins found that most subjects stuck

Figure 8.9
Additional water jar problems. Using jars A, B, and C, with the capacities indicated in each row, figure out how to measure out the desired amount of water specified on the far right. The solutions are shown in Figure 8.13 on page 315. (Based on Luchins, 1942)

Problem	Capacity of empty jars			Desired amount of water
	A	B	C	
1	14	163	25	99
2	18	43	10	5
3	9	42	6	21
4	20	59	4	31
5	23	49	3	20
6	28	76	3	25

Figure 8.8
The method for solving the water jar problem. As explained in the text, the correct formula is $B - A - 2C$.



with the more cumbersome strategy that they had used in problems 1–4. Moreover, most subjects couldn't solve the sixth problem in the allotted time, because they kept trying to use their proven strategy, which does *not* work for this problem. The subjects' reliance on their "tried and true" strategy is an illustration of mental set in problem solving. This tendency to let one's thinking get into a rut is a common barrier to successful problem solving (Smith, 1995). Mental set may explain why having expertise in an area sometimes backfires and can hamper problem-solving efforts (Leighton & Sternberg, 2003).

Unnecessary Constraints



Effective problem solving requires specifying all the constraints governing a problem *without assuming any constraints that don't exist*. An example of a problem in which people place an unnecessary constraint on the solution is the nine-dot problem shown in **Figure 8.10** (Maier, 1930). Without lifting your pencil from the paper, try to draw four straight lines that will cross through all nine dots. Most people will not draw lines outside the imaginary boundary that surrounds the dots. Notice that this constraint is not part of the problem statement. It's imposed only by the problem solver (Adams, 1980). Correct solutions, two of which are shown in **Figure 8.14** on page 315, extend outside the imaginary boundary. People often make assumptions that impose unnecessary constraints on problem-solving efforts.

The nine-dot problem is often solved with a burst of insight. **Insight occurs when people suddenly discover the correct solution to a problem after struggling with it for a while.** Although insight feels like a sudden, "aha" experience to problem solvers, some researchers have questioned whether insight solutions emerge full blown or are preceded by incremental movement toward a solution. Recent studies suggest the latter—that insight breakthroughs are often preceded by gradual movement toward a solution that occurs outside of the problem solver's awareness (Novick & Bassok, 2005).

Approaches to Problem Solving

In their classic treatise on problem solving, Allen Newell and Herbert Simon (1972) use a spatial metaphor to describe the process of problem solving. They use the term **problem space to refer to the set of possible pathways to a solution considered by the problem solver.** Thus, they see problem solving as a search in space. The problem solver's task is to find a solution path among the potential pathways that

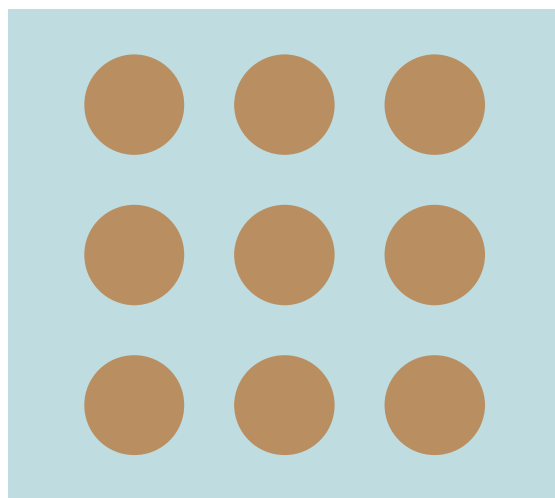


Figure 8.10

The nine-dot problem.

Without lifting your pencil from the paper, draw no more than four lines that will cross through all nine dots. For possible solutions, see Figure 8.14.

Source: Adams, J. L. (1980). *Conceptual block-busting: A guide to better ideas*. New York: W. H. Freeman. Copyright © 1980 by James L. Adams. Reprinted by permission of W. H. Freeman & Co.

could lead from the problem's initial state to its goal state. The problem space metaphor highlights the fact that people must choose from among a variety of conceivable pathways or strategies in attempting to solve problems (Hunt, 1994). In this section, we'll examine some of these general strategies.

Using Algorithms and Heuristics

Trial and error is a common approach to solving problems. **Trial and error involves trying possible solutions and discarding those that are in error until one works.** Trial and error is often applied haphazardly, but people sometimes try to be systematic. **An algorithm is a methodical, step-by-step procedure for trying all possible alternatives in searching for a solution to a problem** (Dietrich, 1999). For instance, to solve the anagram IHCRA, you could write out all the possible arrangements of these letters until you eventually reached an answer (CHAIR). If an algorithm is available for a problem, it guarantees that one can eventually find a solution.

Algorithms can be effective when there are relatively few possible solutions to be tried out. However, algorithms do not exist for many problems, and they can become impractical when the problem space is large. Consider, for instance, the problem shown in **Figure 8.11**. The challenge is to move just two matches to create a pattern containing four equal squares. Sure, you could follow an algorithm in moving pairs of matches about. But you'd better allocate plenty of time to this effort, as there are over 60,000 possible rearrangements to check out (see **Figure 8.15** on page 315 for the solution).

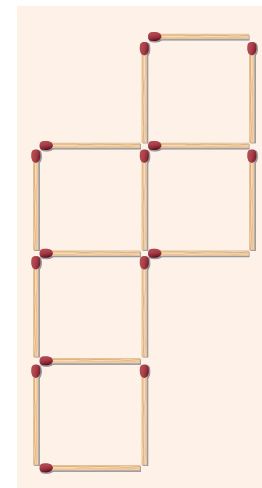
Because algorithms are inefficient, people often use shortcuts called **heuristics** in problem solving. **A heuristic is a guiding principle or "rule of thumb" used in solving problems or making decisions.** In solving problems, a heuristic allows you to discard

Figure 8.11

The matchstick problem.

Move two matches to form four equal squares. A solution can be found in Figure 8.15.

Source: Kendler, H. H. (1974). *Basic psychology*. Menlo Park, CA: Benjamin-Cummings. Copyright © 1974 The Benjamin-Cummings Publishing Co. Adapted by permission of Howard H. Kendler.



some alternatives while pursuing selected alternatives that appear more likely to lead to a solution (Holyoak, 1995). Heuristics can be useful because they selectively narrow the problem space, but they don't guarantee success (Fischhoff, 1999). Helpful heuristics in problem solving include forming subgoals, working backward, searching for analogies, and changing the representation of a problem.

Forming Subgoals

A useful strategy for many problems is to formulate *subgoals*, intermediate steps toward a solution (Carambone, 1998). When you reach a subgoal, you've solved part of the problem. Some problems have fairly obvious subgoals, and research has shown that people take advantage of them. For instance, in analogy problems, the first subgoal is usually to figure out the possible relations between the first two parts of the analogy. In a study by Simon and Reed (1976), subjects working on complex problems were given subgoals that weren't obvious. Providing subgoals helped the subjects solve the problems much more quickly.

The wisdom of formulating subgoals can be seen in the *tower of Hanoi problem*, depicted in **Figure 8.12**. The terminal goal for this problem is to move all three rings on peg A to peg C, while abiding by two restrictions: only the top ring on a peg can be moved, and a ring must never be placed above a smaller ring. See whether you can solve the problem before continuing.

Dividing this problem into subgoals facilitates a solution (Kotovsky, Hayes, & Simon, 1985). If you think in terms of subgoals, your first task is to get ring 3 to the bottom of peg C. Breaking this task into sub-subgoals, subjects can figure out that they should move ring 1 to peg C, ring 2 to peg B, and ring 1 from peg C to peg B. These maneuvers allow you to place ring 3 at the bottom of peg C, thus meeting your first subgoal. Your next subgoal—getting ring 2 over to peg C—can be accomplished in just two steps: move ring 1 to peg A and ring 2 to peg C. It should then be obvious how to achieve your final subgoal—getting ring 1 over to peg C.

Figure 8.12
The tower of Hanoi problem. Your mission is to move the rings from peg A to peg C. You can move only the top ring on a peg and can't place a larger ring above a smaller one. The solution is explained in the text.

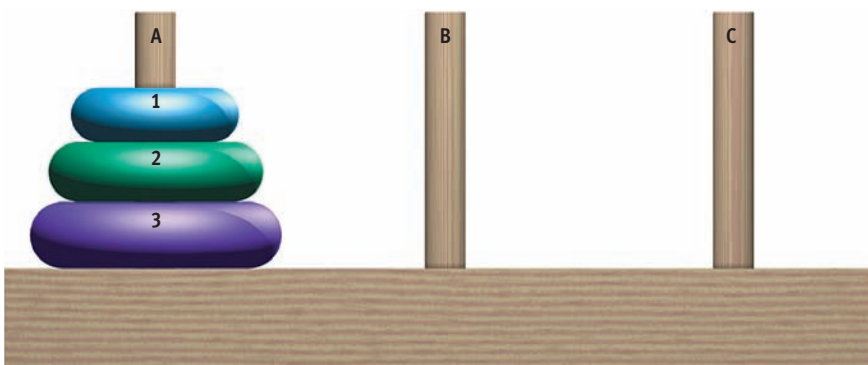


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Working Backward

Try to work the *lily pond problem* described below:

The water lilies on the surface of a small pond double in area every 24 hours. From the time the first water lily appears until the pond is completely covered takes 60 days. On what day is half of the pond covered with lilies?

If you're working on a problem that has a well-specified end point, you may find the solution more readily if you begin at the end and work backward. This strategy is the key to solving the lily pond problem (Davidson, 2003). If the entire pond is covered on the 60th day, and the area covered doubles every day, how much is covered on the 59th day? One-half of the pond will be covered, and that happens to be the exact point you were trying to reach. The lily pond problem is remarkably simple when you work backward. In contrast, if you move forward from the starting point, you wrestle with questions about the area of the pond and the size of the lilies, and you find the problem riddled with ambiguities.

Searching for Analogies

Searching for analogies is another of the major heuristics for solving problems (Holyoak, 2005). If you can spot an analogy between problems, you may be able to use the solution to a previous problem to solve a current one. Of course, using this strategy depends

on recognizing the similarity between two problems, which may itself be a challenging problem. People often are unable to recognize that two problems are similar (Gilhooly, 1996). One reason that people have difficulty recognizing analogies between problems is that they often focus on superficial, surface features of problems rather than their underlying structure (Bassok, 2003). Nonetheless, analogies can be a powerful tool in efforts to solve problems. Try to make use of analogies to solve the following two problems:

A teacher had 23 pupils in his class. All but 7 of them went on a museum trip and thus were away for the day. How many students remained in class that day?

Susan gets in her car in Boston and drives toward New York City, averaging 50 miles per hour. Twenty minutes later, Ellen gets in her car in New York City and starts driving toward Boston, averaging 60 miles per hour. Both women take the same route, which extends a total of 220 miles between the two cities. Which car is nearer to Boston when they meet?

These problems, taken from Sternberg (1986, pp. 213 and 215), resemble the ones that opened our discussion of problem solving. Each has an obvious solution that's hidden in irrelevant quantitative information. If you recognized this similarity, you probably solved the problems easily. If not, take another look now that you know what the analogy is. Neither problem requires any calculation whatsoever. The answer to the first problem is 7. As for the second problem, when the two cars meet they're in the same place. Obviously, they have to be the same distance from Boston.

Changing the Representation of the Problem

Whether you solve a problem often hinges on how you envision it—your *representation of the problem*. Many problems can be represented in a variety of ways, such as verbally, mathematically, or spatially. You might represent a problem with a list, a table, an equation, a graph, a matrix of facts or numbers, a hierarchical tree diagram, or a sequential flowchart (Halpern, 2003). There isn't one ideal way to represent problems. However, when researchers compare experts and novices in a particular area of problem solving, they find that the experts strip away irrelevant details and represent problems much more efficiently (Pretz, Naples, & Sternberg, 2003). This finding highlights the importance of how problems are represented. Thus, when you fail to make progress on a problem with your initial representation, changing

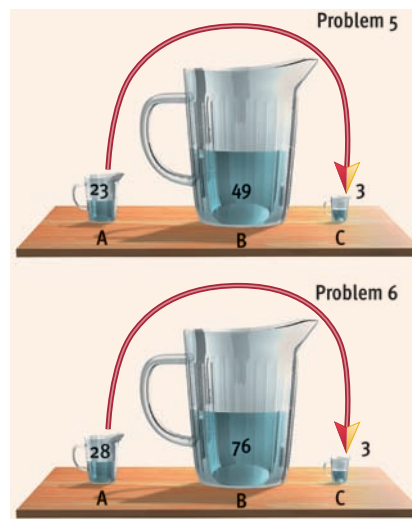


Figure 8.13
Solutions to the additional water jar problems. The solution for problems 1–4 is the same ($B - A - 2C$) as the solution shown in Figure 8.8. This method will work for problem 5, but there also is a simpler solution ($A - C$), which is the only solution for problem 6. Many subjects exhibit a mental set on these problems, as they fail to notice the simpler solution for problem 5.

your representation is often a good strategy (Novick & Bassok, 2005). As an illustration, see whether you can solve the *bird and train problem* (from Bransford & Stein, 1993, p. 11):

Two train stations are 50 miles apart. At 1 P.M. on Sunday a train pulls out from each of the stations and the trains start toward each other. Just as the trains pull out from the stations, a hawk flies into the air in front of the

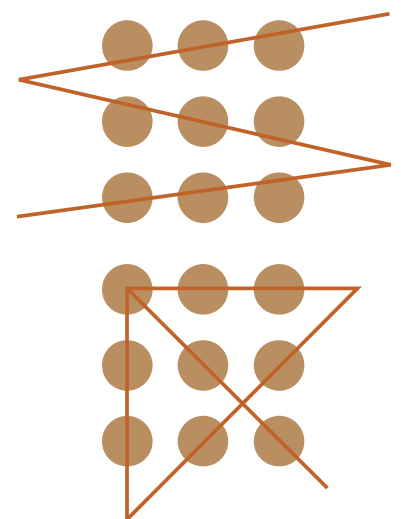
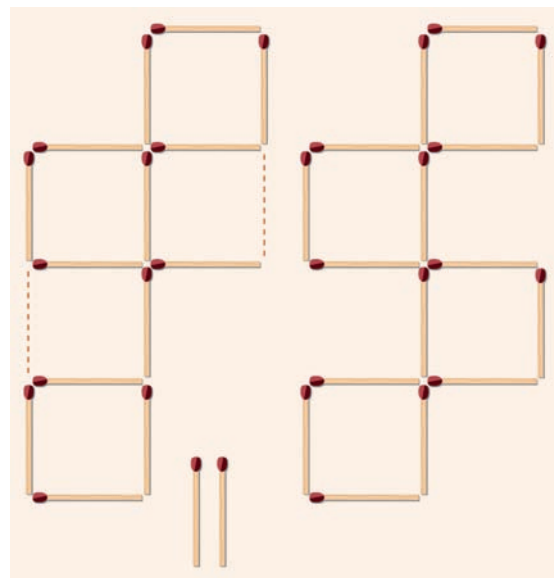


Figure 8.14
Two solutions to the nine-dot problem. The key to solving the problem is to recognize that nothing in the problem statement forbids going outside the imaginary boundary surrounding the dots.

Source: Adams, J. L. (1980). *Conceptual blockbusting: A guide to better ideas*. New York: W. H. Freeman. Copyright © 1980 by James L. Adams. Reprinted by permission of W. H. Freeman & Co.

Figure 8.15
Solution to the matchstick problem. The key to solving this problem is to "open up" the figure, something many subjects are reluctant to do because they impose unnecessary constraints on the problem.

Source: Kendler, H. H. (1974). *Basic psychology*. Menlo Park, CA: Benjamin-Cummings. Copyright © 1974 The Benjamin-Cummings Publishing Co. Adapted by permission of Howard H. Kendler.



Critical Thinking Consortium

The many resources at the Critical Thinking Consortium are designed to help teachers at every level to help develop their students' critical thinking skills. Visitors will find many online pamphlets on critical thinking and active learning.

first train and flies ahead to the front of the second train. When the hawk reaches the second train, it turns around and flies toward the first train. The hawk continues in this way until the trains meet. Assume that both trains travel at the speed of 25 miles per hour and the hawk flies at a constant speed of 100 miles per hour. How many miles will the hawk have flown when the trains meet?

This problem asks about the *distance* the bird will fly, so people tend to represent the problem spatially, as shown in **Figure 8.16**. Represented this way, the problem can be solved, but the steps are tedious and difficult. But consider another angle. The problem asks how far the bird will fly in the time it takes the trains to meet. Since we know how fast the bird flies, all we really need to know is how much *time* it takes for the trains to meet. Changing the representation of the problem from a question of *distance* to a question of *time* makes for an easier solution, as follows: The train stations are 50 miles apart. Since the trains are traveling toward each other at the same speed, they will meet midway and each will have traveled 25 miles. The trains are moving at 25 miles per hour. Hence, the time it takes them to meet 25 miles from each station is 1 hour. Since the bird flies at 100 miles per hour, it will fly 100 miles in the hour it takes the trains to meet.

Culture, Cognitive Style, and Problem Solving

Do the varied experiences of people from different cultures lead to cross-cultural variations in problem solving? Yes, at least to some degree, as researchers

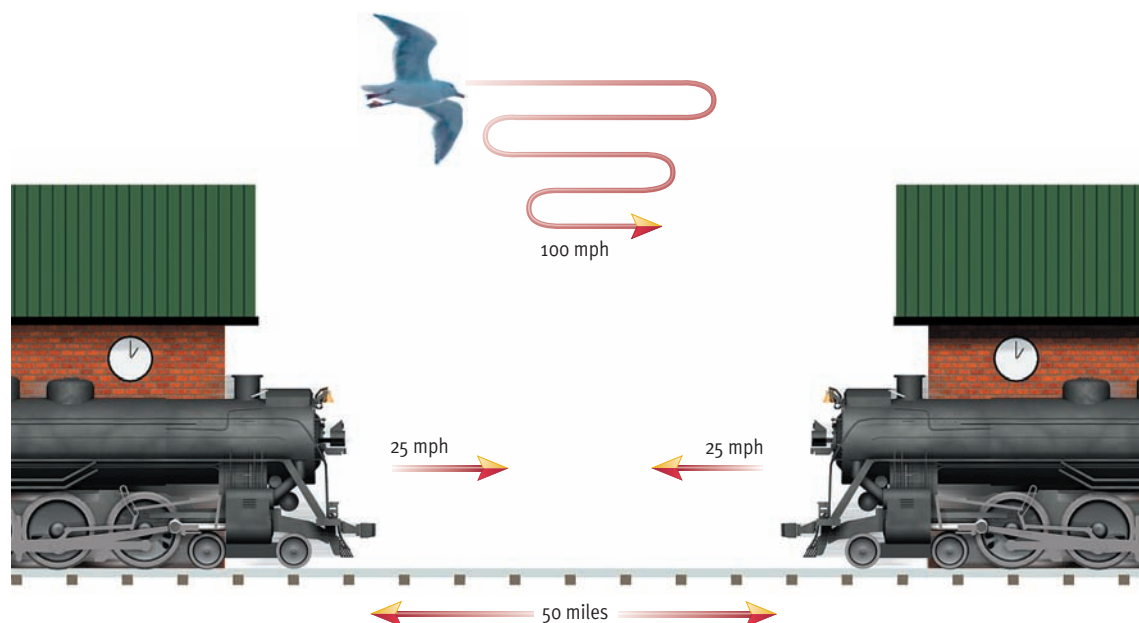
have found cultural differences in the cognitive style that people exhibit in solving problems.

Back in the 1940s, Herman Witkin was intrigued by the observation that some airplane pilots would fly into a cloud bank upright but exit it upside down. Witkin's efforts to explain this aviation problem led to the discovery of an interesting dimension of cognitive style (Witkin, 1950; Witkin et al., 1962). **Field dependence-independence refers to individuals' tendency to rely primarily on external versus internal frames of reference when orienting themselves in space.** People who are *field dependent* rely on external frames of reference and tend to accept the physical environment as a given instead of trying to analyze or restructure it. People who are *field independent* rely on internal frames of reference and tend to analyze and try to restructure the physical environment rather than accepting it as is. In solving problems, field-dependent people tend to focus on the total context of a problem instead of zeroing in on specific aspects or breaking it into component parts. In contrast, field-independent people are more likely to focus on specific features of a problem and to reorganize the component parts. Research has shown that field dependence-independence is related to diverse aspects of cognitive, emotional, and social functioning (Witkin & Goodenough, 1981).

An extensive body of research suggests that some cultures encourage a field-dependent cognitive style, whereas others foster a field-independent style (Berry, 1990; Mishra, 2001). The educational practices in modern Western societies seem to nourish field independence. A field-independent style is also more

Figure 8.16

Representing the bird and train problem. The typical inclination is to envision this problem spatially, as shown here. However, as the text explains, this representation makes the problem much more difficult than it really is.





Thinking About Problem Solving

Check your understanding of problem solving by answering some questions about the following problem. Begin by trying to solve the problem.

The candle problem. Using the objects shown—candles, a box of matches, string, and some tacks—figure out how you could mount a candle on a wall so that it could be used as a light. Work on the problem for a while, then turn to page 318 to see the solution. After you've seen the solution, respond to the following questions. The answers are in Appendix A.



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1. If it didn't occur to you that the matchbox could be converted from a container to a platform, this illustrates _____.
2. While working on the problem, if you thought to yourself, "How can I create a platform attached to the wall?" you used the heuristic of _____.
3. If it occurred to you suddenly that the matchbox could be used as a platform, this realization would be an example of _____.
4. If you had a hunch that there might be some similarity between this problem and the string problem in Figure 8.6 (the similarity is the novel use of an object), your hunch would illustrate the heuristic of _____.
5. In terms of Greeno's three types of problems, the candle problem is a(n) _____ problem.

likely to be predominant in nomadic societies that depend on hunting and gathering for subsistence and in societies that encourage personal autonomy. In contrast, a field-dependent style is found more in sedentary agricultural societies and in societies that stress conformity.

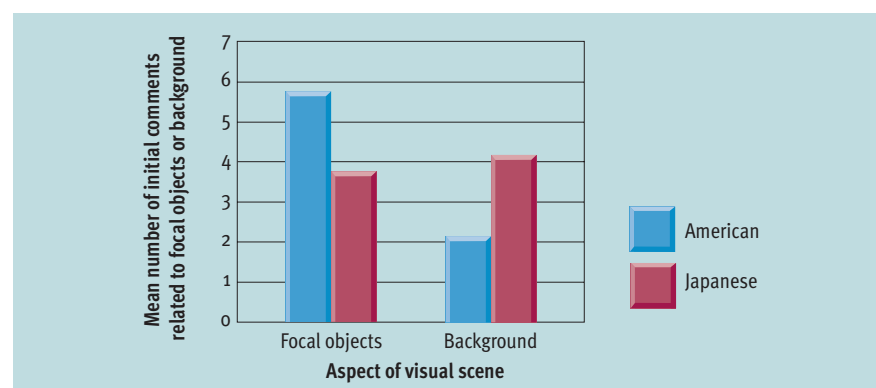
In a related line of research, Richard Nisbett and his colleagues (2001) have argued that people from East Asian cultures (such as China, Japan, and Korea) display a *holistic cognitive style* that focuses on context and relationships among elements in a field, whereas people from Western cultures (America and Europe) exhibit an *analytic cognitive style* that focuses on objects and their properties rather than context. To put it simply, *Easterners see wholes where Westerners see parts*.

To test this hypothesis, Masuda and Nisbett (2001) presented computer-animated scenes of fish and other underwater objects to Japanese and American participants and asked them to report what they had seen. The initial comments of American subjects typically referred to the focal fish, whereas the initial comments of Japanese subjects usually referred to background elements (see Figure 8.17). Furthermore, compared to the Americans, the Japanese participants made about 70% more statements about con-

text or background and about twice as many statements about relationships between elements in the scenes. Other studies have also found that people from Asian cultures pay more attention to contextual information than people from North American cultures do (Kitayama et al., 2003).

Figure 8.17

Cultural disparities in cognitive style. In one of the studies conducted by Masuda and Nisbett (2001), the participants were asked to describe computer-animated visual scenes. As you can see, the initial comments made by American subjects referred more to focal objects in the scenes, whereas the initial comments made by Japanese subjects referred more to background elements in the scenes. These findings are consistent with the hypothesis that Easterners see wholes (a holistic cognitive style) where Westerners see parts (an analytic cognitive style). (Data from Masuda & Nisbett, 2001)





The solution to the candle problem in Concept Check 8.2.

Craig McClain

Cultural variations in analytic versus holistic thinking appear to influence subjects' patterns of logical reasoning, their vulnerability to hindsight bias (see Chapter 7), and their tolerance of contradictions (Nisbett, 2003). Research also suggests that people from Eastern cultures tend to be more field-dependent than their Western counterparts (Ji, Peng, & Nisbett, 2000), but Nisbett and his colleagues view field dependence-independence as just one facet of a broader preference for holistic versus analytic thinking. Based on these and many other findings, Nisbett et al. (2001) conclude that cultural disparities in cognitive style are substantial and that "literally different cognitive processes are often invoked by East Asians and Westerners dealing with the same problem" (p. 305).

Problems are not the only kind of cognitive challenge that people grapple with on a regular basis. Life also seems to constantly demand decisions. As you might expect, cognitive psychologists have shown great interest in the process of decision making, which is our next subject.

➤ REVIEW OF KEY POINTS

- In studying problem solving, psychologists have differentiated among several types of problems, including problems of inducing structure, transformation problems, and arrangement problems. Common barriers to problem solving include functional fixedness, mental set, attention to irrelevant information, and placement of unnecessary constraints on one's solutions. An algorithm is a procedure for trying all possible alternatives in searching for a solution to a problem.
- A variety of strategies, or heuristics, are used for solving problems. When people form subgoals, they try breaking the problem into several parts. Sometimes it is useful to start at the goal state and work backward toward the initial state. Other general strategies include searching for analogies between new problems and old problems, and changing the representation of problems.
- Some cultures encourage a field-dependent cognitive style, whereas others foster more field independence. People who are field independent tend to analyze and restructure problems more than those who are field dependent. Research suggests that Eastern cultures exhibit a more holistic cognitive style, whereas Western cultures display a more analytic cognitive style.

➤ Decision Making: Choices and Chances

PREVIEW QUESTIONS

- How do people make choices about preferences?
- What factors are important in risky decision making?
- What shortcuts do people use in judging probabilities, and what are their effects?
- What is the alternative outcomes effect?
- What do evolutionary psychologists have to say about error and bias in human decision making?

Decisions, decisions. Life is full of them. You decided to read this book today. Earlier today you decided when to get up, whether to eat breakfast, and if so, what to eat. Usually you make routine decisions like these with little effort. But on occasion you need to make important decisions that require more thought. Big decisions—such as selecting a car, a home, or a job—tend to be difficult. The alternatives usually have a number of attributes that need to be weighed. For instance, in choosing among several cars, you may want to compare their costs, roominess, fuel economy, handling, acceleration, stylishness, reliability, safety features, and warranties.

Decision making involves evaluating alternatives and making choices among them. Most people try to be systematic and rational in their decision making. However, the work that earned Herbert Simon the 1978 Nobel prize in economics showed that people don't always live up to these goals. Before Simon's work, most traditional theories in economics assumed that people make rational choices to maximize their economic gains. Simon (1957) demonstrated that people have a limited ability to process and evaluate information on numerous facets of possible alternatives. Thus, Simon's **theory of bounded rationality asserts that people tend to use simple strategies in decision making that focus on only a**

few facets of available options and often result in "irrational" decisions that are less than optimal.

Spurred by Simon's analysis, psychologists have devoted several decades to the study of how cognitive biases distort people's decision making. The results of this research have sometimes been disturbing, leading some theorists to conclude that "normal adult human subjects do a singularly bad job at the business of reasoning, even when they are calm, clear-headed, and under no pressure to perform quickly" (Stich, 1990, pp. 173–174). Researchers' focus on *biases and mistakes* in making decisions may seem a little peculiar, but as Kahneman (1991) has pointed out, the study of people's misguided decisions has illuminated the process of decision making, just as the study of illusions and forgetting has enhanced our understanding of visual perception and memory, respectively.

Making Choices: Selecting an Alternative

Many decisions involve choices about *preferences*, which can be made using a variety of strategies (Goldstein & Hogarth, 1997). For instance, imagine that Boris has found two reasonably attractive apartments and is trying to decide between them. How should

he go about selecting between his alternatives? Let's look at some strategies Boris might use in trying to make his decision.

If Boris wanted to use an *additive strategy*, he would list the attributes that influence his decision. Then he would rate the desirability of each apartment on each attribute. For example, let's say that Boris wants to consider four attributes: rent, noise level, distance to campus, and cleanliness. He might make ratings from -3 to $+3$, like those shown in **Table 8.3**, add up the ratings for each alternative, and select the one with the largest total. Given the ratings in **Table 8.3**, Boris should select apartment B. To make an additive strategy more useful, you can *weight* attributes differently, based on their importance (Shafir & LeBoeuf, 2004). For example, if Boris considers distance to campus to be twice as important as the other considerations, he could multiply his ratings of this attribute by 2. The distance rating would then be $+6$ for apartment A and -2 for apartment B, and apartment A would become the preferred choice.

People also make choices by gradually eliminating less attractive alternatives (Slovic, 1990; Tversky, 1972). This strategy is called *elimination by aspects* because it assumes that alternatives are eliminated by evaluating them on each attribute or aspect in turn. Whenever any alternative fails to satisfy some minimum criterion for an attribute, it is eliminated from further consideration. To illustrate, suppose Juanita is looking for a new car. She may begin by eliminating all cars that cost over \$24,000. Then she may eliminate cars that don't average at least 20 miles per gallon of gas. By continuing to reject choices that don't satisfy some minimum criterion on selected attributes, she can gradually eliminate alternatives until only a single car remains. The final choice in elimination by aspects depends on the order in which attributes are evaluated. For example, if cost was the last attribute Juanita evaluated, she could have previously eliminated all cars that cost under \$24,000. If she has only \$24,000 to spend, her decision-making strategy would not have brought her very far. Thus,

Table 8.3 Application of the Additive Model to Choosing an Apartment

Attribute	Apartment	
	A	B
Rent	+1	+2
Noise level	-2	+3
Distance to campus	+3	-1
Cleanliness	+2	+2
Total	+4	+6



when using elimination by aspects, it's best to evaluate attributes in the order of their importance.

Both the additive and the elimination-by-aspects strategies have advantages, but which strategy do people actually tend to use? Research suggests that people adapt their approach to the demands of the task. When their choices are fairly simple they use additive strategies, but as choices become very complex, they shift toward simpler strategies, such as elimination by aspects (Payne & Bettman, 2004).

Difficulties in choosing between alternatives can also lead people to delay their decisions. Tversky and Shafir (1992) note that "the experience of conflict is the price one pays for the freedom to choose" (p. 358). They argue that when alternatives are not dramatically different in attractiveness, people struggle with conflict and often defer decisions, taking additional time to look for a new car, apartment, or whatever. The research of Tversky and Shafir (1992) suggests that these delayed decisions are common even when the available alternatives are quite satisfactory.

Delaying a decision allows one to seek additional information. However, people have a perplexing tendency to pursue information that seems relevant, but is really *useless*, because when pressed they admit that the information wouldn't change their decision (Bastardi & Shafir, 1998, 2000). Obviously, in some situations seeking more information can facilitate effective decision making. However, in other situations people just clutter the picture with more and more information that is less and less important.

Beyond the basics we've been discussing, research has turned up a number of enlightening findings about the nuances of how people make decisions

People often have to decide between alternative products, such as computers, cars, refrigerators, and so forth, that are not all that different. They often struggle with the abundant choices and delay making a decision. However, as the text explains, extra deliberation does not necessarily lead to better decisions.

Web Link 8.4



Online Decision Research Center Experiments

Michael Birnbaum (California State University, Fullerton) presents a range of continuing and completed experiments conducted online that illustrate how people make decisions.

about preferences. Some of the more interesting findings include the following:

- When people decide between various options (let's say two job opportunities), their evaluations of the options' specific attributes (such as salary, commute, and work hours) fluctuate more than most models of decision making anticipated (Shafir & LeBoeuf, 2004). Models of "rational" choice assumed that people know what they like and don't like and that these evaluations would be stable, but research suggests otherwise. One reason that these judgments tend to be unstable is that they are swayed by incidental emotional fluctuations (Lerner, Small, & Loewenstein, 2004).
- Another reason these evaluations tend to be inconsistent is that *comparative* evaluations of options tend to yield different results than *separate* evaluations (assessing an option on its own, in isolation) (Hsee, Zhang, & Chen, 2004). For example, when subjects directly compare a job with an \$80,000 salary at a firm where one's co-workers tend to earn \$100,000 against a job with a \$70,000 salary at a company where peers earn only \$50,000, they rate the \$80,000 job as more desirable. However, when two sets of subjects evaluate the same job options in isolation, the \$70,000 job is rated as more desirable (LeBoeuf & Shafir, 2005). Thus, the dynamics and implications of comparative and separate evaluations can be quite different.
- A chronic problem faced by decision makers is that although they commonly make choices based on comparative evaluations, the chosen product, activity, or event is actually experienced in isolation (Hsee & Zhang, 2004). This mismatch can lead to decisions that people regret. For example, a shopper may make precise head-to-head comparisons of several speaker systems at an audio store and decide to spend an extra \$1500 on the best speakers, but at home the selected speakers will be experienced in isolation. This person may have been delighted with a much less expensive set of speakers if they had been brought to his or her home and evaluated in isolation.
- A surprisingly influential factor in decision making is the need to avoid regret about making a bad decision. People routinely think about how much regret they are likely to experience if the selection of a particular option backfires (Connolly & Zeelenberg, 2002). These estimates of anticipated regret are weighed heavily and often lead people to make more cautious decisions. Interestingly, research suggests that people tend to overestimate how much regret they will experience as a result of poor decisions (Gilbert et al., 2004). Studies also show that when

people look back on their lives, they tend to experience more regret about the things that they *failed* to do (pathways not chosen) than about things they *did* do (poorly chosen pathways) (Gilovich et al., 2003).

Taking Chances: Factors Weighed in Risky Decisions

Suppose you have the chance to play a dice game in which you might win some money. You must decide whether it would be to your advantage to play. You're going to roll a fair die. If the number 6 appears, you win \$5. If one of the other five numbers appears, you win nothing. It costs you \$1 every time you play. Should you participate?

This problem calls for a type of decision making that is somewhat different from making choices about preferences. In selecting alternatives that reflect preferences, people generally weigh known outcomes (apartment A will require a long commute to campus, car B will get 30 miles per gallon, and so forth). In contrast, **risky decision making involves making choices under conditions of uncertainty**. Uncertainty exists when people don't know what will happen. At best, they know the probability that a particular event will occur.

One way to decide whether to play the dice game would be to figure out the *expected value* of participation in the game. To do so, you would need to calculate the average amount of money you could expect to win or lose each time you play. The value of a win is \$4 (\$5 minus the \$1 entry fee). The value of a loss is -\$1. To calculate expected value, you also need to know the probability of a win or loss. Since a die has six faces, the probability of a win is 1 out of 6, and the probability of a loss is 5 out of 6. Thus, on five out of every six trials, you lose \$1. On one out of six, you win \$4. The game is beginning to sound unattractive, isn't it? We can figure out the precise expected value as follows:

$$\text{Expected value} = \left(\frac{1}{6} \times 4\right) + \left(\frac{5}{6} \times -1\right) = \frac{4}{6} + \left(-\frac{5}{6}\right) = -\frac{1}{6}$$

The expected value of this game is $-\frac{1}{6}$ of a dollar, which means that you lose an average of about 17 cents per turn. Now that you know the expected value, surely you won't agree to play. Or will you?

If we want to understand why people make the decisions they do, the concept of expected value is not enough. People frequently behave in ways that are inconsistent with expected value (Slovic, Lichtenstein, & Fischhoff, 1988). Anytime the expected value is negative, a gambler should expect to lose money. Yet a great many people gamble at racetracks

and casinos and buy lottery tickets. Although they realize that the odds are against them, they continue to gamble. Even people who don't gamble buy homeowner's insurance, which has a negative expected value. After all, when you buy insurance, your expectation (and hope!) is that you will lose money on the deal.

To explain decisions that violate expected value, some theories replace the objective value of an outcome with its *subjective utility* (Fischhoff, 1988). Subjective utility represents what an outcome is personally worth to an individual. For example, buying a few lottery tickets may allow you to dream about becoming wealthy. Buying insurance may give you a sense of security. Subjective utilities like these vary from one person to another. Interestingly, however, studies show that people often make inaccurate predictions about how much subjective utility or enjoyment various experiences will yield (Loewenstein & Schkade, 1999).

Heuristics in Judging Probabilities



- What are your chances of passing your next psychology test if you study only 3 hours?
- How likely is a major downturn in the stock market during the upcoming year?
- What are the odds of your getting into graduate school in the field of your choice?

These questions ask you to make probability estimates. Amos Tversky and Daniel Kahneman (1974, 1982; Kahneman & Tversky, 2000) have conducted extensive research on the *heuristics*, or mental shortcuts, that people use in grappling with probabilities. This research on heuristics earned Kahneman the Nobel Prize in Economics in 2002 (unfortunately, his collaborator, Amos Tversky, died in 1996).

Availability is one such heuristic. **The availability heuristic involves basing the estimated probability of an event on the ease with which relevant instances come to mind.** For example, you may estimate the divorce rate by recalling the number of divorces among your friends' parents. Recalling specific instances of an event is a reasonable strategy to use in estimating the event's probability. However, if instances occur frequently but you have difficulty retrieving them from memory, your estimate will be biased. For instance, it's easier to think of words that begin with a certain letter than words that contain that letter at some other position. Hence, people should tend to respond that there are more words starting with the letter *K* than words having a *K* in the third position. To test this hypothesis, Tversky

and Kahneman (1973) selected five consonants (*K, L, N, R, V*) that occur more frequently in the third position of a word than in the first. Subjects were asked whether each of the letters appears more often in the first or third position. Most of the subjects erroneously believed that all five letters were much more frequent in the first than in the third position, confirming the hypothesis.

Representativeness is another guide in estimating probabilities identified by Kahneman and Tversky (1982). **The representativeness heuristic involves basing the estimated probability of an event on how similar it is to the typical prototype of that event.** To illustrate, imagine that you flip a coin six times and keep track of how often the result is heads (*H*) or tails (*T*). Which of the following sequences is more likely?

1. T T T T T T
2. H T T H T H

People generally believe that the second sequence is more likely. After all, coin tossing is a random affair, and the second sequence looks much more representative of a random process than the first. In reality, the probability of each exact *sequence* is precisely the same ($\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{64}$). Overdependence on the representativeness heuristic has been used to explain quite a variety of decision-making tendencies (Teigen, 2004), as you will see in the upcoming pages.

The Tendency to Ignore Base Rates



Steve is very shy and withdrawn, invariably helpful, but with little interest in people or in the world of reality. A meek and tidy soul, he has a need for order and structure and a passion for detail. Do you think Steve is a salesperson or a librarian? (Adapted from Tversky & Kahneman, 1974, p. 1124)

Using the *representativeness heuristic*, subjects tend to guess that Steve is a librarian because he resembles their prototype of a librarian (Tversky & Kahneman, 1982). In reality, this is not a wise guess, because it *ignores the base rates* of librarians and salespeople in the population. Virtually everyone knows that salespeople outnumber librarians by a wide margin (roughly 75 to 1 in the United States). This fact makes it much more likely that Steve is in sales. But in estimating probabilities, people often ignore information on base rates.

Researchers are still debating how common it is for people to neglect base rate information (Birnbaum, 2004; Koehler, 1996), but it does not appear to be a



Image Not Available



DANIEL KAHNEMAN

"The human mind suppresses uncertainty. We're not only convinced that we know more about our politics, our businesses, and our spouses than we really do, but also that what we don't know must be unimportant."



Image Not Available



AMOS TVERSKY

"People treat their own cases as if they were unique, rather than part of a huge lottery. You hear this silly argument that 'The odds don't apply to me.' Why should God, or whoever runs this lottery, give you special treatment?"



Recognizing Heuristics in Decision Making

Check your understanding of heuristics in decision making by trying to identify the heuristics used in the following example. Each numbered element in the anecdote below illustrates a problem-solving heuristic. Write the relevant heuristic in the space on the left. You can find the answers in Appendix A.

- _____ 1. Marsha can't decide on a college major. She evaluates all the majors available at her college on the attributes of how much she would enjoy them (likability), how challenging they are (difficulty), and how good the job opportunities are in the field (employability). She drops from consideration any major that she regards as "poor" on any of these three attributes.
- _____ 2. When she considers history as a major, she thinks to herself, "Gee, I know four history graduates who are still looking for work," and concludes that the probability of getting a job using a history degree is very low.
- _____ 3. She finds that every major gets a "poor" rating on at least one attribute, so she eliminates everything. Because this is unacceptable, she decides she has to switch to another strategy. Marsha finally focuses her consideration on five majors that received just one "poor" rating. She uses a 4-point scale to rate each of these majors on each of the three attributes she values. She adds up the ratings and selects the major with the highest total as her leading candidate.

rare event. Indeed, evidence indicates that people are particularly bad about applying base rates to themselves. For instance, Weinstein (1984; Weinstein & Klein, 1995) has found that people underestimate the risks of their own health-impairing habits while viewing others' risks much more accurately. Thus, smokers are realistic in estimating the degree to which smoking increases someone else's risk of heart attack but underestimate the risk for themselves. Similarly, people starting new companies ignore the high failure rate for new businesses, and burglars underestimate the likelihood that they will end up in jail. Thus, in risky decision making, people often think that they can beat the odds. As Amos Tversky puts it, "People treat their own cases as if they were unique, rather than part of a huge lottery. You hear this silly argument that 'The odds don't apply to me.' Why should God, or whoever runs this lottery, give you special treatment?" (McKean, 1985, p. 27).

The Conjunction Fallacy



Imagine that you're going to meet a man who is an articulate, ambitious, power-hungry wheeler-dealer. Do you think it's more likely that he's a college teacher or a college teacher who's also a politician?

People tend to guess that the man is a "college teacher who's a politician" because the description fits with the typical prototype of politicians. But stop and think for a moment. The broader category of college teachers completely includes the smaller subcategory of college teachers who are politicians (see **Figure 8.18**). The probability of being in the subcategory cannot be higher than the probability of being in the broader category. It's a logical impossibility!

Tversky and Kahneman (1983) call this error the *conjunction fallacy*. **The conjunction fallacy occurs when people estimate that the odds of two uncertain events happening together are greater than**

Image Not Available

the odds of either event happening alone. The conjunction fallacy has been observed in a number of studies and has generally been attributed to the influence of the representativeness heuristic (Epstein, Donovan, & Denes-Raj, 1999), although some doubts have been raised about this interpretation (Fisk, 2004).

The Alternative Outcomes Effect

Like the conjunction fallacy, the alternative outcomes effect seems irrational. In this case, two different scenarios that represent the same probability situation lead to surprisingly discrepant estimates of the likelihood of an event. According to Paul Windschitl and Gary Wells (1998) the **alternative outcomes effect occurs when people's belief about whether an outcome will occur changes depending on how alternative outcomes are distributed, even though the summed probability of the alternative outcomes is held constant.** Let's look at the research that documented this peculiar effect in decision making.

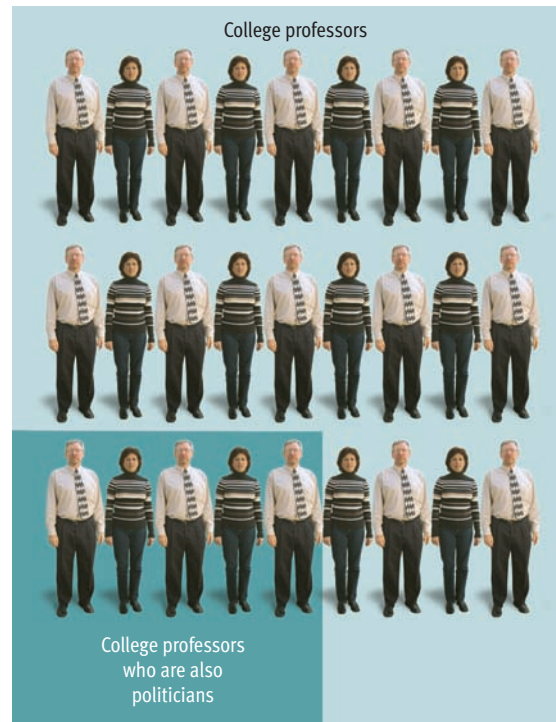


Figure 8.18
The conjunction fallacy. Subjects often fall victim to the conjunction fallacy, but as this diagram makes obvious, the probability of being in a subcategory (college teachers who are politicians) cannot be higher than the probability of being in the broader category (college teachers). As this case illustrates, it often helps to represent a problem in a diagram.

Even Objective Probabilities Are Subjective

The authors begin by citing evidence that people's feelings about the likelihood of an event can be influenced by a variety of factors—even when the objective probability of the event is known. For example, research has shown that people like their chances of winning better when they draw a bean from a bowl that contains 10 winning beans and 90 losing beans as opposed to a bowl containing 1 winning bean and 9 losing beans, in spite of the obvious fact that the two situations involve the same probability of winning. To explore this type of perplexing subjectivity in risky decision making, Windschitl and Wells conducted a series of six studies in which they typically held the probability of a "focal outcome" constant while tinkering with the distribution of probabilities for alternative outcomes. Their first two studies are summarized here.

Study 1

Method. Half of the participants considered the following scenario: *Imagine you are at a casino-style charity party where a raffle is held for a \$200 prize. Of the 88 raffle tickets, you hold 21 tickets, Mary has 14, Simon has 13, Amman has 15, Tara has 12, and George has 13.* The other half of the participants read about the same situation, but were given a different ticket distribution. *Of the 88 raffle tickets, you hold 21 tickets, Mary has 52, Simon has 6, Amman has 2, Tara has 2, and George has 5.* Ninety-six undergraduates rated the likelihood that they would

win the raffle prize on an 11-point scale ranging from 0 (*impossible*) to 10 (*certain*).

Results. Although the objective probability of winning the raffle was the same in both conditions ($21/88$), subjects who worked with the 21–14–13–15–12–13 distribution of tickets rated their chances of winning significantly higher than did the subjects exposed to the 21–52–6–2–2–5 distribution.

Study 2

Method. Half of the participants considered the following scenario: *After dinner, young Katie is told that she can have one cookie, which she must pull out of a cookie jar without looking. She is hoping to snag a chocolate chip cookie from the jar, which contains 2 chocolate chip cookies, 1 oatmeal, 1 raisin, 1 butterscotch, 1 rum, 1 peanut butter, 1 pecan, and 1 sugar cookie.* The other half of the participants read about the same situation, but they were informed that *the jar contains 2 chocolate chip cookies and 7 oatmeal cookies.* Ninety-six undergraduates rated the likelihood that Katie would get her chocolate chip cookie on the same 11-point scale used in Study 1.

Results. Although the objective probability of Katie getting a chocolate chip cookie was the same in both conditions and very easy to calculate ($2/9$), subjects who worked with the 2–1–1–1–1–1–1–1 distribution of cookies liked Katie's chances significantly better than the subjects exposed to the 2–7 distribution.

FEATURED Study

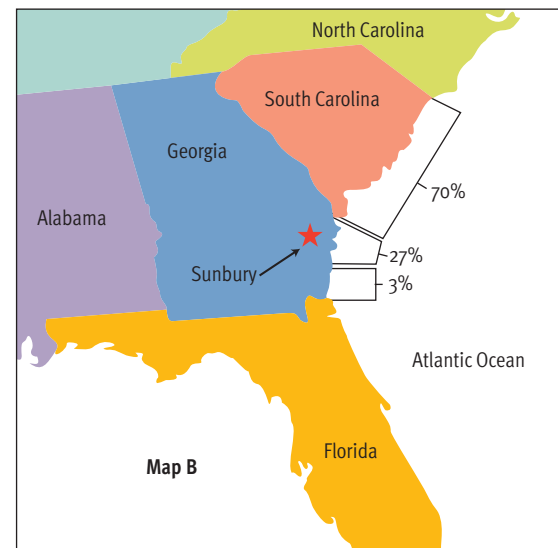
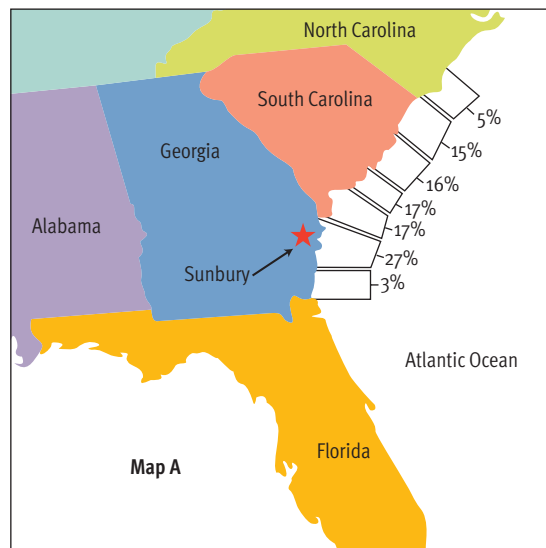
Source: Windschitl, P. D., & Wells, G. L. (1998). The alternative outcomes effect. *Journal of Personality and Social Psychology*, 75, 1411–1423.

Figure 8.19

The alternative outcomes effect in a study of hurricane projections.

In one of their six studies, Windschitl and Wells (1998) showed participants these two maps, which depict the estimated probability of a hurricane coming ashore in the fictitious town of Sunbury, Georgia. As in their other studies, the distribution of alternative outcomes influenced subjects' perceptions about the likelihood of the focal event. The people who saw Map A were more worried about the hurricane hitting Sunbury than those who saw Map B.

Source: Windschitl, P. D., & Wells, G. L. (1998). The alternative outcomes effect. *Journal of Personality and Social Psychology*, 75 (6), 1411–1423. Copyright © 1998 by the American Psychological Association. Reprinted by permission of the publisher and author.



Discussion

The results seen in these two studies demonstrate that the perceived likelihood of a focal outcome is influenced by the distribution of alternative outcomes. It appears that participants focus heavily on comparisons between the focal outcome and the most likely alternative. When these simple comparisons do not favor the focal outcome, subjective estimates of its likelihood decrease. The authors speculate that these subjective distortions in the evaluation of probabilities could influence many real-world decisions.

Comment

This research was featured because it provided an interesting and convincing demonstration that even objective probabilities are ultimately very subjective—a result that once again highlights the text's theme about the subjectivity of human experience. This research also fleshes out Simon's (1957) concept of *bounded rationality*, which was introduced at the beginning of the section on decision making. Consistent with Simon's the-

ory, research has repeatedly shown that in evaluating their alternatives, people tend to use simple strategies that focus on only a few facets of the situation, which can lead to peculiarities that are often characterized as irrational.

The alternative outcomes effect discovered by Windschitl and Wells appears to be reliable, as it showed up in one form or another in all six of their studies, which involved quite a variety of situations. These situations included some more realistic scenarios where the given probabilities were only *estimates* rather than *known realities*. For example, in one study subjects were told that they lived in the coastal town of Sunbury, Georgia, and that a hurricane was headed their way. The estimated probabilities of the hurricane coming ashore at various places along the coast were given to subjects in the two maps shown in Figure 8.19. As predicted, subjects who saw Map A were more worried about the hurricane coming ashore in Sunbury than those who saw Map B, even though the crucial estimated probability was 27% on both maps.

Evolutionary Analyses of Flaws in Human Decision Making

Consistent with our Featured Study, a central conclusion of the last 25 years of research on decision making has been that human decision-making strategies are riddled with errors and biases that yield surprisingly irrational results (Goldstein & Hogarth, 1997; Shafir & LeBoeuf, 2002). Theorists have discovered that people have “mental limitations” and have concluded that people are not as bright and rational as they think they are. Conversely, over the same period of time, researchers studying the behavior of animals in their natural environments have been increasingly

impressed by how the animals tend to make sound choices that approximate optimal decision making consistent with elaborate mathematical models of optimality (Real, 1991; Shettleworth, 1998). So, we have quite a paradox: How can humans appear so dumb, when animals appear so bright? This paradox has led some evolutionary psychologists to reconsider the work on human decision making, and their take on the matter is quite interesting. First, they argue that traditional decision research has imposed an invalid and unrealistic standard of rationality, which assumes that people should be impeccable in applying the laws of deductive logic and statistical probability while objectively and precisely weighing multiple factors

in arriving at decisions (Gigerenzer, 2000). Second, they argue that humans only *seem* irrational because cognitive psychologists have been asking the wrong questions and formulating problems in the wrong ways—ways that have nothing to do with the adaptive problems that the human mind has evolved to solve (Cosmides & Tooby, 1996).

According to Leda Cosmides and John Tooby (1994, 1996), the human mind consists of a large number of specialized cognitive mechanisms that have emerged over the course of evolution to solve specific adaptive problems, such as finding food, shelter, and mates and dealing with allies and enemies. Thus, human decision and problem-solving strategies have been tailored to handle real-world adaptive problems. Participants perform poorly in cognitive research, say Cosmides and Tooby, because it confronts them with contrived, artificial problems that do not involve natural categories and have no adaptive significance.

For example, evolutionary psychologists argue that the human mind is wired to think in terms of *raw frequencies* rather than *base rates and probabilities* (Gigerenzer, 1997, 2000). Asking about the probability of a single event is routine in today's world, where we are inundated with statistical data ranging from batting averages to weather predictions. But our ancient ancestors had access to little data other than their own observations, which were accumulating counts of natural frequencies, such as “we had a good hunt three out of the last five times we went to the north plains.” Thus, evolutionary theorists assert that many errors in human reasoning, such as neglect of base rates and the conjunction fallacy, should vanish if classic laboratory problems are reformulated in terms of raw frequencies rather than probabilities and base rates.

Consistent with this analysis, evolutionary psychologists have shown that some errors in reasoning that are seen in laboratory studies disappear or are decreased when problems are presented in ways that resemble the type of input humans would have processed in ancestral times (Brase, Cosmides & Tooby, 1998; Gigerenzer & Hoffrage, 1999; Hertwig & Gigerenzer, 1999). Although there is plenty of room for debate (Mellers, Hertwig & Kahneman, 2001; Shafir & LeBoeuf, 2002), this evidence and a couple of other lines of research are gradually reducing cognitive psychologists' tendency to characterize human reasoning as “irrational.”

Fast and Frugal Heuristics

Working from an evolutionary point of view, Gerd Gigerenzer has argued that humans' reasoning largely

depends on “fast and frugal heuristics” that are quite a bit simpler than the complicated inferential processes studied in traditional cognitive research (Gigerenzer, 2000, 2004; Goldstein & Gigerenzer, 1999; Todd & Gigerenzer, 2000). According to Gigerenzer, organisms from toads to stockbrokers have to make fast decisions under demanding circumstances with limited information. In most instances organisms (including humans) do not have the time, resources, or cognitive capacities to gather all the relevant information, consider all the possible options, calculate all the probabilities and risks, and then make the statistically optimal decision. Instead, they use quick and dirty heuristics that are less than perfect but that work well enough most of the time to be adaptive in the real world.

To explore these fast and frugal heuristics, Gigerenzer and his colleagues have typically studied inferences from *memory*, which challenge participants to search some portion of their general knowledge, rather than inferences from *givens*, which challenge participants to draw logical conclusions from information provided by the experimenter (example: you hold 21 of the 88 raffle tickets, Mary has 14, and so forth). Gigerenzer (2000) maintains that the traditional approach of studying inferences from givens is contrived because in the real world people are rarely given all the information relevant to their decisions; they normally have to search for useful information and base their decisions on limited knowledge. To model this process, Gigerenzer and his colleagues have often asked subjects to draw inferences based on their knowledge of geography, which tends to be limited and imperfect. In a typical study, participants are asked to make a series of choices between pairs of alternatives based on some quantitative dimension, such as deciding which of two cities is larger.

What has this research revealed? It has demonstrated that fast and frugal heuristics can be surprisingly effective. One heuristic that is often used in selecting between alternatives based on some quantitative dimension is the *recognition heuristic*, which works as follows: If one of two alternatives is recognized and the other is not, infer that the recognized alternative has the higher value. Consider the following questions—Which city has more inhabitants: San Diego or San Antonio? Hamburg or Munich? In choosing between U.S. cities, American college students weighed a lifetime of facts useful for inferring population and made the correct choice 71% of the time; in choosing between German cities about which they knew very little, the same students depended on the recognition heuristic and chose correctly 73% of the time (Goldstein & Gigerenzer, 2002). Thus, the recognition heuristic allowed students to



Image Not Available



Image Not Available



JOHN TOOBY AND LEDA COSMIDES

“The problems our cognitive devices are designed to solve do not reflect the problems our modern life experiences lead us to see as normal . . . Instead, they are the ancient and seemingly esoteric problems that our hunter-gatherer ancestors encountered generation after generation over hominid evolution.”

Web Link 8.5



Has Natural Selection Shaped How Humans Reason?

This link will take you to a recorded talk by Leda Cosmides and John Tooby (University of California, Santa Barbara) in which they discuss their evolutionary perspective on human decision making.



GERD GIGERENZER

"These 'fast and frugal' heuristics operate with simple psychological principles that satisfy the constraints of limited time, knowledge, and computational might, rather than those of classical rationality."

Web Link 8.6



Simple Minds—Smart Choices

This link leads to an article from *Science News* on Gerd Gigerenzer's research, which suggests that decisions can be made quickly and accurately with remarkably simple strategies.

perform just as well with very limited knowledge as they did with extensive knowledge.

Gigerenzer and his colleagues have studied a variety of other quick, one-reason decision-making strategies and demonstrated that they can yield inferences that are just as accurate as much more elaborate and time-consuming strategies that carefully weigh a multiplicity of relevant factors. And they have demonstrated that people actually use these fast and frugal heuristics in a diverse array of situations (Gigerenzer, 2004; Rieskamp & Hoffrage, 1999). Thus, the study of fast and frugal heuristics promises to be an intriguing new line of research in the area of human decision making.

How have traditional decision-making theorists responded to the challenge presented by Gigerenzer and other evolutionary theorists? They acknowledge that people often rely on fast and frugal heuristics, but they argue that this reality does not make decades of research on carefully reasoned approaches to decision making meaningless. Rather, they propose *dual-process theories* positing that people depend on two very different modes or systems of thinking when making decisions (Kahneman, 2003; Kahneman & Frederick, 2005; Sloman, 2002; Stanovich & West, 2002). One system consists of quick, simple, effortless, automatic judgments, like Gigerenzer's fast and frugal heuristics, which traditional theorists prefer to characterize as "intuitive thinking." The second system consists of slower, more elaborate, effortful, controlled judgments, like those studied in traditional decision research. According to this view, the second system monitors and corrects the intuitive system as needed and takes over when complicated

or important decisions loom. Thus, traditional theorists maintain that fast and frugal heuristics and reasoned, rule-governed decision strategies exist side-by-side and that both need to be studied to fully understand decision making.

REVIEW OF KEY POINTS

- Simon's theory of bounded rationality suggests that human decision strategies are simplistic and often yield irrational results. An additive decision model is used when people make decisions by rating the attributes of each alternative and selecting the alternative that has the highest sum of ratings.
- When elimination by aspects is used, people gradually eliminate alternatives whose attributes fail to satisfy some minimum criterion. To some extent, people adapt their decision-making strategy to the situation, moving toward simpler strategies when choices become complex. In making decisions, people have a curious tendency to pursue information that is not likely to alter their decisions.
- In making decisions, comparative evaluations of options often yield different results than separate evaluations. Decisions may be influenced by people's need to avoid regret. Models of how people make risky decisions focus on the expected value or subjective utility of various outcomes.
- People use the representativeness and availability heuristics in estimating probabilities. These heuristics can lead people to ignore base rates and to fall prey to the conjunction fallacy. In the alternative outcomes effect, two scenarios that represent the same probability situation lead to surprisingly discrepant estimates of the likelihood of an event.
- Evolutionary psychologists maintain that many errors and biases in human reasoning are greatly reduced when problems are presented in ways that resemble the type of input humans would have processed in ancestral times. Gigerenzer argues that people largely depend on fast and frugal decision heuristics that are adaptive in the real world.

Reflecting on the Chapter's Themes

Heredity and Environment



Empiricism



Cultural Heritage



Subjectivity of Experience



Four of our unifying themes have been especially prominent in this chapter. The first is the continuing question about the relative influences of heredity and environment. The controversy about how children acquire language skills replays the nature versus nurture debate. The behaviorist theory, that children learn language through imitation and reinforcement, emphasizes the importance of the environment. The nativist theory, that children come equipped with an innate language acquisition device, argues for the importance of biology. The debate is far from settled, but the accumulating evidence suggests that language development depends on both nature and nurture, as more recent interactionist theories have proposed.

The second pertinent theme is the empirical nature of psychology. For many decades, psychologists paid little attention to cognitive processes, because most of them assumed that thinking is too private to be studied scientifically. During the 1950s and 1960s, however, psychologists began to devise creative new ways to measure mental processes. These innovations fueled the cognitive revolution that put the *psyche* (the mind) back in psychology. Thus, once again, we see how empirical methods are the lifeblood of the scientific enterprise.

Third, the study of cognitive processes shows how there are both similarities and differences across cultures in behavior. On the one hand, we saw that language development unfolds in much the same way

in widely disparate cultures. On the other hand, we learned that there are interesting cultural variations in cognitive style.

The fourth theme is the subjective nature of human experience. We have seen that decision making is a highly subjective process. For example, probabili-

ties weighed in decisions that are objectively identical can subjectively seem very different. The subjectivity of decision processes will continue to be prominent in the upcoming Personal Application, which discusses some more common pitfalls in reasoning about decisions.

PERSONAL Application

Understanding Pitfalls in Reasoning About Decisions

Consider the following scenario:

Laura is in a casino watching people play roulette. The 38 slots in the roulette wheel include 18 black numbers, 18 red numbers, and 2 green numbers. Hence, on any one spin, the probability of red or black is slightly less than 50-50 (.474 to be exact). Although Laura hasn't been betting, she has been following the pattern of results in the game very carefully. The ball has landed in red seven times in a row. Laura concludes that black is long overdue and she jumps into the game, betting heavily on black.

Has Laura made a good bet? Do you agree with Laura's reasoning? Or do you think that Laura misunderstands the laws of probability? You'll find out momentarily, as we discuss how people reason their way to decisions—and how their reasoning can go awry.

The pioneering work of Amos Tversky and Daniel Kahneman (1974, 1982) led to an explosion of research on risky decision making. In their efforts to identify the heuristics that people use in decision making, investigators stumbled onto quite a few misconceptions, oversights, and biases. It turns out that people deviate in predictable ways from optimal decision strategies—with surprising regularity (Goldstein & Hogarth, 1997). As explained in the chapter, recent evolutionary research on decision making has offered a new explanation for *why* our decision making appears to be muddled. And evolutionary theorists argue that our decision strategies actually are rational—when viewed as evolved mechanisms designed to solve the adaptive problems faced in ancestral times (Cosmides & Tooby, 1996).

But, while the evolutionary explanations for our foibles in reasoning *may* be on tar-

get, the fact remains that *we do not live in ancestral times*. We live in the information age and we have to deal with base rates, probabilities, and percentages on a routine basis. In our modern world, reproductive fitness surely depends more on SAT scores than on counting berries. So, mainstream cognitive research on flaws in human reasoning about decisions remains relevant (Stanovich, 2003). Fortunately, research indicates that increased awareness of common shortcomings in reasoning about decisions can lead to improved decision making (Agnoli & Krantz, 1989; Fischhoff, 1982; Keren, 1990). With this goal in mind, let's look at some common pitfalls in decision making.

The Gambler's Fallacy



As you may have guessed by now, Laura's reasoning in our opening scenario is flawed. A great many people tend to believe that Laura has made a good bet (Stanovich, 2003; Tversky & Kahneman, 1982). However, they're wrong. Laura's behavior illustrates **the gambler's fallacy—the belief that the odds of a chance event increase if the event hasn't occurred recently**. People believe that the laws of probability should yield fair results. If they believe that a process is random, they expect the process to be self-correcting (Burns & Corpus, 2004). These aren't bad assumptions in the long run. However, they don't apply to individual, independent events.

The roulette wheel does not remember its recent results and make adjustments for them. Each spin of the wheel is an independent event. The probability of black on each spin remains at .474, even if red comes up 100 times in a row! The gambler's fallacy re-

flects the pervasive influence of the *representativeness heuristic*. In betting on black, Laura is predicting that future results will be more representative of a random process. This logic can be used to estimate the probability of black across a *string of spins*. But it doesn't apply to a *specific spin* of the roulette wheel.

Overestimating the Improbable



Various causes of death are paired up below. In each pairing, which is the more likely cause of death?

Asthma or tornadoes?

Accidental falls or shooting accidents?

Tuberculosis or floods?

Suicide or murder?

Table 8.4 on the next page shows the actual mortality rates for each of the causes of death just listed. As you can see, the first choice in each pair is the more common cause of death. If you guessed wrong for several pairings, don't feel bad. Like many other people, you may be a victim of the tendency to *overestimate the improbable*. People tend to greatly overestimate the likelihood of dramatic, vivid—but infrequent—events that receive heavy media coverage. Thus, the number of fatalities due to tornadoes, floods, food poisonings, and murders is usually overestimated (Slovic, Fischhoff, & Lichtenstein, 1982). Fatalities due to asthma and other common diseases, which receive less media coverage, tend to be underestimated. For instance, a majority of subjects estimate that tornadoes kill more people than asthma, even though asthma fatalities outnumber tornado fatalities by a ratio of 80 to 1. This tendency to ex-

Table 8.4 Actual Mortality Rates for Selected Causes of Death

Cause of Death	Rate	Cause of Death	Rate
Asthma	2,000	Tornadoes	25
Accidental falls	6,021	Firearms accidents	320
Tuberculosis	400	Floods	44
Suicide	11,300	Homicide	6,800

Note: Mortality rates are per 100 million people and are based on the *Statistical Abstract of the United States, 2001*.

aggrate the improbable has generally been attributed to operation of the *availability heuristic* (Reber, 2004). Instances of floods, tornadoes, and such are readily available in memory because people are exposed to a great deal of media coverage of such events.

As a general rule, people's beliefs about what they should fear tend to be surprisingly inconsistent with actual probabilities (Glassner, 1999). This propensity has been especially prominent in the aftermath of 9/11, which left countless people extremely worried about the possibility of being harmed in a terrorist attack (as the terrorists intended). To date, one's chances of being hurt in a terrorist attack are utterly microscopic in comparison to one's chances of *perishing* in an automobile accident, yet people worry about the former and not the latter (Myers, 2001). People tend to overestimate the likelihood of rare events when their estimates are based on descriptive information (such as media coverage) as opposed to when their estimates are based on personal experiences (Hertwig et al., 2004).

Confirmation Bias

Imagine a young physician examining a sick patient. The patient is complaining of a high fever and a sore throat. The physician must decide on a diagnosis from among a myriad possible diseases. The physician thinks that it may be the flu. She asks the patient if he feels "achey all over." The answer is "yes." The physician asks if the symptoms began a few days ago. Again, the response is "yes." The physician concludes that the patient has the flu. (Adapted from Halpern, 1984, pp. 215–216)

Do you see any flaws in the physician's reasoning? Has she probed into the causes of the patient's malady effectively? No, she has asked about symptoms that would be con-

sistent with her preliminary diagnosis, but she has not inquired about symptoms that could rule it out. Her questioning of the patient illustrates **confirmation bias—the tendency to only seek information that is likely to support one's decisions and beliefs**. This bias is common in medical diagnosis and other forms of decision making (Nickerson, 1998). There's nothing wrong with searching for confirming evidence to support one's decisions. However, people should also seek disconfirming evidence—which they often neglect to do.

The Overconfidence Effect



Make high and low estimates of the total U.S. Defense Department budget in the year 2004. Choose estimates far enough apart to be 98% confident that the actual figure lies between them. In other words, you should feel that there is only a 2% chance that the correct figure is lower than your low estimate or higher than your high estimate. Write your estimates in the spaces provided, before reading further.

High estimate: _____

Low estimate: _____

When working on problems like this one, people reason their way to their best estimate and then create a confidence interval around it. For instance, let's say that you arrived at \$300 billion as your best estimate of the defense budget. You would then expand a range around that estimate—say \$250 billion to \$350 billion—that you're sure will contain the correct figure. The answer in this case is \$456 billion. If the answer falls outside your estimated range, you are not unusual. In making this type of estimate, people consistently tend to make their confidence intervals too narrow (Lichtenstein, Fischhoff, & Phillips, 1982; Soll & Klayman,

2004). For example, subjects' 98% confidence intervals should include the correct answer 98% of the time, but they actually do so only about 60% of the time.

The crux of the problem is that people tend to put too much faith in their estimates, beliefs, and decisions, even when they should know better, a principle called the *overconfidence effect*. People vary considerably in their tendency to be overconfident (Stanovich, 1999), but overconfidence effects have been seen in perceptual judgments, predictions of sports results, and economic forecasts, among many other things (West & Stanovich, 1997). The overconfidence effect is seen even when people make probability predictions about personal matters, such as whether they will break up with their boyfriend or girlfriend within a certain period of time (Vallone et al., 1990). In fact, research suggests that *the more confident people are about their predictions, the more likely it is that they are overconfident* (Vallone et al., 1990).

The overconfidence effect is also seen among experts in many walks of life (Fischhoff, 1988). Studies have shown that physicians, weather forecasters, military leaders, gamblers, investors, and scientists tend to be overconfident about their predictions. As Daniel Kahneman puts it, "The human mind suppresses uncertainty. We're not only convinced that we know more about our politics, our businesses, and our spouses than we really do, but also that what we don't know must be unimportant" (McKean, 1985, p. 27). Thus, the overconfidence effect sometimes leads people to ignore useful sources of information that might well improve their predictions (Sieck & Arkes, 2005).

The Effects of Framing



Another consideration in making decisions involving risks is the framing of questions (Tversky & Kahneman, 1988, 1991). **Framing refers to how decision issues are posed or how choices are structured**. People often allow a decision to be shaped by the language or context in which it's presented, rather than explore it from different perspectives. Consider the following scenario, which is adapted from Kahneman and Tversky (1984, p. 343):



The availability heuristic can be dramatized by juxtaposing the unrelated phenomena of floods and tuberculosis (TB). Many people are killed by floods, but far more die from tuberculosis (see Table 8.4). However, since the news media report flood fatalities frequently and prominently, but rarely focus on deaths from tuberculosis, people tend to assume that flood-related deaths are more common.

Imagine that the U.S. is preparing for the outbreak of a dangerous disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows.

- If Program A is adopted, 200 people will be saved.
- If Program B is adopted, there is a one-third probability that all 600 people will be saved and a two-thirds probability that no people will be saved.

Kahneman and Tversky found that 72% of their subjects chose the “sure thing” (Program A) over the “risky gamble” (Program B). However, they obtained different results when the alternatives were reframed as follows:

- If Program C is adopted, 400 people will die.
- If Program D is adopted, there is a one-third probability that nobody will die and a two-thirds probability that all 600 people will die.

Although framed differently, Programs A and B represent exactly the same probability situation as Programs C and D (see **Figure 8.20**). In spite of this equivalence, 78% of the subjects chose Program D. Thus, subjects chose the sure thing when the decision was framed in terms of lives saved, but they

went with the risky gamble when the decision was framed in terms of lives lost. Additional experiments have shown that these results reflect a general trend in thinking about decisions. When seeking to obtain gains, people tend to avoid risky options. However, when seeking to cut their losses, people are much more likely to take risks.

Obviously, sound decision making should yield consistent decisions that are not altered dramatically by superficial changes in how options are presented, so framing effects once again highlight the foibles of human decision making. Fortunately, however, there are some limiting conditions that reduce the likelihood of framing effects (Mellers, Schwartz, & Cooke, 1998).

Nonetheless, research shows that framing is a factor in many of the choices people face in everyday life, including medical decisions (Gurm & Litaker, 2000) and consumer choices (Park, Jun, & Macinnis, 2000). For instance, some oil companies charge gas station patrons an extra nickel or so per gallon when they pay with a credit card. This fee clearly is a credit surcharge that results in a small financial loss. However, the oil companies never explicitly label it as a surcharge. Instead, they assert that they offer a discount for cash. Thus, they frame the decision as a choice between the normal price or an op-

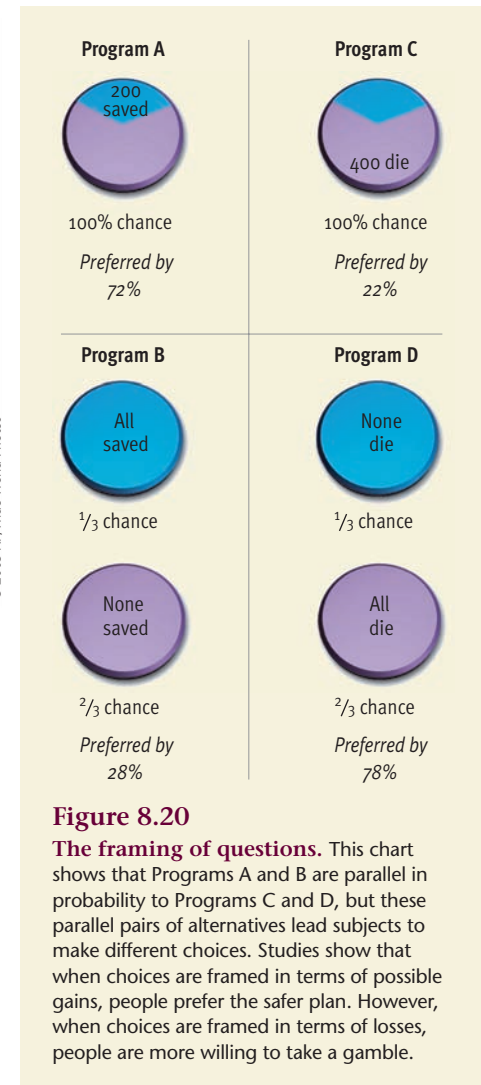


Figure 8.20

The framing of questions. This chart shows that Programs A and B are parallel in probability to Programs C and D, but these parallel pairs of alternatives lead subjects to make different choices. Studies show that when choices are framed in terms of possible gains, people prefer the safer plan. However, when choices are framed in terms of losses, people are more willing to take a gamble.

portunity for a gain. They understand that it's easier for customers to foresake a gain than it is to absorb a loss.

➤ REVIEW OF KEY POINTS

- The heuristics that people use in decision making can lead to various flaws in reasoning. For instance, the use of the representativeness heuristic contributes to the gambler's fallacy. The availability heuristic underlies the tendency to overestimate the improbable. People often exhibit confirmation bias—the tendency to only seek information that supports one's view.
- People generally fail to appreciate these shortcomings, which leads to the overconfidence effect. Evidence suggests that the more confident you feel about a prediction, the more likely it is that you are overconfident. In evaluating choices, it is wise to understand that decisions can be influenced by the language in which they are framed.

CRITICAL THINKING Application

Shaping Thought with Language: “Only a Naive Moron Would Believe That”

As explained in the chapter, the *linguistic relativity hypothesis* asserts that different languages may lead people to think about things differently. Given the power of language, it should come as no surprise that carefully chosen words and labels (within a specific language) can exert subtle influence on people's feelings about various issues (Calvert, 1997; Johnson & Dowling-Guyer, 1996; Pohl, 2004; Weatherall, 1992). In everyday life, many people clearly recognize that language can tilt thought along certain lines. This possibility is the basis for some of the concerns that have been expressed about sexist language. Women who object to being called “girls,” “chicks,” and “babes” believe that these terms influence the way people think about and interact with women. In a similar vein, used car dealers that sell “preowned cars” and airlines that outline precautions for “water landings” are manipulating lan-

guage to influence thought. Indeed, bureaucrats, politicians, advertisers, and big business have refined the art of shaping thought by tinkering with language, and to a lesser degree the same techniques are used by many people in everyday interactions. Let's look at two of these techniques: semantic slanting and name calling.

Semantic Slanting

Semantic slanting refers to deliberately choosing words to create specific emotional responses. For example, consider the crafty word choices made in the incendiary debate about abortion (Halpern, 1996). The anti-abortion movement recognized that it is better to be *for* something than to be *against* something and then decided to characterize its stance as “pro-life” rather than “anti-choice.” Likewise, the faction that favored

abortion did not like the connotation of an “anti-life” or “pro-abortion” campaign, so they characterized their position as “pro-choice.” The position advocated is exactly the same either way, but the label clearly influences how people respond. Thinking along similar lines, some “pro-life” advocates have asserted that the best way to win the debate about abortion is to frequently use the words *kill* and *baby* in the same sentence (Kahane, 1992). Obviously, these are words that push people's buttons and trigger powerful emotional responses.

In his fascinating book *Doublespeak*, William Lutz (1989) describes an endless series of examples of how government, business, and advertisers manipulate language to bias people's thoughts and feelings. For example, in the language of the military, an invasion is a “preemptive counterattack,” bombing the enemy is providing “air support,” a retreat is a “backloading of augmentation personnel,” civilians accidentally killed or wounded by military strikes are “collateral damage,” and troops killed by their own troops are “friendly casualties.” In the world of business, layoffs and firings become “headcount reductions,” “workforce adjustments,” or “career alternative enhancement programs,” whereas bad debts become “non-performing assets.” And in the language of bureaucrats, hospital deaths become “negative patient care outcomes” and tax increases become “revenue enhancement initiatives,” leading Lutz to quip that “Nothing in life is certain except negative patient care outcome and revenue enhancement.” You can't really appreciate how absurd this process can become until you go shopping for “genuine imitation leather” or “real counterfeit diamonds.”

Of course, you don't have to be a bureaucrat or military spokesperson to use semantic slanting. For example, if a friend of yours is annoyed at her 60-year-old professor for



Semantic slanting, which consists of carefully choosing words to create specific emotional reactions, has been used extensively by both sides in the debate about abortion.

Image Not Available

Briefings on the status of military actions are renowned for their creative but unintelligible manipulation of language, which is often necessary to obscure the unpleasant realities of war.

giving a tough exam and describes him as an “old geezer,” she would be using semantic slanting. She would have communicated that the professor’s age is a negative factor—one that is associated with a host of unflattering stereotypes about older people. And she would have implied that he gave an inappropriate exam because of his antiquated expectations or senile incompetence—all with a couple of well-chosen words. We are all the recipients of many such messages containing emotionally laden words and content. An important critical thinking skill is to recognize when semantic slanting is being used to influence how you think so you can resist this subtle technique.

In becoming sensitive to semantic slanting, notice how the people around you and those whom you see on television and read about in the newspapers refer to people from other racial and ethnic groups. You can probably determine a politician’s attitudes toward immigration, for example, by considering the words he or she uses when speaking about people from other countries. Are the students on your campus who come from other countries referred to as “international students” or “foreign students”? The term

“international” seems to convey a more positive image, with associations of being cosmopolitan and worldly. On the other hand, the term “foreign” suggests someone who is strange. Clearly, it pays to be careful when selecting the words you use in your own communication.

Name Calling

Another way that word choice influences thinking is in the way people tend to label and categorize others through the strategy of *name calling*. People often attempt to neutralize or combat views they don’t like by attributing such views to “radical feminists,”

“knee-jerk liberals,” “right-wingers,” “religious zealots,” or “extremists.” In everyday interactions, someone who inspires our wrath may be labeled as a “bitch,” a “moron,” or a “cheapskate.” In these examples, the name calling is not subtle and is easy to recognize. But name calling can also be used with more cunning and finesse. Sometimes, there is an *implied threat* that if you make an unpopular decision or arrive at a conclusion that is not favored, a negative label will be applied to you. For example, someone might say, “Only a naive moron would believe that” to influence your attitude on an issue. This strategy of *anticipatory name calling* makes it difficult for you to declare that you favor the negatively valued belief because it means that you make yourself look like a “naive moron.” Anticipatory name calling can also invoke positive group memberships, such as asserting that “all good Americans will agree . . .” or “people in the know think that . . .” Anticipatory name calling is a shrewd tactic that can be effective in shaping people’s thinking.

Regardless of your position on these issues, how would you respond to someone who says, “Only a knee-jerk liberal would support racial quotas or affirmative action programs that give unfair advantages to minorities.” Or “Only a stupid bigot would oppose affirmative action programs that rectify the unfair discrimination that minorities face.” Can you identify the anticipatory name calling and the attempts at semantic slanting in each of these examples? More important, can you resist attempts like these to influence how you think about complex social issues?

Table 8.5 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding the way language can influence thought	The critical thinker appreciates that when you want to influence how people think, you should choose your words carefully.
Recognizing semantic slanting	The critical thinker is vigilant about how people deliberately choose certain words to elicit specific emotional responses.
Recognizing name calling and anticipatory name calling	The critical thinker is on the lookout for name calling and the implied threats used in anticipatory name calling.

CHAPTER 8 *Recap*

Key Ideas

Language: Turning Thoughts into Words

- Languages are symbolic, generative, and structured. Human languages are structured hierarchically. At the bottom of the hierarchy are the basic sound units, called phonemes. At the next level are morphemes, the smallest units of meaning.
- Children typically utter their first words around their first birthday. Vocabulary growth is slow at first, but a vocabulary spurt often begins at around 18–24 months. Children begin to combine words by the end of their second year. Their early sentences are telegraphic, in that they omit many nonessential words. Over the next several years, children gradually learn the complexities of syntax.
- Research does not support the assumption that bilingualism has a negative effect on language development or on cognitive development. The learning of a second language is facilitated by starting at a younger age and by acculturation.
- Sue Savage-Rumbaugh's work with Kanzi suggests that some animals are capable of some basic language acquisition, although some skeptics disagree. Many theorists believe that humans' special talent for language is the product of natural selection.
- According to Skinner and other behaviorists, children acquire a language through imitation and reinforcement. Nativist theories assert that humans have an innate capacity to learn language rules. Today, theorists are moving toward interactionist perspectives, which emphasize the role of both biology and experience. The linguistic relativity hypothesis suggests that language determines the nature of people's thinking to some degree.

Problem Solving: In Search of Solutions

- Psychologists have differentiated among several types of problems, including problems of inducing structure, problems of transformation, and problems of arrangement. Common barriers to problem solving include functional fixedness, mental set, attending to irrelevant information, and placement of unnecessary constraints on one's solutions.
- A variety of strategies, or heuristics, are used for solving problems, including using trial and error, forming subgoals, working backward, searching for analogies, and changing the representation of a problem.
- Some cultures encourage a field-dependent cognitive style, whereas others foster more field independence. People who are field independent tend to analyze and restructure problems more than those who are field dependent. Research suggests that Eastern cultures exhibit a more holistic cognitive style, whereas Western cultures display a more analytic cognitive style.

Decision Making: Choices and Chances

- Simon's theory of bounded rationality suggests that human decision strategies are simplistic and often yield irrational results. An additive decision model is used when people make decisions by rating the attributes of each alternative and selecting the alternative that has the highest sum of ratings.
- When elimination by aspects is used, people gradually eliminate alternatives if their attributes fail to satisfy some minimum criterion. To some extent, people adapt their decision-making strategy to the situation, moving toward simpler strategies when choices become complex.
- In making decisions, comparative evaluations of options often yield different results than separate evaluations. Decisions may be influenced by people's need to avoid regret. Models of how people make risky decisions focus on the expected value or subjective utility of various outcomes.
- People use the representativeness and availability heuristics in estimating probabilities. These heuristics can lead people to ignore base rates and to fall for the conjunction fallacy. In the alternative outcomes effect, two scenarios that represent the same probability situation lead to surprisingly discrepant estimates of the likelihood of an event.
- Evolutionary psychologists maintain that many errors and biases in human reasoning are greatly reduced when problems are presented in ways

that resemble the type of input humans would have processed in ancestral times. Gigerenzer argues that people largely depend on fast and frugal decision heuristics that are adaptive in the real world.

Reflecting on the Chapter's Themes

- Four of our unifying themes surfaced in the chapter. Our discussion of language acquisition revealed once again that all aspects of behavior are shaped by both nature and nurture. The recent progress in the study of cognitive processes showed how science depends on empirical methods. Research on decision making illustrated the importance of subjective perceptions. We also saw that cognitive processes are moderated—to a limited degree—by cultural factors.

PERSONAL APPLICATION • Understanding Pitfalls in Reasoning About Decisions

- The heuristics that people use in decision making lead to various flaws in reasoning. For instance, the use of the representativeness heuristic contributes to the gambler's fallacy. The availability heuristic underlies the tendency to overestimate the improbable. People sometimes exhibit confirmation bias—the tendency to seek only information that supports one's view.
- People generally fail to appreciate these shortcomings, which leads to the overconfidence effect. In evaluating choices, it is wise to understand that decisions can be influenced by the language in which they are framed.

CRITICAL THINKING APPLICATION • Shaping Thought with Language: "Only a Naive Moron Would Believe That"

- Language can exert subtle influence over how people feel about various issues. Semantic slanting refers to the deliberate choice of words to create specific emotional responses, as has been apparent in the debate about abortion. In anticipatory name calling, there is an implied threat that a negative label will apply to you if you express certain views.

Key Terms

Acculturation (p. 305)
Algorithm (p. 313)
Alternative outcomes effect (p. 323)
Availability heuristic (p. 321)
Bilingualism (p. 304)
Cognition (p. 299)
Confirmation bias (p. 328)
Conjunction fallacy (pp. 322–323)
Decision making (p. 318)
Fast mapping (p. 302)
Field dependence-independence (p. 316)
Framing (p. 328)
Functional fixedness (p. 312)
Gambler's fallacy (p. 327)
Heuristic (p. 313)
Insight (p. 313)
Language (p. 300)
Language acquisition device (LAD) (p. 308)
Linguistic relativity (pp. 308–309)
Mean length of utterance (MLU) (p. 303)
Mental set (p. 312)
Metalinguistic awareness (p. 304)
Morphemes (p. 301)
Overextension (p. 303)

Overregularization (p. 303)
Phonemes (p. 301)
Problem solving (p. 310)
Problem space (p. 313)
Representativeness heuristic (p. 321)
Risky decision making (p. 320)
Semantics (p. 301)
Syntax (p. 301)
Telegraphic speech (p. 303)
Theory of bounded rationality (p. 318)
Trial and error (p. 313)
Underextensions (p. 303)

Key People

Noam Chomsky (pp. 307–308)
Leda Cosmides & John Tooby (p. 325)
Gerd Gigerenzer (pp. 325–326)
Daniel Kahneman (p. 321)
Steven Pinker (p. 307)
Sue Savage-Rumbaugh (pp. 306–307)
Herbert Simon (pp. 299, 318)
B. F. Skinner (p. 307)
Amos Tversky (p. 321)

CHAPTER 8 Practice Test

1. The 2-year-old child who refers to every four-legged animal as "doggie" is making which of the following errors?
 - A. underextension
 - B. overextension
 - C. overregularization
 - D. underregularization
2. Research suggests that bilingualism has a negative effect on:
 - A. language development.
 - B. cognitive development.
 - C. metalinguistic awareness.
 - D. none of the above.
3. Based on the work with Kanzi, which statement best summarizes the current status of the research on whether chimps can learn language?
 - A. Chimps can acquire the use of symbols but cannot combine them into sentences or learn rules of language.
 - B. Chimps are nearly as well suited for learning and using language as humans.
 - C. Chimps are incapable even of learning the symbols of a language.
 - D. Chimps can learn some basic language skills, but the linguistic capacities of humans are far superior.
4. Chomsky proposed that children learn language swiftly:
 - A. because they possess an innate language acquisition device.
 - B. through imitation, reinforcement, and shaping.
 - C. as the quality of their thought improves with age.
 - D. because they need to in order to get their increasingly complex needs met.
5. The linguistic relativity hypothesis is the notion that:
 - A. one's language determines the nature of one's thought.
 - B. one's thought determines the nature of one's language.
 - C. language and thought are separate and independent processes.
 - D. language and thought interact, with each influencing the other.
6. The nine-dot problem is:
 - A. often solved suddenly with a burst of insight.
 - B. difficult because people assume constraints that are not part of the problem.
 - C. solved through fast mapping.
 - D. both a and b.
7. Problems that require a common object to be used in an unusual way may be difficult to solve because of:
 - A. mental set.
 - B. irrelevant information.
 - C. unnecessary constraints.
 - D. functional fixedness.
8. A heuristic is:
 - A. a flash of insight.
 - B. a guiding principle or "rule of thumb" used in problem solving.
 - C. a methodical procedure for trying all possible solutions to a problem.
 - D. a way of making a compensatory decision.
9. In solving problems, people who are field dependent:
 - A. rely on external frames of reference.
 - B. tend to accept the physical environment as a given.
 - C. tend to focus on specific features of a problem.
 - D. tend to do all of the above.
 - E. do both a and b.
10. According to Nisbett, Eastern cultures tend to favor a(n) _____ cognitive style, whereas Western cultures tend to display a(n) _____ cognitive style.
 - A. analytic; holistic
 - B. holistic; analytic
 - C. holistic; field dependent
 - D. field independent; field dependent
11. The theory of bounded rationality was originally developed by:
 - A. Herbert Simon.
 - B. Noam Chomsky.
 - C. Steven Pinker.
 - D. Gerd Gigerenzer.
12. When you estimate the probability of an event by judging the ease with which relevant instances come to mind, you are relying on:
 - A. an additive decision-making model.
 - B. the representativeness heuristic.
 - C. the availability heuristic.
 - D. a noncompensatory model.
13. The belief that the probability of heads is higher after a long string of tails:
 - A. is rational and accurate.
 - B. is an example of the "gambler's fallacy."
 - C. reflects the influence of the representativeness heuristic.
 - D. b and c.
14. The more confident you are about your predictions:
 - A. the less likely it is that your predictions are accurate.
 - B. the less likely it is that your predictions are overconfident.
 - C. the more likely it is that your predictions are overconfident.
 - D. both a and b.
15. If someone says, "Only a congenital pinhead would make that choice," this use of language would represent:
 - A. confirmation bias.
 - B. syntactic slanting.
 - C. anticipatory name calling.
 - D. telegraphic speech.

Answers
1 B p. 303
2 D pp. 304-305
3 D p. 306
4 A pp. 307-308
5 A pp. 308-309
6 D p. 313
7 D p. 312
8 B p. 313
9 E p. 316
10 B p. 317
11 A p. 318
12 C p. 321
13 D p. 327
14 C p. 328
15 C p. 331

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

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Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



Intelligence and Psychological Testing



Key Concepts in Psychological Testing

Principal Types of Tests
Standardization and Norms
Reliability
Validity

The Evolution of Intelligence Testing

Galton's Studies of Hereditary Genius
Binet's Breakthrough
Terman and the Stanford-Binet
Wechsler's Innovations
Intelligence Testing Today

Basic Questions About Intelligence Testing

What Kinds of Questions Are on Intelligence Tests?
What Do Modern IQ Scores Mean?
Do Intelligence Tests Measure Potential or Knowledge?
Do Intelligence Tests Have Adequate Reliability?
Do Intelligence Tests Have Adequate Validity?
Do Intelligence Tests Predict Vocational Success?
Are IQ Tests Widely Used in Other Cultures?

Extremes of Intelligence

Mental Retardation
Giftedness

Heredity and Environment as Determinants of Intelligence

Evidence for Hereditary Influence
Evidence for Environmental Influence
The Interaction of Heredity and Environment
Cultural Differences in IQ Scores

FEATURED STUDY • Racial Stereotypes and Test Performance

New Directions in the Assessment and Study of Intelligence

Exploring Biological Indexes and Correlates of Intelligence
Investigating Cognitive Processes in Intelligent Behavior
Expanding the Concept of Intelligence
Measuring Emotional Intelligence

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Understanding Creativity

The Nature of Creativity
Measuring Creativity
Correlates of Creativity

CRITICAL THINKING APPLICATION • The Intelligence Debate, Appeals to Ignorance, and Reification

Appeal to Ignorance
Reification

Recap

Practice Test

Have you ever thought about the role that psychological testing has played in your life? In all likelihood, your years in grade school and high school were punctuated with a variety of intelligence tests, achievement tests, creativity tests, aptitude tests, and occupational interest tests. In the lower grades, you were probably given standardized achievement tests once or twice a year. For instance, you may have taken the Iowa Tests of Basic Skills, which measured your progress in reading, language, vocabulary, mathematics, and study skills. Perhaps you still have vivid memories of the serious atmosphere in the classroom, the very formal instructions (“Do not break the seal on this test until your examiner tells you to do so”), and the heavy pressure to work fast (I can still see Sister Dominic marching back and forth with her intense gaze riveted on her stopwatch).

Where you’re sitting at this very moment may have been influenced by your performance on standardized tests. That is, the college you chose to attend may have hinged on your SAT or ACT scores. Moreover, your interactions with standardized tests may be far from finished. Even at this point in your life, you may be selecting your courses to gear up for the Graduate Record Exam (GRE), the Law School Admission Test (LSAT), the Medical College Admission Test (MCAT), or certification tests in fields such as accounting or nursing. After graduation, when you go job hunting, you may find that prospective employers expect you to take still more batteries of psychological tests as they attempt to assess your personality, your motivation, and your talents.

The vast enterprise of modern testing evolved from psychologists’ pioneering efforts to measure *general intelligence*. The first useful intelligence tests, which were created soon after the turn of the twentieth century, left a great many “descendants.” Today, over 2600 published psychological tests measure a diverse array of mental abilities and other behavioral traits. Indeed, psychological testing has become a big business that annually generates hundreds of millions of dollars in revenues (Koocher & Rey-Casserly, 2003).

Clearly, American society has embraced psychological testing (Hanson, 1993). Each year in the United States alone, people take *hundreds of millions* of intelligence and achievement tests. Scholarships, degrees, jobs, and self-concepts are on the line as Americans

attempt to hurdle a seemingly endless succession of tests. Because your life is so strongly affected by how you perform on psychological tests, it pays to be aware of their strengths and limitations. In this chapter we’ll explore many questions about testing, including the following:

- How did psychological testing become so prevalent in modern society?
- How do psychologists judge the validity of their tests?
- What exactly do intelligence tests measure?
- Is intelligence inherited? If so, to what extent?
- How do psychological tests measure creativity?

We’ll begin by introducing some basic concepts in psychological testing. Then we’ll explore the history of intelligence tests, because they provided the model for subsequent psychological tests. Next we’ll address practical questions about how intelligence tests work. After examining the nature versus nurture debate as it relates to intelligence, we’ll explore some new directions in the study of intelligence. In the Personal Application, we’ll discuss efforts to measure and understand another type of mental ability: creativity. In the Critical Thinking Application, we will critique some of the reasoning used in the vigorous debate about the roots of intelligence.



Most children become familiar with standardized psychological tests—intelligence, achievement, and aptitude tests—in school settings.

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> Key Concepts in Psychological Testing

PREVIEW QUESTIONS

- Why is it wise to be cautious when interpreting test results?
- What are the two main categories of psychological tests?
- What makes a test standardized?
- What are test norms and percentile scores?
- What is reliability, and how can it be measured?
- What are the three types of test validity?

A **psychological test** is a standardized measure of a **sample of a person's behavior**. Psychological tests are measurement instruments. They're used to measure the *individual differences* that exist among people in abilities, aptitudes, interests, and aspects of personality.

Your responses to a psychological test represent a *sample* of your behavior. The word *sample* should alert you to one of the key limitations of psychological tests: A particular behavior sample may not be representative of your characteristic behavior. Everyone has bad days. A stomachache, a fight with a friend, a problem with your car—all might affect your responses to a particular test on a particular day.

This sampling problem is not unique to psychological testing. It's an unavoidable problem for any measurement technique that relies on sampling. For example, a physician taking your blood pressure might get an unrepresentative reading. Likewise, a football scout clocking a prospect's 40-yard sprint time might get a misleading figure. Because of the limitations of the sampling process, test scores should always be interpreted *cautiously*.

Principal Types of Tests

Psychological tests are used extensively in research, but most of them were developed to serve a practical purpose outside of the laboratory. Most tests can be placed in one of two broad categories: mental ability tests and personality tests.

Mental Ability Tests

Psychological testing originated with efforts to measure general mental ability. Today, tests of mental abilities remain the most common kind of psychological test. This broad class of tests includes three principal subcategories: intelligence tests, aptitude tests, and achievement tests.

Intelligence tests measure general mental ability. They're intended to assess intellectual potential rather than previous learning or accumulated knowledge. **Aptitude tests** are also designed to measure potential more than knowledge, but they break mental ability into separate components. Thus, **aptitude tests assess specific types of mental abilities.** For example, the Differential Aptitude Tests assess verbal reasoning, numerical ability, abstract reasoning, perceptual speed and accuracy, mechanical reasoning, space relations, spelling, and language usage (see **Figure 9.1**). Like aptitude tests, **achievement tests** have a specific

focus, but they're supposed to measure previous learning instead of potential. Thus, **achievement tests gauge a person's mastery and knowledge of various subjects** (such as reading, English, or history).

Personality Tests

If you had to describe yourself in a few words, what words would you use? Are you introverted? Independent? Ambitious? Enterprising? Conventional? Assertive? Domineering? Words such as these refer to personality traits. These *traits* can be assessed systematically with personality tests, of which there are more than 500. **Personality tests measure various aspects of personality, including motives, interests, values, and attitudes.** Many psychologists prefer to call these tests *personality scales* because, unlike tests of mental abilities, the questions do not have right and wrong answers. We'll look at personality scales in our upcoming chapter on personality (Chapter 12).

Standardization and Norms

Both personality scales and tests of mental abilities are *standardized* measures of behavior. **Standardization refers to the uniform procedures used in the administration and scoring of a test.** All subjects get the same instructions, the same questions, and the same time limits so that their scores can be compared meaningfully. This means, for instance, that a person taking the Differential Aptitude Tests (DAT) in 1984 in San Diego, another taking the DAT in 1994 in Baltimore, and another taking it in 2004 in Peoria all confront the same test-taking task.

The standardization of a test's scoring system includes the development of test norms. **Test norms provide information about where a score on a psychological test ranks in relation to other scores on that test.** Why are test norms needed? Because in psychological testing, everything is relative. Psychological tests tell you how you score *relative to other people*. They tell you, for instance, that you are average in creativity or slightly above average in clerical ability. These interpretations are derived from the test norms that help you understand what your test score means.

Usually, test norms allow you to convert your "raw score" on a test into a *percentile*. **A percentile score indicates the percentage of people who score at or below the score one has obtained.** For example, imagine that you take a 40-item assertiveness scale



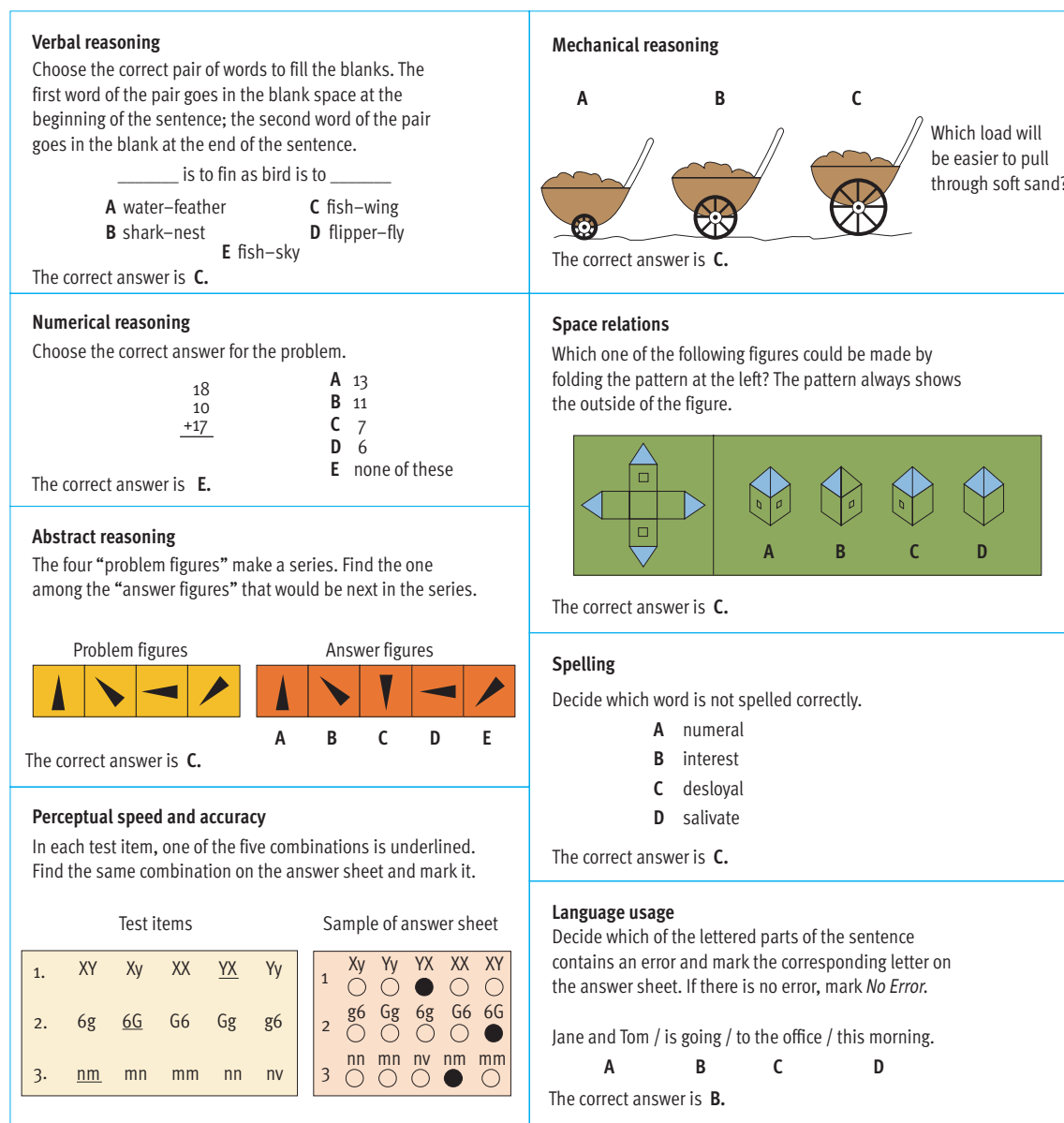


Figure 9.1
Examples of aptitude tests. Aptitude tests measure specific mental abilities instead of general mental ability. The questions shown here illustrate the specific types of abilities assessed by the Differential Aptitude Tests.

Source: Simulated items similar to those from the *Differential Aptitude Tests*, Fifth Edition. Copyright © 2005 by Harcourt Assessment Inc. Reproduced with permission. All rights reserved.

and obtain a raw score of 26. In other words, you indicate a preference for the assertive option on 26 of the questions. Your score of 26 has little meaning until you consult the test norms and find out that it places you at the 82nd percentile. This normative information would indicate that you appear to be as assertive as or more assertive than 82% of the sample of people who provided the basis for the test norms.

The sample of people that the norms are based on is called a test's *standardization group* or *norm group*. Ideally, test norms are based on a large sample of people who were carefully selected to be representative of the broader population. For example, the norms for most intelligence tests are based on samples of 2000–6000 people whose demographic characteristics closely match the overall demographics of the United States (Woodcock, 1994). Although intel-

ligence tests have been standardized carefully, the representativeness of standardization groups for other types of tests varies considerably. Another issue is that the norms for psychological tests need to be updated periodically with contemporary samples, as test norms may gradually grow old and out-of-date (Wasserman & Bracken, 2003).

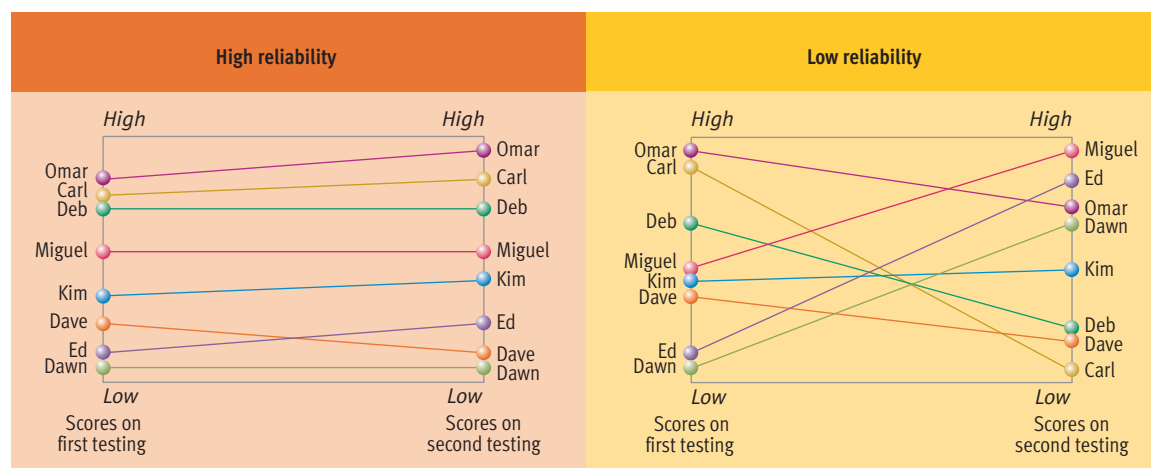
Reliability



Any kind of measuring device, whether it's a tire gauge, a stopwatch, or a psychological test, should be reasonably consistent. That is, repeated measurements should yield reasonably similar results. Psychologists call this quality *reliability*. To better appreciate the importance of reliability, think about how you would react if a tire pressure gauge were to give

Figure 9.2

Test-retest reliability. In each panel, subjects' scores on the first administration of an assertiveness test are represented on the left, and their scores on a second administration of the same test a few weeks later are shown on the right. If participants obtain similar scores on both administrations, as in the left panel, the test measures assertiveness consistently and has high test-retest reliability. If they get very different scores on the second administration, as in the right panel, the test has low reliability.



you several very different readings for the same tire. You would probably conclude that the gauge is broken and toss it into the trash. Consistency in measurement is essential to accuracy in measurement.

Reliability refers to the measurement consistency of a test (or of other kinds of measurement techniques). Like most other types of measuring devices, psychological tests are not perfectly reliable. A test's reliability can be estimated in several ways. One widely used approach is to check *test-retest reliability*, which is estimated by comparing subjects' scores on two administrations of a test. If we wanted to check the test-retest reliability of a newly developed test of assertiveness, we would ask a group of subjects to take the test on two occasions, probably a few weeks apart (see Figure 9.2). The underlying assumption is that assertiveness is a fairly stable aspect of personality that won't change in a matter of a few weeks. Thus, changes in participants' scores across the two administrations of the test would presumably reflect inconsistency in measurement.

Reliability estimates require the computation of correlation coefficients, which we introduced in Chapter 2 (see Figure 9.3 for a brief recapitulation). A **correlation coefficient is a numerical index of the degree of relationship between two variables.** In estimating test-retest reliability, the two variables that must

be correlated are the two sets of scores from the two administrations of the test. If people get fairly similar scores on the two administrations of our hypothetical assertiveness test, this consistency yields a substantial positive correlation. The magnitude of the correlation gives us a precise indication of the test's consistency. The closer the correlation comes to +1.00, the more reliable the test is.

There are no absolute guidelines about acceptable levels of reliability. What's acceptable depends to some extent on the nature and purpose of the test (Reynolds, 1994). The reliability estimates for most psychological tests range from the .70s through the .90s. The higher the reliability coefficient, the more consistent the test is. As reliability goes down, concern about measurement error increases. Tests that are used to make important decisions about people's lives should have reliability coefficients in the .90s (Nunnally & Bernstein, 1994).

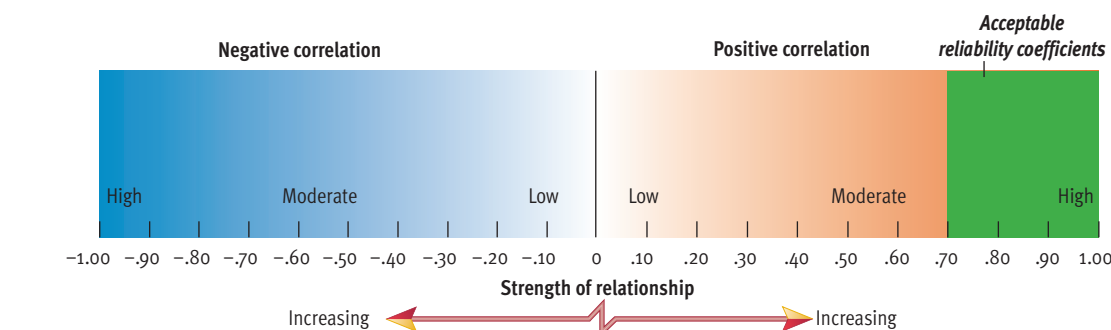
Validity



Even if a test is quite reliable, we still need to be concerned about its validity. **Validity refers to the ability of a test to measure what it was designed to measure.** If we develop a new test of assertiveness, we have to provide some evidence that it really mea-

Figure 9.3

Correlation and reliability. As explained in Chapter 2, a positive correlation means that two variables co-vary in the *same* direction; a negative correlation means that two variables co-vary in the *opposite* direction. The closer the correlation coefficient gets to either -1.00 or $+1.00$, the stronger the relationship. At a minimum, reliability estimates for psychological tests must be fairly high positive correlations. Most reliability coefficients fall between .70 and .95. Tests used in "high stakes" testing should have reliability coefficients above .90.



sures assertiveness. Increasingly, the term *validity* is also used to refer to the accuracy or usefulness of the *inferences* or *decisions* based on a test (Moss, 1994). This broader conception of validity highlights the fact that a specific test might be valid for one purpose, such as placing students in school, and invalid for another purpose, such as making employment decisions for a particular occupation. Validity can be estimated in several ways, depending on the nature and purpose of a test (Golden, Sawicki, & Franzen, 1990; Wasserman & Bracken, 2003).

Content Validity

Achievement tests and educational tests such as classroom exams should have adequate content validity. **Content validity refers to the degree to which the content of a test is representative of the domain it's supposed to cover.** Imagine a poorly prepared physics exam that includes questions on material that was not covered in class or in assigned reading. The professor has compromised the content validity of the exam. Content validity is evaluated with logic more than with statistics.

Criterion-Related Validity

Psychological tests are often used to make predictions about specific aspects of individuals' behavior. They are used to predict performance in college, job capability, and suitability for training programs, as just a few examples. Criterion-related validity is a central concern in such cases. **Criterion-related validity is estimated by correlating subjects' scores on a test with their scores on an independent criterion (another measure) of the trait assessed by the test.** For example, let's say you developed a test to measure aptitude for becoming an airplane pilot. You could check its validity by correlating subjects' scores on your aptitude test with subsequent ratings of their

performance in their pilot training (see **Figure 9.4**). The performance ratings would be the independent criterion of pilot aptitude. If your test has reasonable validity, there ought to be a reasonably strong positive correlation between the test and the criterion measure. Such a correlation would help validate your test's predictive ability.

Construct Validity

Many psychological tests attempt to measure abstract personal qualities, such as creativity, intelligence, extraversion, or independence. No obvious criterion measures exist for these abstract qualities, which are called *hypothetical constructs*. In measuring abstract qualities, psychologists are concerned about **construct validity—the extent to which evidence shows that a test measures a particular hypothetical construct.**

The process of demonstrating construct validity can be complicated. It usually requires a series of studies that examine the correlations between the test and various measures *related* to the trait in question. A thorough demonstration of construct validity requires looking at the relations between a test and many other measures. For example, some of the evidence on the construct validity of a measure of extraversion (the Expression scale from the Psychological Screening Inventory) is summarized in **Figure 9.5** on the next page. This network of correlation coefficients shows that the Expression scale correlates negatively, positively, or not at all with various measures, much as one would expect if the scale is really assessing extraversion. Ultimately, it's the overall pattern of correlations that provides convincing (or unconvincing) evidence of a test's construct validity.

The complexities involved in demonstrating construct validity will be apparent in our upcoming discussion of intelligence testing. The ongoing debate about the construct validity of intelligence tests is

Web Link 9.1



Finding Information About Psychological Tests

Maintained by the American Psychological Association, this FAQ site answers all sorts of questions about the availability of various kinds of tests. It explains how to find specific tests, describes how to get information on tests, and outlines information on the proper use of tests.

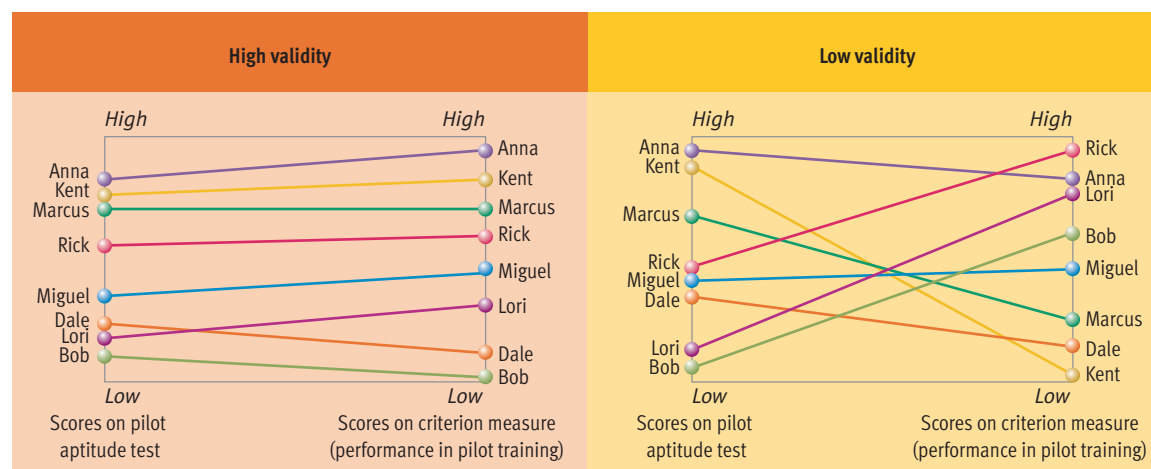
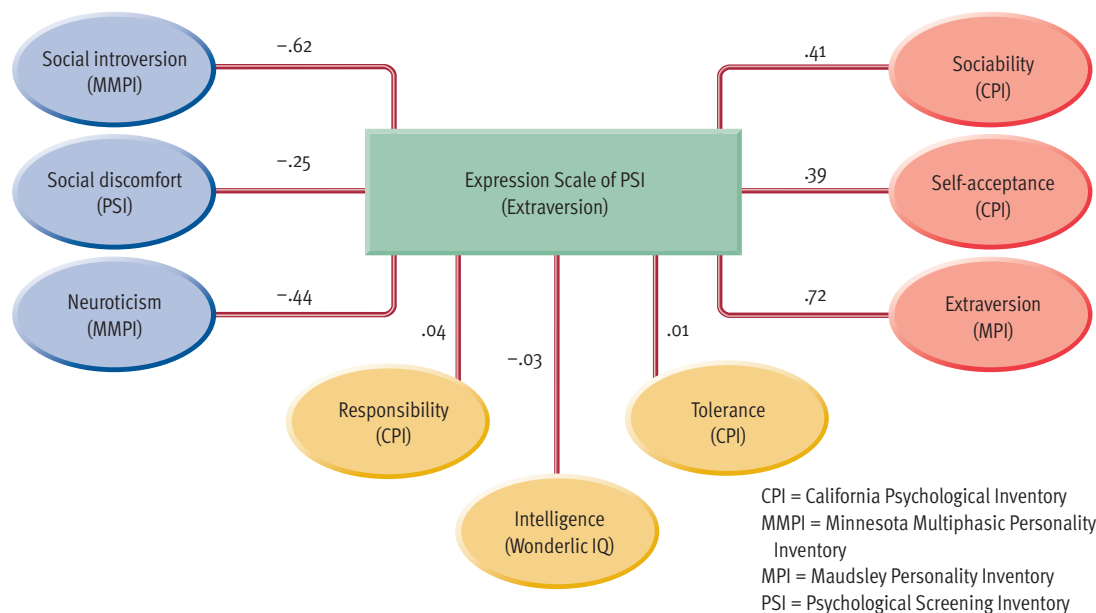


Figure 9.4
Criterion-related validity. To evaluate the criterion-related validity of a pilot aptitude test, a psychologist would correlate subjects' test scores with a criterion measure of their aptitude, such as ratings of their performance in a pilot training program. The validity of the test is supported if the people who score high on the test also score high on the criterion measure (as shown in the left panel), yielding a substantial correlation between the two measures. If little or no relationship exists between the two sets of scores (as shown in the right panel), the data do not provide support for the validity of the test.

Figure 9.5

Construct validity. Some of the evidence on the construct validity of the Expression Scale from the Psychological Screening Inventory is summarized here. This scale is supposed to measure the personality trait of *extraversion*. As you can see on the left side of this network of correlations, the scale correlates negatively with measures of social introversion, social discomfort, and neuroticism, just as one would expect if the scale is really tapping extraversion. On the right, you can see that the scale is correlated positively with measures of sociability and self-acceptance and another index of extraversion, as one would anticipate. At the bottom, you can see that the scale does not correlate with several traits that should be unrelated to extraversion. Thus, the network of correlations depicted here supports the idea that the Expression Scale measures the construct of extraversion.



one of the oldest debates in psychology. We'll look first at the origins of intelligence tests; this historical review will help you appreciate the current controversies about intelligence testing.

➤ REVIEW OF KEY POINTS

- Psychological tests are standardized measures of behavior—usually mental abilities or aspects of personality. Test scores are interpreted by consulting test norms to find out what represents a high or low score.

- As measuring devices, psychological tests should produce consistent results, a quality called reliability. Test-retest reliability is estimated by comparing subjects' scores on two administrations of a test. Reliability estimates should yield fairly high positive correlations.
- Validity refers to the degree to which there is evidence that a test measures what it was designed to measure. Content validity is crucial on classroom tests. Criterion-related validity is critical when tests are used to predict performance. Construct validity is critical when a test is designed to measure a hypothetical construct.

concept check 9.1



Recognizing Basic Concepts in Testing

Check your understanding of basic concepts in psychological testing by answering the questions below. Select your responses from the following concepts. The answers are in Appendix A.

Test norms

Criterion-related validity

Test-retest reliability

Construct validity

Split-half reliability

Content validity

- At the request of the HiTechnoLand computer store chain, Professor Charlz develops a test to measure aptitude for selling computers. Two hundred applicants for sales jobs at HiTechnoLand stores are asked to take the test on two occasions, a few weeks apart. A correlation of $+.82$ is found between applicants' scores on the two administrations of the test. Thus, the test appears to possess reasonable _____.
- All 200 of these applicants are hired and put to work selling computers. After six months Professor Charlz correlates the new workers' aptitude test scores with the dollar value of the computers that each sold during the first six months on the job. This correlation turns out to be $-.21$. This finding suggests that the test may lack _____.
- Back at the university, Professor Charlz is teaching a course in theories of personality. He decides to use the same midterm exam that he gave last year, even though the exam includes questions about theorists that he did not cover or assign reading on this year. There are reasons to doubt the _____ of Professor Charlz's midterm exam.

> The Evolution of Intelligence Testing

Psychological tests may play a prominent role in contemporary society, but this wasn't always so. The first psychological tests were invented only a little over a hundred years ago. Since then, reliance on psychological tests has grown gradually. In this section, we discuss the pioneers who launched psychological testing with their efforts to measure general intelligence.

Galton's Studies of Hereditary Genius

It all began with the work of a British scholar, Sir Francis Galton, in the later part of the 19th century. Galton studied family trees and found that success and eminence appeared consistently in some families over generations. For the most part, these families were much like Galton's: well-bred, upper-class families with access to superior schooling and social connections that pave the way to success. Yet Galton discounted the advantages of such an upbringing. In his book *Hereditary Genius*, Galton (1869) concluded that success runs in families because great intelligence is passed from generation to generation through genetic inheritance.

To better demonstrate that intelligence is governed by heredity, Galton needed an objective measure of intelligence. His approach to this problem was guided by the theoretical views of his day. Thus, he assumed that the contents of the mind are built out of elementary *sensations*, and he hypothesized that exceptionally bright people should exhibit exceptional sensory acuity. Working from this premise, he tried to assess innate mental ability by measuring simple sensory processes. Among other things, he measured sensitivity to high-pitched sounds, color perception, and reaction time (the speed of one's response to a stimulus). His efforts met with little success. Research eventually showed that the sensory processes that he measured were largely unrelated to other criteria of mental ability that he was trying to predict, such as success in school or in professional life (Kaufman, 2000).

In pursuing this line of investigation, Galton coined the phrase *nature versus nurture* to refer to the heredity-environment issue (Hilgard, 1989). Along the way, he also invented the concepts of *correlation* and *percentile test scores* (Roberts et al., 2005). Although Galton's mental tests were a failure, his work created an interest in the measurement of mental ability, setting the stage for a subsequent breakthrough by Alfred Binet, a prominent French psychologist.

Binet's Breakthrough



In 1904 a commission on education in France asked Alfred Binet to devise a test to identify mentally subnormal children. The commission was motivated by admirable goals: It wanted to single out youngsters in need of special training. It also wanted to avoid complete reliance on teachers' evaluations, which might often be subjective and biased.

In response to this need, Binet and a colleague, Theodore Simon, published the first useful test of general mental ability in 1905. They had the insight to load it with items that required abstract reasoning skills, rather than the sensory skills Galton had measured (Brody, 2000). Their scale was a success because it was inexpensive, easy to administer, objective, and capable of predicting children's performance in school fairly well (Siegler, 1992). Thanks to these qualities, its use spread across Europe and America.

The Binet-Simon scale expressed a child's score in terms of "mental level" or "mental age." A child's **mental age indicated that he or she displayed the mental ability typical of a child of that chronological (actual) age**. Thus, a child with a mental age of 6 performed like the average 6-year-old on the test. Binet realized that his scale was a somewhat crude initial effort at measuring mental ability. He revised it in 1908 and again in 1911. Unfortunately, his revising came to an abrupt end with his death in 1911. However, other psychologists continued to build on Binet's work.

Terman and the Stanford-Binet



In America, Lewis Terman and his colleagues at Stanford University soon went to work on a major expansion and revision of Binet's test. Their work led to the 1916 publication of the Stanford-Binet Intelligence Scale (Terman, 1916). Although this revision was quite loyal to Binet's original conceptions, it incorporated a new scoring scheme based on the "intelligence quotient" suggested by William Stern (1914). **An intelligence quotient (IQ) is a child's mental age divided by chronological age, multiplied by 100.** As you can see, IQ scores originally involved actual quotients:

$$IQ = \frac{\text{Mental age}}{\text{Chronological age}} \times 100$$

The ratio of mental age to chronological age made it possible to compare children of different ages. In

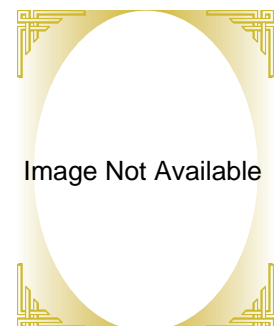
PREVIEW QUESTIONS

- When and how did intelligence testing begin?
- What were Binet's contributions to the progress of intelligence testing?
- What is an IQ score, and with what test did it originate?
- How did Wechsler improve intelligence testing?



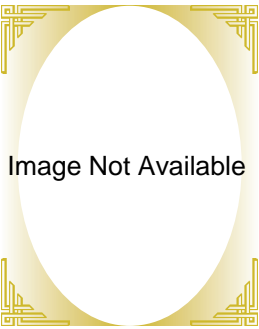
SIR FRANCIS GALTON

"There is no escape from the conclusion that nature prevails enormously over nurture when the differences in nurture do not exceed what is commonly to be found among persons of the same rank of society and in the same country."



ALFRED BINET

"The intelligence of anyone is susceptible of development. With practice, enthusiasm, and especially with method one can succeed in increasing one's attention, memory, judgment, and in becoming literally more intelligent than one was before."

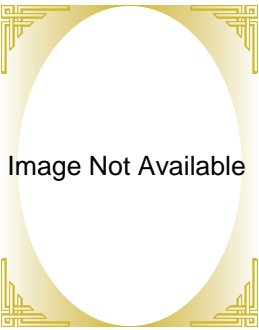


LEWIS Terman
“It is the method of tests that has brought psychology down from the clouds and made it useful to men; that has transformed the ‘science of trivialities’ into the ‘science of human engineering.’”

Web Link 9.2



Human Intelligence
A graphic approach to the history of intelligence testing is taken at this site, which uses colored arrows to show academic lineage and connections among various theorists. Maintained by Jonathan Plucker of Indiana University, this site covers all the major intelligence theorists and offers excellent discussions of contemporary topics.



DAVID WECHSLER
“The subtests [of the WAIS] are different measures of intelligence, not measures of different kinds of intelligence.”

Binet’s system, such comparisons had been awkward. Using the IQ ratio, all children (regardless of age) were placed on the same scale, which was centered at 100 if their mental age corresponded to their chronological age (see **Table 9.1** for examples of IQ calculations).

Terman’s technical and theoretical contributions to psychological testing were modest, but he made an articulate case for the potential educational benefits of testing and became the key force behind American schools’ widespread adoption of IQ tests (Chapman, 1988). As a result of his efforts, the Stanford-Binet quickly became the world’s foremost intelligence test and the standard of comparison for virtually all intelligence tests that followed (White, 2000). Since its publication in 1916, the Stanford-Binet has been updated periodically—in 1937, 1960, 1973, 1986, and 2003. Although the 1986 revision introduced some major changes in the organizational structure of the test, the modern Stanford-Binet remains loyal to the conception of intelligence originally formulated by Binet and Terman.

Wechsler’s Innovations



As chief psychologist at New York’s massive Bellevue Hospital, David Wechsler was charged with overseeing the psychological assessment of thousands of adult patients. He found the Stanford-Binet somewhat unsatisfactory for this purpose. Thus, Wechsler set out to improve on the measurement of intelligence *in adults*. In 1939 he published the first high-quality IQ test designed specifically for adults, which came to be known as the Wechsler Adult Intelligence Scale (WAIS) (Wechsler, 1955, 1981, 1997). Ironically, Wechsler (1949, 1967, 1991, 2003) eventually devised downward extensions of his scale for children.

The Wechsler scales were characterized by at least two major innovations (Prifitera, 1994). First, Wechsler made his scales less dependent on subjects’ verbal ability than the Stanford-Binet. He included many items that required nonverbal reasoning. To highlight the distinction between verbal and nonverbal ability, he formalized the computation of separate

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scores for verbal IQ, performance (nonverbal) IQ, and full-scale (total) IQ.

Second, Wechsler discarded the intelligence quotient in favor of a new scoring scheme based on the *normal distribution*. This scoring system has since been adopted by most other IQ tests, including the Stanford-Binet. Although the term *intelligence quotient* lingers on in our vocabulary, scores on intelligence tests are no longer based on an actual quotient. We’ll take a close look at the modern scoring system for IQ tests a little later.

Intelligence Testing Today

Today, psychologists and educators have many IQ tests available for their use. Basically, these tests fall into two categories: *individual tests* and *group tests*. Individual IQ tests are administered only by psychologists who have special training for this purpose. A psychologist works face to face with a single examinee at a time. The Stanford-Binet and the Wechsler scales are both individual IQ tests.

The problem with individual IQ tests is that they’re expensive and time-consuming to administer. Therefore, researchers have developed a number of IQ tests that can be administered to large groups of people at

Table 9.1 Calculating the Intelligence Quotient

Measure	Child 1	Child 2	Child 3	Child 4
Mental age (MA)	6 years	6 years	9 years	12 years
Chronological age (CA)	6 years	9 years	12 years	9 years
$IQ = \frac{MA}{CA} \times 100$	$\frac{6}{6} \times 100 = 100$	$\frac{6}{9} \times 100 = 67$	$\frac{9}{12} \times 100 = 75$	$\frac{12}{9} \times 100 = 133$



Group IQ tests are much less expensive and time-consuming to administer than individual IQ tests.

once, such as the Otis-Lennon School Ability Test and the Cognitive Abilities Test (Kaufman, 2000). Group IQ tests are a little different in character from

individual tests (much more time pressure, for instance), but their widespread usage is a testimonial to their much greater efficiency and cost-effectiveness (Cianciolo & Sternberg, 2004). Indeed, if you've taken an IQ test, chances are that it was a group test.

➤ REVIEW OF KEY POINTS

- The first crude efforts to devise intelligence tests were made by Sir Francis Galton, who wanted to show that intelligence is inherited. Galton is also known for inventing correlation and percentile test scores.
- Modern intelligence testing began with the work of Alfred Binet, a French psychologist who published the first useful intelligence test in 1905. Binet's scale measured a child's mental age.
- Lewis Terman revised the original Binet scale to produce the Stanford-Binet in 1916. It introduced the intelligence quotient and became the standard of comparison for subsequent intelligence tests.
- David Wechsler devised an improved measure of intelligence for adults and a series of IQ tests that reduced the emphasis on verbal ability. He also introduced a new scoring system based on the normal distribution.
- Today, there are many individual and group intelligence tests. An individual IQ test is administered to a single examinee by a psychologist who has special training for this purpose. Group IQ tests can be administered to many people simultaneously.

➤ Basic Questions About Intelligence Testing

Misconceptions abound when it comes to intelligence tests. In this section we'll use a question-and-answer format to explain the basic principles underlying intelligence testing.

What Kinds of Questions Are on Intelligence Tests?

The nature of the questions found on IQ tests varies somewhat from test to test. These variations depend on whether the test is intended for children or adults (or both) and whether the test is designed for individuals or groups. Overall, the questions are fairly diverse in format. The Wechsler scales, with their numerous subtests, provide a representative example of the kinds of items that appear on most IQ tests. As you can see in **Figure 9.6** on the next page, the items in the Wechsler subtests require subjects to furnish information, recognize vocabulary, figure out patterns, and demonstrate basic memory. Generally speaking, examinees are required to manipulate words, numbers, and images through abstract reasoning.

What Do Modern IQ Scores Mean?



As we've discussed, scores on intelligence tests once represented a ratio of mental age to chronological age. However, this system has given way to one based on the normal distribution and the standard deviation (see Chapter 2). **The normal distribution is a symmetric, bell-shaped curve that represents the pattern in which many characteristics are dispersed in the population.** When a trait is normally distributed, most cases fall near the center of the distribution (an average score) and the number of cases gradually declines as one moves away from the center in either direction (see **Figure 9.7** on page 345).

The normal distribution was first discovered by 18th-century astronomers. They found that their measurement errors were distributed in a predictable way that resembled a bell-shaped curve. Since then, research has shown that many human traits, ranging from height to running speed to spatial ability, also follow a normal distribution. Psychologists eventually

PREVIEW QUESTIONS

- What types of items are found on IQ tests?
- What role does the normal distribution play in the scoring system for modern IQ tests?
- Do IQ tests assess innate intellectual potential?
- Are IQ tests reliable?
- What type of evidence is used to support the validity of IQ tests?
- How well do IQ tests predict occupational attainment and job success?
- Do non-Western cultures make much use of IQ tests?



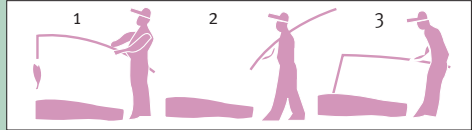

Wechsler Adult Intelligence Scale (WAIS)		
Test	Description	Example
Verbal scale		
Information	Taps general range of information	On what continent is France?
Comprehension	Tests understanding of social conventions and ability to evaluate past experience	Why are children required to go to school?
Arithmetic	Tests arithmetic reasoning through verbal problems	How many hours will it take to drive 150 miles at 50 miles per hour?
Similarities	Asks in what way certain objects or concepts are similar; measures abstract thinking	How are a calculator and a typewriter alike?
Digit span	Tests attention and rote memory by orally presenting series of digits to be repeated forward or backward	Repeat the following numbers backward: 2 4 3 5 1 8 6
Vocabulary	Tests ability to define increasingly difficult words	What does audacity mean?
Performance scale		
Digit symbol	Tests speed of learning through timed coding tasks in which numbers must be associated with marks of various shapes	Shown: 1 2 3 4 ○ □ △ ⊙ Fill in: 1 4 3 2 ____
Picture completion	Tests visual alertness and visual memory through presentation of an incompletely drawn figure; the missing part must be discovered and named	Tell me what is missing: 
Block design	Tests ability to perceive and analyze patterns by presenting designs that must be copied with blocks	Assemble blocks to match this design: 
Picture arrangement	Tests understanding of social situations through a series of comic-strip-type pictures that must be arranged in the right sequence to tell a story	Put the pictures in the right order: 
Object assembly	Tests ability to deal with part/whole relationships by presenting puzzle pieces that must be assembled to form a complete object	Assemble the pieces into a complete object: 

Figure 9.6
Subtests on the Wechsler Adult Intelligence Scale (WAIS). The WAIS is divided into scales that yield separate verbal and performance (nonverbal) IQ scores. The verbal scale consists of six subtests and the performance scale is made up of five subtests. Examples of low-level (easy) test items that closely resemble those on the WAIS are shown on the right.

recognized that intelligence scores also fall into a normal distribution. This insight permitted David Wechsler to devise a more sophisticated scoring system for his tests that has been adopted by virtually all subsequent IQ tests. In this system, raw scores are translated into *deviation IQ scores that locate subjects precisely within the normal distribution, using the standard deviation as the unit of measurement.*

For most IQ tests, the mean of the distribution is set at 100 and the standard deviation (SD) is set at 15. These choices were made to provide continuity with the original IQ ratio (mental age to chronological age) that was centered at 100. In this system, which is depicted in **Figure 9.7**, a score of 115 means that a person scored exactly one SD (15 points) above the mean. A score of 85 means that a person scored one

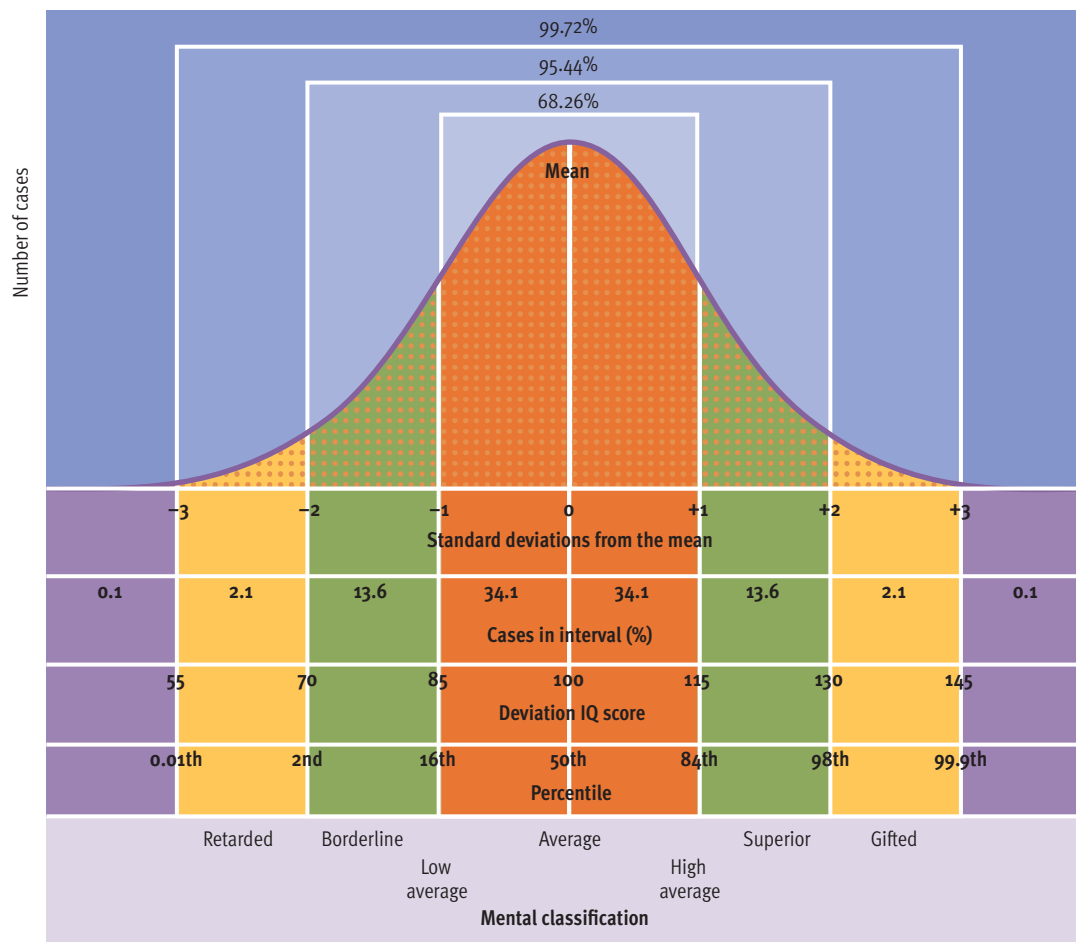


Figure 9.7
The normal distribution.
 Many characteristics are distributed in a pattern represented by this bell-shaped curve. The horizontal axis shows how far above or below the mean a score is (measured in plus or minus standard deviations). The vertical axis is used to graph the number of cases obtaining each score. In a normal distribution, the cases are distributed in a fixed pattern. For instance, 68.26% of the cases fall between +1 and -1 standard deviation. Modern IQ scores indicate where a person's measured intelligence falls in the normal distribution. On most IQ tests, the mean is set at an IQ of 100 and the standard deviation at 15. Any deviation IQ score can be converted into a percentile score. The mental classifications at the bottom of the figure are descriptive labels that roughly correspond to ranges of IQ scores.

SD below the mean. A score of 100 means that a person showed average performance. You don't really need to know how to work with standard deviations to understand this system (but if you're interested, consult Appendix B). *The key point is that modern IQ scores indicate exactly where you fall in the normal distribution of intelligence.* Thus, a score of 120 does not indicate that you answered 120 questions correctly. Nor does it mean that you have 120 "units" of intelligence. A deviation IQ score places you at a specific point in the normal distribution of intelligence.

Deviation IQ scores can be converted into percentile scores (see Figure 9.7). In fact, a major advantage of this scoring system is that a specific score on a specific test always translates into the same percentile score, regardless of the person's age group. The old system of IQ ratio scores lacked this consistency.

Do Intelligence Tests Measure Potential or Knowledge?

Intelligence tests are intended to measure intellectual potential. They do so by presenting novel questions that require test takers to think on their feet,

rather than questions that simply tap factual knowledge. However, because people's backgrounds differ, it's not easy to devise items that are completely unaffected by differences in knowledge. Test developers try to circumvent this problem by requiring subjects to *apply* relatively *common* knowledge. Nevertheless, IQ tests unavoidably contain items that are influenced by the test taker's previous learning. *Thus, IQ tests measure a blend of potential and knowledge.* Test developers try to tilt the balance toward the assessment of potential as much as possible, but factual knowledge clearly has an impact on intelligence test scores (Ackerman & Beier, 2005; Cianciolo & Sternberg, 2004).

Do Intelligence Tests Have Adequate Reliability?

Do IQ tests produce consistent results when people are retested? Yes. Most IQ tests report commendable reliability estimates. The correlations generally range into the .90s (Kaufman, 2000). In comparison to most other types of psychological tests, IQ tests are exceptionally reliable. However, like other tests, they *sam-*



Educational Psychology Interactive: Intelligence
This site, maintained by Bill Huitt of Valdosta State University, leads to a helpful review of psychological approaches to intelligence and is an excellent resource for other topics in educational psychology.

ple behavior, and a specific testing may yield an unrepresentative score.

Variations in examinees' motivation to take an IQ test or in their anxiety about the test can sometimes produce misleading scores (Hopko et al., 2005; Zimmerman & Woo-Sam, 1984). The most common problem is that low motivation or high anxiety may drag a person's score down on a particular occasion. For instance, a fourth-grader who is made to feel that the test is really important may get jittery and be unable to concentrate. The same child might score much higher on a subsequent testing by another examiner who creates a more comfortable atmosphere. Although the reliability of IQ tests is excellent, caution is always in order in interpreting test scores.

Do Intelligence Tests Have Adequate Validity?

Do intelligence tests measure what they're supposed to measure? Yes, but this answer has to be qualified very carefully. IQ tests are valid measures of the kind of intelligence that's necessary to do well in academic work. But if the purpose is to assess intelligence in a broader sense, the validity of IQ tests is debatable.

As you may recall, intelligence tests were originally designed with a relatively limited purpose in mind: to predict school performance. This has continued to be the principal purpose of IQ testing. Efforts to document the validity of IQ tests have usually concentrated on their relationship to grades in school. Typically, positive correlations in the .40s and .50s are

found between IQ scores and school grades (Kline, 1991). Even higher correlations (between .60 and .80) are found between IQ scores and the number of years of school that people complete (Ceci, 1991). However, the meaning of this finding is complicated by the fact that the causal links between IQ and schooling are bidirectional. Although high IQ clearly fosters success in school, schooling also has a positive effect on IQ (Ceci & Williams, 1997).

In any event, these correlations are about as high as one could expect, given that many factors besides a person's intelligence are likely to affect grades and school progress. For example, school grades may be influenced by a student's motivation, diligence, or personality, not to mention teachers' subjective biases. Thus, IQ tests are reasonably valid indexes of school-related intellectual ability, or academic intelligence.

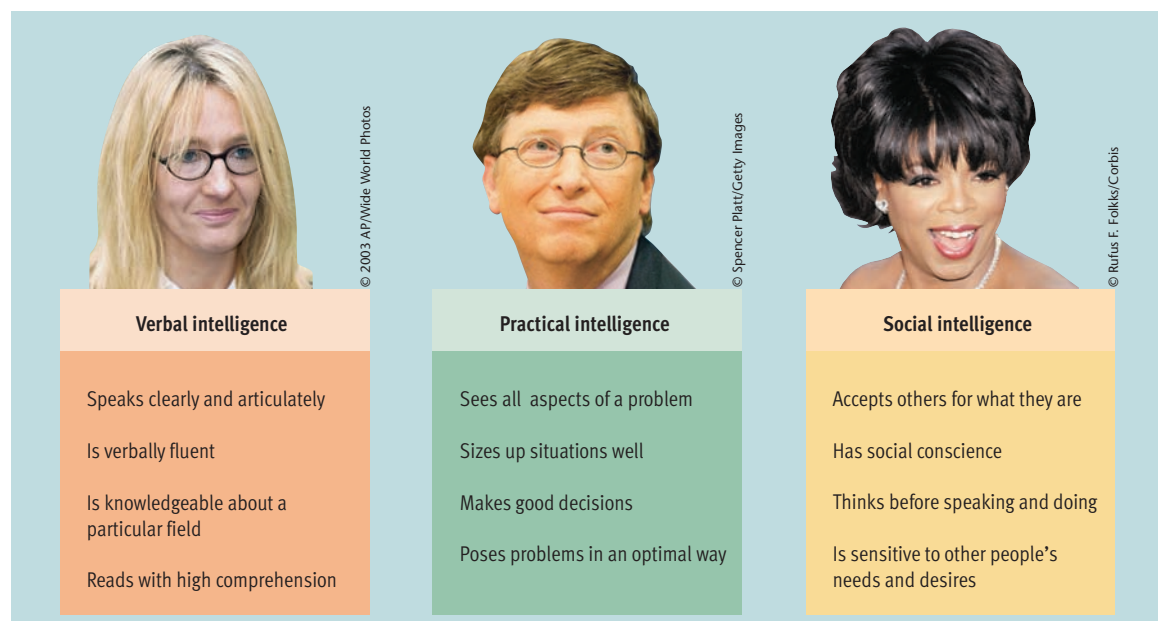
However, over the years people have mistakenly come to believe that IQ tests measure mental ability in a truly general sense. In reality, IQ tests have always focused on the abstract reasoning and verbal fluency that are essential to academic success. The tests do not tap social competence, practical problem solving, creativity, mechanical ingenuity, or artistic talent.

When Robert Sternberg and his colleagues (1981) asked people to list examples of intelligent behavior, they found that the examples fell into three categories: (1) *verbal intelligence*, (2) *practical intelligence*, and (3) *social intelligence* (see Figure 9.8). Thus, people generally recognize three basic components of intelligence. For the most part, IQ tests assess only the first

Figure 9.8

Laypersons' conceptions of intelligence. Robert Sternberg and his colleagues (1981) asked participants to list examples of behaviors characteristic of intelligence. The examples tended to sort into three groups that represent the three types of intelligence recognized by the average person: verbal intelligence, practical intelligence, and social intelligence. The three well-known individuals shown here are prototype examples of verbal intelligence (J. K. Rowling), practical intelligence (Bill Gates), and social intelligence (Oprah Winfrey).

Source: Adapted from Sternberg, R. J., Conway, B. E., Keton, J. L., & Bernstein, M. (1981). People's conceptions of intelligence. *Journal of Personality and Social Psychology*, 41 (1), 37–55. Copyright © 1981 by the American Psychological Association. Adapted by permission of the publisher and author.



of these three components. Although IQ tests are billed as measures of *general* mental ability, they actually focus somewhat narrowly on a specific type of intelligence: academic/verbal intelligence (Sternberg, 1998, 2003b).

Do Intelligence Tests Predict Vocational Success?

Vocational success is a vague, value-laden concept that's difficult to quantify. Nonetheless, researchers have attacked this question by examining correlations between IQ scores and specific indicators of vocational success, such as the prestige of subjects' occupations or ratings of subjects' job performance. The data relating IQ to occupational attainment are pretty clear. *People who score high on IQ tests are more likely than those who score low to end up in high-status jobs* (Gottfredson, 2003b; Herrnstein & Murray, 1994; Schmidt & Hunter, 2004). Because IQ tests measure school ability fairly well and because school performance is important in reaching certain occupations, this link between IQ scores and job status makes sense. Of course, the correlation between IQ and occupational attainment is moderate, and there are plenty of exceptions to the general trend. Some people plow through the educational system with bulldog determination and hard work, despite limited ability as measured by IQ tests. Such people may go on to prestigious jobs, while people who are brighter (according to their test results), but less motivated, settle for lower-status jobs.

There is considerable debate, however, about whether IQ scores are effective predictors of performance *within* a particular occupation. On the one hand, research suggests that (a) there is a substantial correlation (about .50) between IQ scores and job performance, (b) this correlation varies somewhat depending on the complexity of a job's requirements but does not disappear even for low-level jobs (see **Figure 9.9**), (c) this association holds up even when workers have more experience at their jobs, and (d) measures of specific mental abilities and personality traits are much less predictive of job performance than measures of intelligence (Gottfredson, 2002; Ones, Viswesvaran, & Dilchert, 2005; Schmidt, 2002). On the other hand, critics argue that the reported correlations have usually been corrected for statistical artifacts and that the raw, uncorrected correlations are lower (.30s) (Outtz, 2002), and they note that even a correlation of .50 would provide only modest accuracy in prediction (accounting for about 25% of the variation in job performance) (Goldstein,

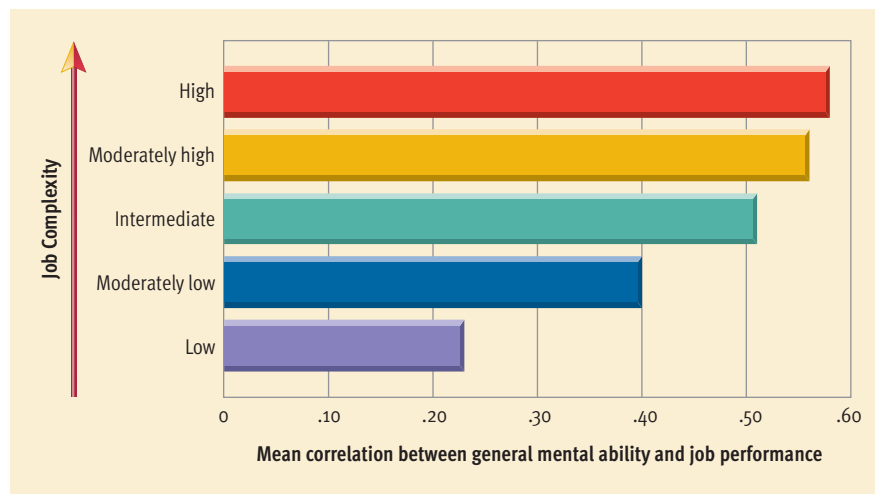


Figure 9.9

Intelligence as a predictor of job performance. Based on a review of 425 studies, Schmidt and Hunter (2004) report that the correlation between general mental ability and job performance depends on the complexity of the job. As jobs become more complicated, intelligence becomes a better predictor of performance. Schmidt and Hunter conclude that these correlations show that IQ tests can be valuable in hiring decisions. However, as the text explains, some other experts have reservations about using intelligence tests in employee selection. (Based on data from Schmidt & Hunter, 2004)

Zedeck, & Goldstein, 2002; Sternberg & Hedlund, 2002). Critics have also questioned the validity of the supervisory ratings that have typically been used as an index of job performance (Tenopyr, 2002). Concerns have also been raised that when IQ tests are used for job selection, they can have an adverse impact on employment opportunities for many minority groups that tend to score somewhat lower (on average) on such tests (Murphy, 2002; Outtz, 2002). In the final analysis, there is no question that intelligence is associated with vocational success, but there is room for argument about whether this association is strong enough to justify reliance on IQ testing in hiring employees.

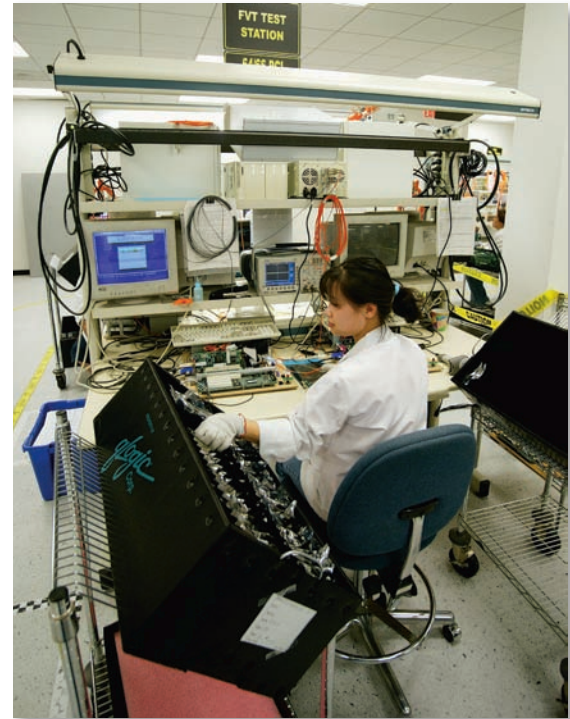
Are IQ Tests Widely Used in Other Cultures?

In other Western cultures with European roots, the answer to this questions is yes. In most non-Western cultures, the answer is not really. IQ testing has a long history and continues to be a major enterprise in many Western countries, such as Britain, France, Norway, Canada, and Australia (Irvine & Berry, 1988). However, efforts to export IQ tests to non-Western societies have met with mixed results. The tests have been well received in some non-Western cultures, such as Japan, where the Binet-Simon scales were introduced as early as 1908 (Iwawaki & Vernon, 1988),



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The skills and knowledge that are crucial to success vary from one culture to the next. IQ tests were designed to assess the skills and knowledge valued in modern, Western cultures. They have proven useful in some non-Western cultures that value similar sets of skills, but they have also proven irrelevant in many cultures.



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but they have been met with indifference or resistance in other cultures, such as China and India (Chan & Vernon, 1988; Sinha, 1983).

The bottom line is that Western IQ tests do not translate well into the language and cognitive frameworks of many non-Western cultures (Berry, 1994; Sternberg, 2004). Using an intelligence test with a cultural group other than the one for which it was orig-

inally designed can be problematic. The entire process of test administration, with its emphasis on rapid information processing, decisive responding, and the notion that ability can be quantified, is foreign to some cultures (Serpell, 2000). Moreover, different cultures have different conceptions of what intelligence is and value different mental skills (Das, 1994; Sternberg & Kaufman, 1998).

Image Not Available

➤ REVIEW OF KEY POINTS

- Intelligence tests contain a diverse mixture of questions. In the modern scoring system, deviation IQ scores indicate where people fall in the normal distribution of intelligence for their age group. On most tests, the mean is set at 100 and the standard deviation is set at 15.
- Although they are intended to measure potential for learning, IQ tests inevitably assess a blend of potential and knowledge. IQ tests are exceptionally reliable, with reliability coefficients typically ranging into the .90s.
- IQ tests are reasonably valid measures of academic intelligence in that they predict school grades and the number of years of school that people complete. However, they do not tap social or practical intelligence, and they do not measure intelligence in a truly general sense.
- IQ scores are correlated with occupational attainment. However, there is active debate about whether they predict performance within an occupation very well.
- Intelligence testing is largely a Western enterprise, and IQ tests are not widely used in most non-Western cultures. One reason is that different cultures have different conceptions of intelligence.

> Extremes of Intelligence

What are the cutoff scores for extremes in intelligence that lead children to be designated as retarded or gifted? On the low end, IQ scores roughly two standard deviations or more below the mean are regarded as subnormal. On the high end, children who score more than two or three standard deviations above the mean are regarded as gifted. However, designations of mental retardation and giftedness should not be based exclusively on IQ test results. Let's look more closely at the concepts of mental retardation and intellectual giftedness.

Mental Retardation

According to the American Association on Mental Retardation (AAMR), **mental retardation refers to subaverage general mental ability accompanied by deficiencies in adaptive skills, originating before age 18**. Adaptive skills consist of everyday living skills in ten domains, including communication (example: writing a letter), self-care (dressing oneself), home living (preparing meals), social interaction (coping with others' demands), community use (shopping), and health/safety (recognizing illness).

There are two noteworthy aspects to this definition. First, the IQ criterion of subnormality is arbitrary. In the 1992 and 2002 releases of its manual on mental retardation, the AAMR set a flexible cutoff line, which is an IQ score of 70 to 75 or below. This cutoff line could be drawn elsewhere. Indeed, the AAMR has changed the cutoff four times in recent decades (Ramey & Ramey, 2000). These periodic changes in the scoring norms for IQ tests have had erratic effects on the percentage of children falling

below the cutoffs (Flynn, 2000; Kanaya, Scullin, & Ceci, 2003). Second, the requirement of deficits in everyday living skills is included because experts feel that retardation should not be determined solely on the basis of individuals' test ability (Bunch, 1994). This requirement acknowledges that "school learning" is not the only important kind of learning. Unfortunately, there are no objective methods of measuring everyday living skills, so this assessment is necessarily subjective (Detterman, Gabriel, & Ruthsatz, 2000).

Levels of Retardation

Approximately 2%–3% of the school-age population is diagnosed as mentally retarded (Frazier, 1999). Mental retardation has traditionally been classified into four levels characterized as mild, moderate, severe, or profound. **Table 9.2** lists the IQ range for each level and the typical behavioral and educational characteristics of individuals at each level.

As **Figure 9.10** (on the next page) shows, the vast majority of retarded people fall in the *mildly retarded* category. Only about 15% of retarded people exhibit the obvious mental deficiencies that most people envision when they think of retardation. Many mildly retarded individuals are not all that easily distinguished from the rest of the population. The mental deficiency of children in the mildly retarded category often is not noticed until they have been in school a few years. Outside of school, many are considered normal. Furthermore, as many as two-thirds of these children manage to shed the label of retardation when they reach adulthood and leave the educational system (Popper et al., 2003). A significant portion of

PREVIEW QUESTIONS

- What are the different levels of retardation, and how common are they?
- How often is retardation attributable to a known biological cause?
- How are children typically selected for gifted programs?
- Are most gifted children lonely and maladjusted?
- Do most gifted children achieve eminence as adults?
- Which contributes more to extraordinary achievement: innate talent or hard work?

Web Link 9.4



The ARC
The ARC is a "national organization of and for people with mental retardation and related developmental disabilities and their families." Materials available here include overviews of the causes of mental retardation, education and employment of the mentally retarded, and the rights of mentally retarded individuals, among many other issues.

Table 9.2 Categories of Mental Retardation

Category of Retardation	IQ Range	Education Possible	Life Adaptation Possible
Mild	51–70	Sixth grade (maximum) by late teens; special education helpful	Can be self-supporting in nearly normal fashion if environment is stable and supportive; may need help with stress
Moderate	36–50	Second to fourth grade by late teens; special education necessary	Can be semi-independent in sheltered environment; needs help with even mild stress
Severe	20–35	Limited speech, toilet habits, and so forth with systematic training	Can help contribute to self-support under total supervision
Profound	below 20	Little or no speech; not toilet-trained; relatively unresponsive to training	Requires total care

Note: As explained in the text, diagnoses of retardation should not be made on the basis of IQ scores alone.

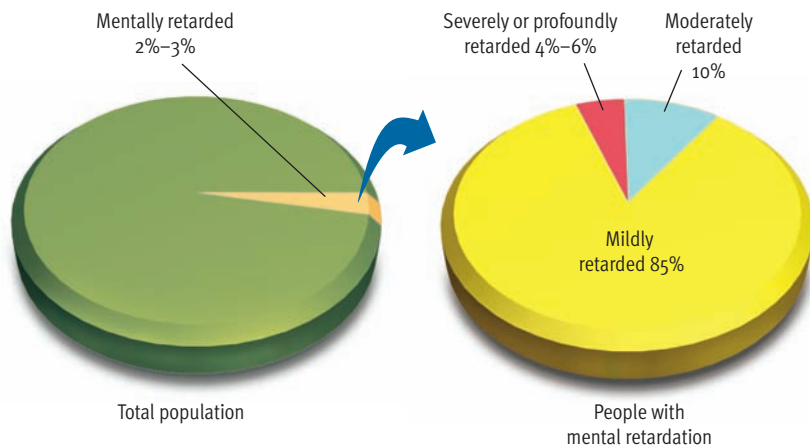


Figure 9.10

The prevalence and severity of mental retardation. The overall prevalence of mental retardation is 2%–3% of the school-age general population. The vast majority (85%) of the retarded population falls in the mildly retarded category (IQ: 51–70). Only about 15% of the retarded population falls into the subcategories of moderate, severe, or profound retardation.

them become self-supporting and are integrated into the community.

Origins of Retardation

Many organic conditions can cause mental retardation (Szymanski & Wilska, 2003). For example, *Down syndrome* is a condition marked by distinctive physical characteristics (such as slanted eyes, stubby limbs, and thin hair) that is associated with mild to severe retardation. Most children exhibiting this syndrome carry an extra chromosome. *Phenylketonuria* is a metabolic disorder (due to an inherited enzyme deficiency)

that can lead to retardation if it is not caught and treated in infancy. In *hydrocephaly*, an excessive accumulation of cerebrospinal fluid in the skull destroys brain tissue and causes retardation. Although over 350 such organic syndromes are known to cause retardation (King, Hodapp, & Dykens, 2000), diagnosticians are only able to pin down an organic cause for retardation in fewer than 25% of cases (Popper & West, 1999). However, this percentage appears to be increasing as scientists unravel more of the genetic bases for various kinds of disorders (Castellvi-Bel & Mila, 2001; Simonoff, Bolton, & Rutter, 1998).

The cases of unknown origin tend to involve milder forms of retardation. A number of theories have attempted to identify the factors that underlie retardation in the absence of a known organic pathology (Hodapp, 1994). Some theorists believe that subtle, difficult-to-detect physiological defects contribute to many of these cases. However, others believe the majority of cases are caused by a variety of unfavorable environmental factors. Consistent with this hypothesis, the vast majority of mildly retarded children come from the lower socioeconomic classes (see **Figure 9.11**), where a number of factors—such as greater marital instability and parental neglect, inadequate nutrition and medical care, and lower-quality schooling—may contribute to children’s poor intellectual development (Popper et al., 2003).

Giftedness

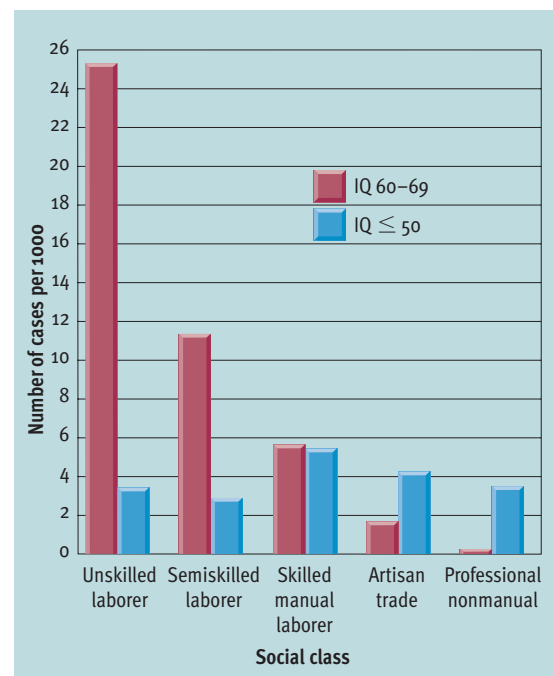
Like mental retardation, giftedness is widely misunderstood. This misunderstanding is a result, in part, of television and movies inaccurately portraying gifted children as social misfits and “nerds.”

Identifying Gifted Children

Definitions of giftedness vary considerably (Cramond, 2004), and some curious discrepancies exist between ideals and practice in how gifted children are identified. The experts who shape government policy consistently assert that giftedness should not be equated with high intelligence, and they recommend that schools not rely too heavily on IQ tests to select gifted children (Gallagher & Courtright, 1986; Robinson & Clinkenbeard, 1998). In practice, however, efforts to identify gifted children focus almost exclusively on IQ scores and rarely consider qualities such as creativity, leadership, or special talent (Callahan, 2000). Most school districts consider children who fall in the upper 2%–3% of the IQ distribution to be gifted. Thus, the minimum IQ score for gifted programs usually falls somewhere around 130. The types of school programs and services available to gifted students

Figure 9.11

Social class and mental retardation. This graph charts the prevalence of mild retardation (IQ 60 to 69) and more severe forms of retardation (IQ below 50) in relation to social class. Severe forms of retardation are distributed pretty evenly across the social classes, a finding that is consistent with the notion that they are the product of biological aberrations that are equally likely to strike anyone. In contrast, the prevalence of mild retardation is greatly elevated in the lower social classes, a finding that meshes with the notion that mild retardation is largely a product of unfavorable environmental factors. (Data from Popper and Steingard, 1994)



vary enormously from one school district to the next (Olszewski-Kubilius, 2003).

Personal Qualities of the Gifted

Gifted children have long been stereotyped as weak, sickly, socially inept “bookworms” who are often emotionally troubled. The empirical evidence *largely* contradicts this view. The best evidence comes from a major longitudinal study of gifted children begun by Lewis Terman in 1921 (Terman, 1925; Terman & Oden, 1959). Other investigators have continued to study Terman’s subjects through the present (Cronbach, 1992; Holahan & Sears, 1995). This project represents psychology’s longest-running study.

Terman’s original subject pool consisted of around 1500 youngsters who had an average IQ of 150. In comparison to normal subjects, Terman’s gifted children were found to be above average in height, weight, strength, physical health, emotional adjustment, mental health, and social maturity. As a group, Terman’s subjects continued to exhibit better-than-average physical health, emotional stability, and social satisfaction throughout their adult years. A variety of other studies have also found that samples of high-IQ children are either average or above average in social and emotional development (Garland & Zigler, 1999; Robinson & Clinkenbeard, 1998).

However, some other lines of research raise some questions about this conclusion. For instance, Ellen Winner (1997, 1998) asserts that moderately gifted children (those with an IQ of 130–150) are very different from profoundly gifted children (those with an IQ above 180). She asserts that profoundly gifted children are often introverted and socially isolated. She also estimates that the incidence of interpersonal and emotional problems in this group is about twice as high as in other children. Another line of research, which is discussed in more detail in the Personal Application, has focused on samples of people who have displayed truly exceptional creative achievement. Contrary to the findings of the Terman study, investigators have found elevated rates of mental illness in these samples (Andreasen, 1996; Ludwig, 1995). Thus, the psychosocial adjustment of gifted individuals may depend in part on their level of giftedness.

Giftedness and Achievement in Life

Terman’s gifted children grew up to be very successful by conventional standards. By midlife they had produced 92 books, 235 patents, and nearly 2200 scientific articles. Although Terman’s gifted children accomplished a great deal, no one in the group achieved recognition for genius-level contributions. In retrospect, this finding may not be surprising. The concept

of giftedness is applied to two very different groups. One consists of high-IQ children who are the cream of the crop in school. The other consists of eminent adults who make enduring contributions in their fields. According to Ellen Winner (2000), a sizable gap exists between these two groups. Joseph Renzulli (1986, 1999, 2002) theorizes that this rarer form of giftedness depends on the intersection of three factors: high intelligence, high creativity, and high motivation (see **Figure 9.12**). He emphasizes that high intelligence alone does not usually foster genuine greatness. Thus, the vast majority of children selected for gifted school programs do not achieve eminence as adults or make genius-like contributions to society (Callahan, 2000; Richert, 1997; Winner, 2003).

Another hot issue in the study of giftedness concerns the degree to which extraordinary achievement depends on innate talent as opposed to intensive training and hard work. In recent years, the emphasis has been on what Simonton (2001) calls the “drudge theory” of exceptional achievement. According to this view, eminence primarily or entirely depends on dogged determination; endless, tedious practice; and outstanding mentoring and training (Bloom, 1985; Ericsson & Lehman, 1996; Howe, 1999). This conclusion is based on studies of eminent scientists, artists, writers, musicians, and athletes, which show that they push themselves much harder and engage in far more deliberate practice than their less successful counterparts. The essence of the drudge theory is captured by the reaction of one violin virtuoso after a critic hailed him as a genius: “A genius! For 37 years I’ve practiced 14 hours a day, and now they call me a genius!” (quoted in Simonton, 1999b). Although the evidence linking strenuous training and prodigious effort to world-class achievement is convincing, Winner (2000) points out that obsessive hard work and inborn ability may be confounded in retrospective analyses of eminent individuals. The youngsters who work the hardest may be those with the greatest in-



ELLEN WINNER

“Moderately gifted children are very different from profoundly gifted children. . . . Most gifted children do not grow into eminent adults.”

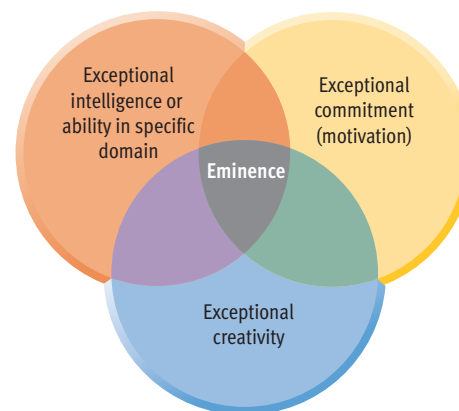
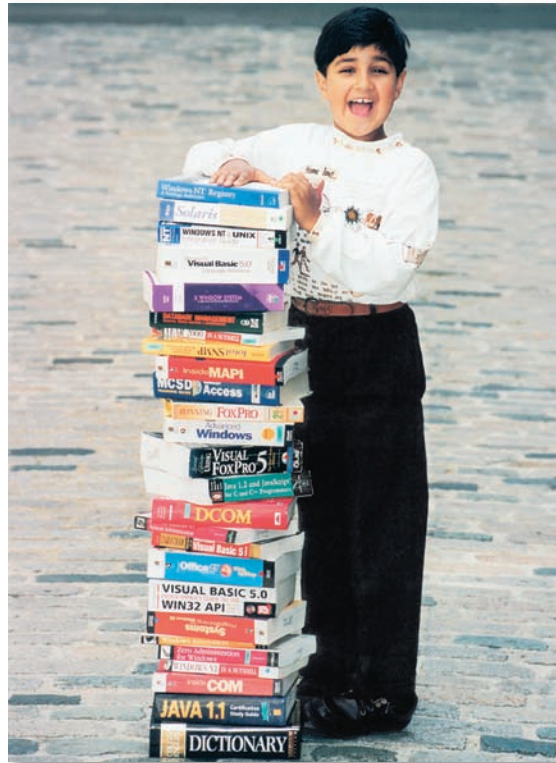


Figure 9.12
A three-ring conception of eminent giftedness.
According to Renzulli (1986), high intelligence is only one of three requirements for achieving eminence. He proposes that a combination of exceptional ability, creativity, and motivation leads some people to make enduring contributions in their fields.

Source: Adapted from Renzulli, J. S. (1986). The three-ring conception of giftedness: A developmental model for creative productivity. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of Giftedness* (pp. 53–92). New York: Cambridge University Press. Copyright © 1986 Cambridge University Press. Adapted by permission.

Young Nirav Gathani made exam history in England when he became the youngest student to pass the General Certificate of Secondary Education at age 7. As amazing as this feat was, it is hard to say whether Nirav will go on to achieve eminence, which typically requires a combination of exceptional intelligence, motivation, and creativity.



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nate talent, who are likely to find their efforts more rewarding than others. In other words, innate ability may be the key factor fostering the single-minded commitment that seems to be crucial to greatness. Simonton (1999b) has devised an elaborate theory of talent development that allocates a significant

role to both innate ability and a host of supportive environmental factors. In sum, recent research has clearly demonstrated that quality training, monumental effort, and perseverance are crucial factors in greatness, but many experts on giftedness maintain that extraordinary achievement also requires rare, innate talent.

➤ REVIEW OF KEY POINTS

- IQ scores below 70–75 are usually diagnostic of mental retardation, but these diagnoses should not be based solely on test results, as adaptive behavior should also be evaluated carefully. Four levels of retardation have been distinguished. The vast majority of retarded people are mildly retarded.
- Although over 350 biological conditions can cause retardation, biological causes can be pinpointed in only a minority of cases. Research suggests that cases of unknown origin are mostly caused by unfavorable environmental factors, such as poverty, neglect, and poor nutrition.
- Children who obtain IQ scores above 130 may be viewed as gifted, but cutoffs for accelerated programs vary, and schools rely too much on IQ scores. Research by Terman showed that gifted children tend to be socially mature and well adjusted. However, Winner has expressed some concerns about the adjustment of profoundly gifted individuals.
- Gifted youngsters typically go on to be very successful in life. However, most do not make genius-level contributions because such achievements depend on a combination of high intelligence, creativity, and motivation. Research suggests that intensive training and hard work are crucial to achieving eminence, but many theorists are reluctant to dismiss the importance of innate talent.

➤ Heredity and Environment as Determinants of Intelligence

PREVIEW QUESTIONS

- What types of evidence suggest that intelligence is inherited?
- What is heritability, and what are some limitations of heritability estimates?
- How has research demonstrated that environment influences IQ?
- How is the concept of reaction range used to explain the interaction of heredity and environment?
- What are some explanations for cultural differences in average IQ scores?

Most early pioneers of intelligence testing maintained that intelligence is inherited (Cravens, 1992). Small wonder, then, that this view lingers on among many people. Gradually, however, it has become clear that both heredity and environment influence intelligence (Bartels et al., 2002; Plomin, 2003; Scarr, 1997). Does this mean that the nature versus nurture debate has been settled with respect to intelligence? Absolutely not. Theorists and researchers continue to argue *vigorously* about which of the two is more important, in part because the issue has such far-reaching sociopolitical implications.

Theorists who believe that intelligence is largely inherited downplay the value of special educational programs for underprivileged groups (Herrnstein & Murray, 1994; Rushton & Jensen, 2005). They assert that a child's intelligence cannot be increased noticeably, because a child's genetic destiny cannot be altered. Other theorists take issue with this argument,

pointing out that traits with a strong genetic component are not necessarily unchangeable (Sternberg, Grigorenko, & Kidd, 2005; Wahlsten, 1997). The people in this camp tend to maintain that even more funds should be allocated for remedial education programs, improved schooling in lower-class neighborhoods, and college financial aid for the underprivileged. Because the debate over the role of heredity in intelligence has direct relevance to important social issues and political decisions, we'll take a detailed look at this complex controversy.

Evidence for Hereditary Influence



Galton's observation that intelligence runs in families was quite accurate. However, *family studies* can determine only whether genetic influence on a trait is

plausible, not whether it is certain (see Chapter 3). Family members share not just genes, but similar environments. If high intelligence appears in a family over generations, this consistency could reflect the influence of either shared genes or shared environment. Because of this problem, researchers must turn to *twin studies* and *adoption studies* to obtain more definitive evidence on whether heredity affects intelligence.

Twin Studies



The best evidence regarding the role of genetic factors in intelligence comes from studies that compare identical and fraternal twins. The rationale for twin studies is that both identical and fraternal twins normally develop under similar environmental conditions. However, identical twins share more genetic kinship than fraternal twins. Hence, if pairs of identical twins are more similar in intelligence than pairs of fraternal twins, it's presumably because of their greater genetic similarity. (See Chapter 3 for a more detailed explanation of the logic underlying twin studies.)

What are the findings of twin studies regarding intelligence? The data from over 100 studies of intellectual similarity for various kinds of kinship relations and child-rearing arrangements are summarized in **Figure 9.13**. This figure plots the average correlation observed for various types of relationships. As you can see, the average correlation reported for identical twins (.86) is very high, indicating that identical twins

tend to be quite similar in intelligence. The average correlation for fraternal twins (.60) is significantly lower. This correlation indicates that fraternal twins also tend to be similar in intelligence, but noticeably less so than identical twins. These results support the notion that IQ is inherited to a considerable degree (Bouchard, 1998; Plomin & Spinath, 2004).

Of course, critics have tried to poke holes in this line of reasoning. They argue that identical twins are more alike in IQ because parents and others treat them more similarly than they treat fraternal twins. This environmental explanation of the findings has some merit. After all, identical twins are always the same sex, and gender influences how a child is raised. However, this explanation seems unlikely in light of the evidence on identical twins reared apart because of family breakups or adoption (Bouchard, 1997; Bouchard et al., 1990). *Although reared in different environments, these identical twins still display greater similarity in IQ (average correlation: .72) than fraternal twins reared together (average correlation: .60)*. Moreover, the gap in IQ similarity between identical twins and fraternal twins appears to widen in adulthood, suggesting paradoxically that the influence of heredity increases with age (Plomin & Spinath, 2004).

Adoption Studies



Research on adopted children also provides evidence about the effects of heredity (and of environment, as

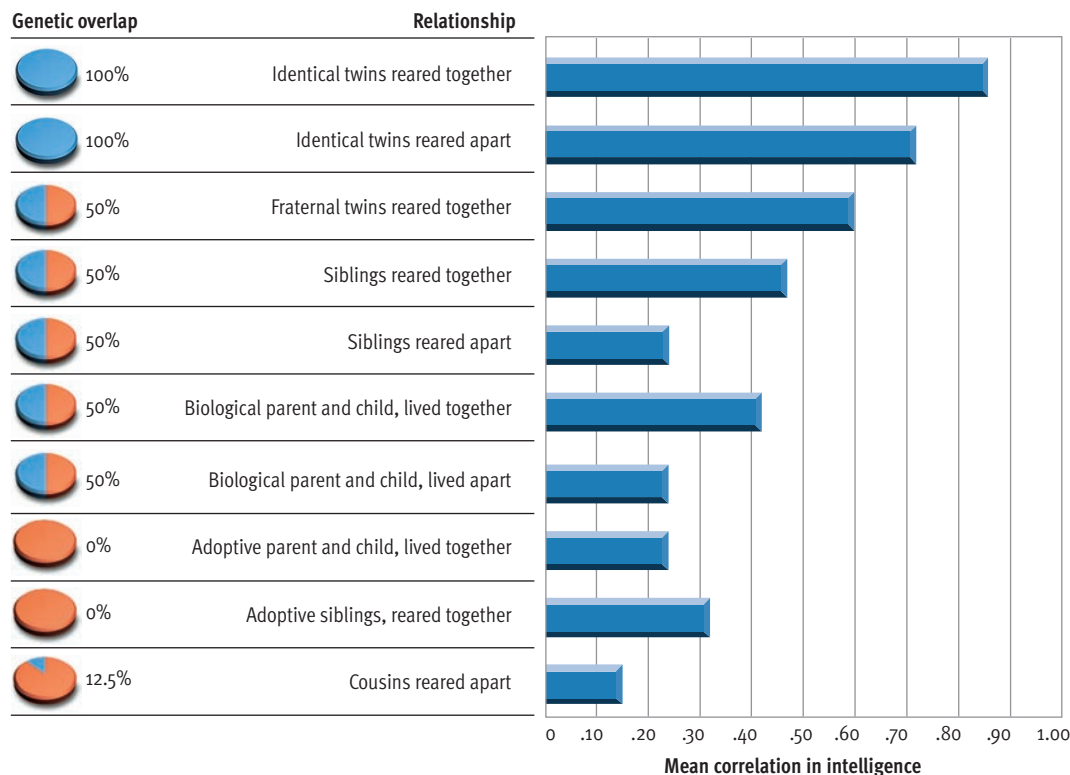


Figure 9.13

Studies of IQ similarity. The graph shows the mean correlations of IQ scores for people of various types of relationships, as obtained in studies of IQ similarity. Higher correlations indicate greater similarity. The results show that greater genetic similarity is associated with greater similarity in IQ, suggesting that intelligence is partly inherited (compare, for example, the correlations for identical and fraternal twins). However, the results also show that living together is associated with greater IQ similarity, suggesting that intelligence is partly governed by environment (compare, for example, the scores of siblings reared together and reared apart). (Data from McGue et al., 1993; Plomin & Spinath, 2004)

we shall see). If adopted children resemble their biological parents in intelligence even though they were not reared by these parents, this finding supports the genetic hypothesis. The relevant studies indicate that there is indeed more than chance similarity between adopted children and their biological parents (Plomin et al., 2001; refer again to **Figure 9.13**).

Heritability Estimates

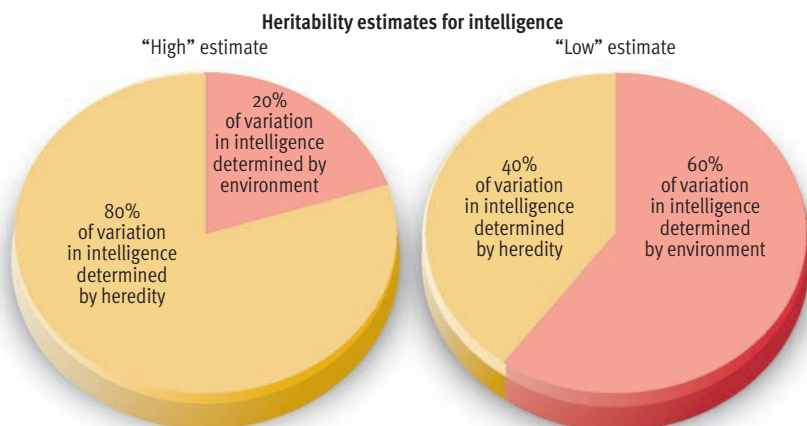


Experts have sifted through mountains of correlational evidence to estimate the *heritability* of intelligence. A **heritability ratio is an estimate of the proportion of trait variability in a population that is determined by variations in genetic inheritance**. Heritability can be estimated for any trait. For example, the heritability of height is estimated to be around 90% (Plomin, 1994). Heritability can be estimated in a variety of ways that appear logically and mathematically defensible (Grigorenko, 2000; Loehlin, 1994). Given the variety of methods available and the strong views that experts bring to the IQ debate, it should come as no surprise that heritability estimates for intelligence vary considerably (see **Figure 9.14**).

At the high end, some theorists estimate that the heritability of IQ ranges as high as 80% (Bouchard, 2004; Jensen, 1980, 1998). That is, they believe that only about 20% of the variation in intelligence is attributable to environmental factors. Estimates at the low end of the spectrum suggest that the heritability of intelligence is around 40% (Plomin, 2003). *In recent years, the consensus estimates of the experts tend to hover around 50%* (Petrill, 2005; Plomin & Spinath, 2004).

Figure 9.14

The concept of heritability. A heritability ratio is an estimate of the portion of trait variation in a population determined by heredity—with the remainder presumably determined by environment—as these pie charts illustrate. Typical heritability estimates for intelligence range between a high of 80% and a low of 40%. In recent years, the consensus of the experts seems to hover around 50%. Bear in mind that heritability ratios are *estimates* and have certain limitations that are discussed in the text.



However, it's important to understand that heritability estimates have certain limitations (Ceci et al., 1997; Grigorenko, 2000; Reeve & Hakel, 2002). First, a heritability estimate is a *group statistic* based on studies of trait variability within a specific group. A heritability estimate cannot be applied meaningfully to *individuals*. In other words, even if the heritability of intelligence were 70%, it would *not* mean that each individual's intelligence was 70% inherited. Second, a specific trait's *heritability may vary from one group to another* depending on a variety of factors. For instance, in a group with a given gene pool, heritability will decrease if a shift occurs toward rearing youngsters in more diverse circumstances. Why? Because environmental variability will be increased. Third, it is crucial to understand that “there really is no single fixed value that represents any true, constant value for the heritability of IQ or anything else” (Sternberg et al., 2005, p. 53). Heritability ratios are merely sample-specific estimates.

Evidence for Environmental Influence



Heredity unquestionably influences intelligence, but a great deal of evidence indicates that upbringing also affects mental ability. In this section, we'll examine various approaches to research that show how life experiences shape intelligence.

Adoption Studies



Research with adopted children provides useful evidence about the impact of experience as well as heredity (Dickens & Flynn, 2001; Locurto, 1990; Loehlin, Horn, & Willerman, 1997). Many of the correlations in **Figure 9.13** reflect the influence of the environment. For example, adopted children show some resemblance to their foster parents in IQ. This similarity is usually attributed to the fact that their foster parents shape their environment. Adoption studies also indicate that siblings reared together are more similar in IQ than siblings reared apart. This is true even for identical twins who have the same genetic endowment. Moreover, entirely unrelated children who are raised in the same home also show a significant resemblance in IQ. All of these findings indicate that environment influences intelligence.

Environmental Deprivation and Enrichment

If environment affects intelligence, children who are raised in substandard circumstances should experience a gradual decline in IQ as they grow older (since other children will be progressing more rapidly).

This *cumulative deprivation hypothesis* was tested decades ago. Researchers studied children consigned to understaffed orphanages and children raised in the poverty and isolation of the back hills of Appalachia (Sherman & Key, 1932; Stoddard, 1943). Generally, investigators *did* find that environmental deprivation led to the predicted erosion in IQ scores.

Conversely, children who are removed from a deprived environment and placed in circumstances more conducive to learning should benefit from their environmental enrichment. Their IQ scores should gradually increase. This hypothesis has been tested by studying children who have been moved from disadvantaged homes into middle- and upper-class adoptive homes (Scarr & Weinberg, 1977, 1983; Schiff & Lewontin, 1986; Skodak & Skeels, 1947). Although there are limits on the improvements seen, the IQs of these children tend to increase noticeably (typically 10–12 points). These findings also show that environment influences IQ.

Generational Changes: The Flynn Effect

The most interesting, albeit perplexing, evidence showcasing the importance of the environment is the finding that performance on IQ tests has steadily increased over generations. This trend was not widely appreciated until recently because the tests are renormed periodically with new standardization groups, so that the mean IQ always remains at 100. However, in a study of the IQ tests used by the U.S. military, James Flynn noticed that the level of performance required to earn a score of 100 jumped upward every time the tests were renormed. Curious about this unexpected finding, he eventually gathered extensive data from 20 nations and demonstrated that IQ performance has been rising steadily all over the industrialized world since the 1930s (Flynn, 1987, 1994, 1999, 2003). Thus, the performance that today would earn you an average score of 100 would have earned you an IQ score of about 120 back in the 1930s (see **Figure 9.15**). Researchers who study intelligence are now scrambling to explain this trend, which has been dubbed the “Flynn effect.” About the only thing they mostly agree on is that the Flynn effect has to be attributed to environmental factors, as the modern world’s gene pool could not have changed overnight (in evolutionary terms, 70 years is more like a fraction of a second) (Dickens & Flynn, 2001; Neisser, 1998; Sternberg et al., 2005).

At this point, the proposed explanations for the Flynn effect are conjectural, but it is worth reviewing some of them, as they highlight the diversity of environmental factors that may shape IQ performance. Some theorists attribute generational gains in IQ test performance to reductions in the prevalence of severe

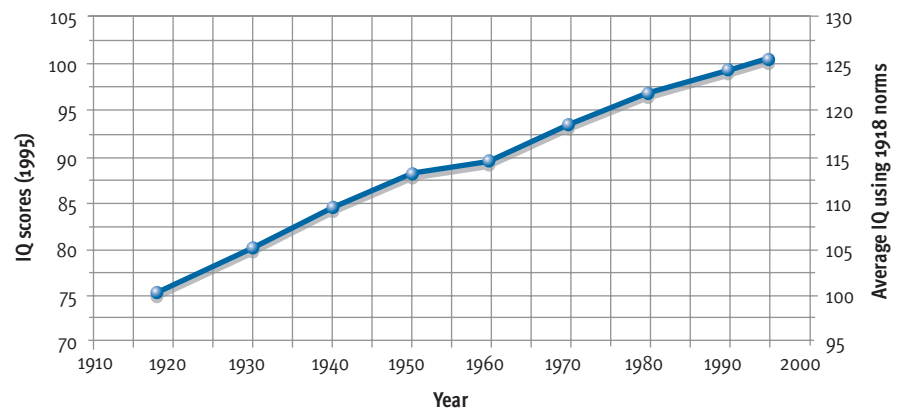


Figure 9.15

Generational increases in measured IQ. IQ tests are renormed periodically so that the mean score remains at 100. However, research by James Flynn (1998) has demonstrated that performance on IQ tests around the world has been increasing throughout most of the century. This graph traces the estimated increases in IQ in the United States from 1918 to 1995. In relation to the axis on the right, the graph shows how average IQ would have increased if IQ tests continued to use 1918 norms. In relation to the axis on the left, the graph shows how much lower the average IQ score would have been in earlier years if 1995 norms were used. The causes of the “Flynn effect” are unknown, but they have to involve environmental factors.

Source: Adapted from Horgan, J. (1995). Get smart, take a test. *Scientific American*, 273 (5), p. 14. Copyright © 1995 by Scientific American, Inc. Adapted by permission of the publisher and author.

malnutrition among children (Colom, Lluís-Font, & Andres-Pueyo, 2005; Sigman & Whaley, 1998). Others attribute the Flynn effect to increased access to schooling and more demanding curricula in schools over the course of the last century (Blair et al., 2005). Patricia Greenfield (1998) argues that advances in technology, including much maligned media such as television and video games, have enhanced visuospatial skills and other specific cognitive skills that contribute to performance on IQ tests. Wendy Williams (1998) discusses the importance of a constellation of factors, including improved schools, smaller families, better-educated parents, and higher-quality parenting. All of these speculations have some plausibility and are not mutually exclusive. Thus, the causes of the Flynn effect remain under investigation.

The Interaction of Heredity and Environment



Clearly, heredity and environment both influence intelligence to a significant degree. And their effects involve intricate, dynamic, reciprocal interactions (Dickens & Flynn, 2001; Grigerenko, 2000; Petrill, 2005). Genetic endowments influence the experiences that people are exposed to, and environments influence the degree to which genetic predispositions are realized. Indeed, many theorists now assert that the question of whether heredity or environment is more important ought to take a back seat to the question of *how they interact* to govern IQ.



SANDRA SCARR

"My research has been aimed at asking in what kind of environments genetic differences shine through and when do they remain hidden."

One prominent model of this interaction, perhaps championed most prominently by Sandra Scarr (1991), is that heredity may set certain limits on intelligence and that environmental factors determine where individuals fall within these limits (Bouchard, 1997; Weinberg, 1989). According to this idea, genetic makeup places an upper limit on a person's IQ that can't be exceeded even when environment is ideal. Heredity is also thought to place a lower limit on an individual's IQ, although extreme circumstances (for example, being locked in an attic until age 10) could drag a person's IQ beneath this boundary. Theorists use the term **reaction range** to refer to these genetically determined limits on IQ (or other traits).

According to the reaction-range model, children reared in high-quality environments that promote the development of intelligence should score near the top of their potential IQ range (see Figure 9.16). Children reared under less ideal circumstances should score lower in their reaction range. The concept of a reaction range can explain why high-IQ children sometimes come from poor environments. It can also explain why low-IQ children sometimes come from very good environments. Moreover, it can explain these apparent paradoxes without discounting the role that environment undeniably plays.

Scientists hope to achieve a more precise understanding of how heredity and environment interactively govern intelligence by identifying the specific genes that influence general mental ability. Advances in molecular genetics, including the mapping of the human genome, are allowing researchers to search for individual genes that are associated with measures of intelligence (Plomin, 2003). This new line of research is both exciting and promising, although progress has been slower than expected. The prob-

lem is that intelligence may be influenced by several hundred specific genes, each of which may have a small effect that is extremely difficult to detect with current technologies (Petrill, 2005). However, researchers in this area hope to achieve breakthroughs as the technology of molecular genetics gradually becomes more powerful (Butcher et al., 2005).

Cultural Differences in IQ Scores

The age-old nature versus nurture debate lies at the core of the current controversy about ethnic differences in average IQ. Although the full range of IQ scores is seen in all ethnic groups, the average IQ for many of the larger minority groups in the United States (such as African Americans, Native Americans, and Hispanics) is somewhat lower than the average for whites. The disparity ranges from 3 to 15 points, depending on the group tested and the IQ scale used (Loehlin, 2000; Nisbett, 2005; Perlman & Kaufman, 1990; Suzuki & Vraniak, 1994). There is little argument about the existence of these group differences, variously referred to as racial, ethnic, or cultural differences in intelligence. The controversy concerns *why* the differences are found. A vigorous debate continues as to whether cultural differences in intelligence are mainly attributable to the influence of heredity or of environment.

Heritability as an Explanation

In 1969 Arthur Jensen sparked a heated war of words by arguing that racial differences in average IQ are largely the result of heredity. The cornerstone for Jensen's argument was his analysis suggesting that the

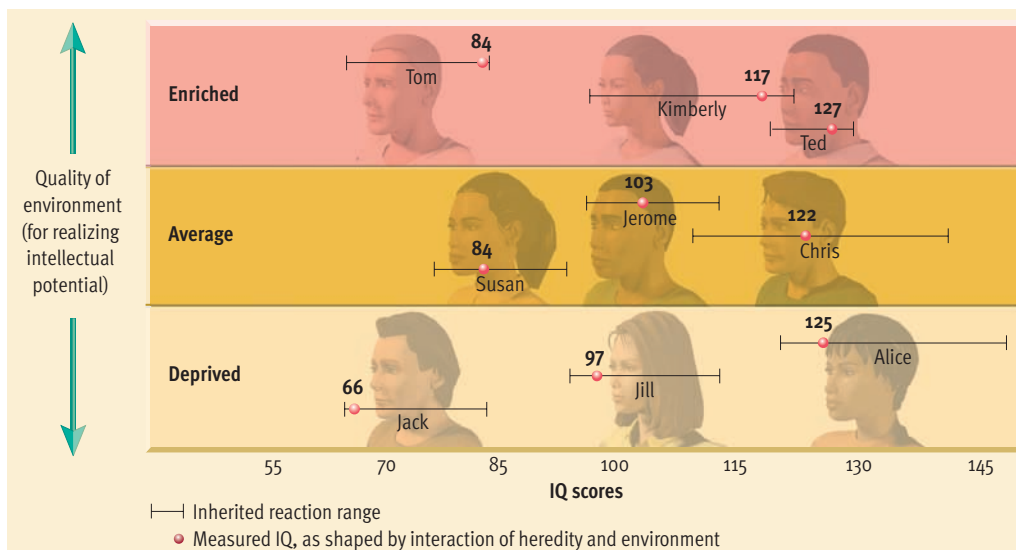


Figure 9.16

Reaction range. The concept of reaction range posits that heredity sets limits on one's intellectual potential (represented by the horizontal bars), while the quality of one's environment influences where one scores within this range (represented by the dots on the bars). People raised in enriched environments should score near the top of their reaction range, whereas people raised in poor-quality environments should score near the bottom of their range. Genetic limits on IQ can be inferred only indirectly, so theorists aren't sure whether reaction ranges are narrow (like Ted's) or wide (like Chris's). The concept of reaction range can explain how two people with similar genetic potential can be quite different in intelligence (compare Tom and Jack) and how two people reared in environments of similar quality can score quite differently (compare Alice and Jack).



Understanding Correlational Evidence on the Heredity-Environment Question

Check your understanding of how correlational findings relate to the nature versus nurture issue by indicating how you would interpret the meaning of each “piece” of evidence described below. The numbers inside the parentheses are the mean IQ correlations observed for the relationships described (based on McGue et al., 1993), which are shown in **Figure 9.13** (on page 353). In the spaces on the left, enter the letter H if the findings suggest that intelligence is shaped by heredity, enter the letter E if the findings suggest that intelligence is shaped by the environment, and enter the letter B if the findings suggest that intelligence is shaped by both (or either) heredity and environment. The answers can be found in Appendix A.

- _____ 1. Identical twins reared apart are more similar (.72) than fraternal twins reared together (.60).
- _____ 2. Identical twins reared together are more similar (.86) than identical twins reared apart (.72).
- _____ 3. Siblings reared together are more similar (.47) than siblings reared apart (.24).
- _____ 4. Biological parents and the children they rear are more similar (.42) than unrelated persons who are reared apart (no correlation if sampled randomly).
- _____ 5. Adopted children show similarity to their biological parents (.24) and to their adoptive parents (.24).

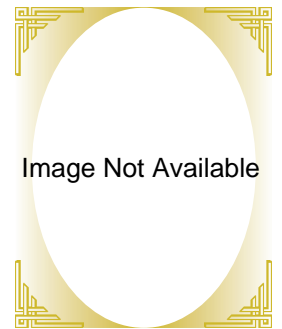
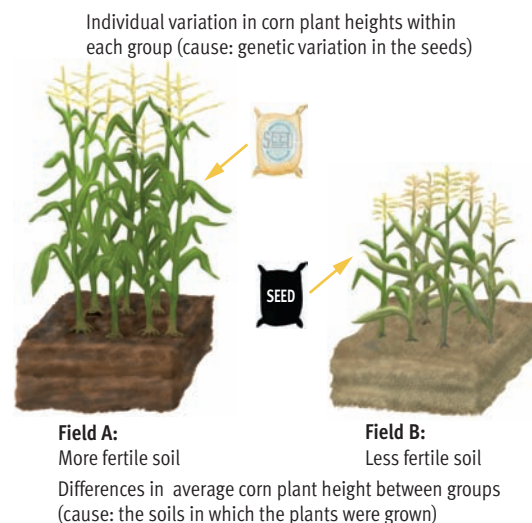
heritability of intelligence is about 80%. Essentially, he asserted that (1) intelligence is largely genetic in origin, and (2) therefore, genetic factors are “strongly implicated” as the cause of ethnic differences in intelligence. Jensen’s article triggered outrage and bitter criticism in many quarters, as well as a great deal of additional research on the determinants of intelligence. Twenty-five years later, Richard Herrnstein and Charles Murray (1994) reignited the same controversy with the publication of their widely discussed book *The Bell Curve*. They argued that ethnic differences in average intelligence are substantial, not easily reduced, and at least partly genetic in origin. The implicit message throughout *The Bell Curve* was that disadvantaged groups cannot avoid their fate because it is their genetic destiny. And as recently as 2005, based on an extensive review of statistical evidence, J. Phillippe Rushton and Arthur Jensen argued that genetic factors account for about half of the gap between races in average IQ, a conclusion that was echoed by Linda Gottfredson (2005).

As you might guess, these analyses and conclusions have elicited many lengthy and elaborate rebuttals. Critics argue that heritability explanations for ethnic differences in IQ have a variety of flaws and weaknesses (Devlin et al., 2002; Horn, 2002; Brody, 2003; Nisbett, 2005; Sternberg, 2003b, 2005). For example, recent research suggests that the heritability of intelligence may be notably lower in samples drawn from the lower socioeconomic classes as opposed to higher socioeconomic classes (Turkheimer et al., 2003). However, heritability estimates for intelligence have largely been based on samples drawn from white, middle-class, North American and European popula-

tions (Grigorenko, 2000). Hence, there is doubt about the validity of applying these heritability estimates to other cultural groups.

Moreover, even if one accepts the assumption that the heritability of IQ is very high, it does not follow logically that differences *between groups* must be due largely to heredity. Leon Kamin has presented a compelling analogy that highlights the logical fallacy in this reasoning (see **Figure 9.17**):

We fill a white sack and a black sack with a mixture of different genetic varieties of corn seed. We make certain that the proportions of each variety of seed are identical in each sack. We then plant the seed from the white sack in fertile Field A, while that from the black sack is planted in barren Field B. We will observe that within Field A, as within Field B, there is considerable variation in the



ARTHUR JENSEN

“Despite more than half a century of repeated efforts by psychologists to improve the intelligence of children, particularly those in the lower quarter of the IQ distribution relative to those in the upper half of the distribution, strong evidence is still lacking as to whether or not it can be done.”

Figure 9.17
Genetics and between-group differences on a trait. Leon Kamin’s analogy (see text) shows how between-group differences on a trait (the average height of corn plants) could be due to environment, even if the trait is largely inherited. The same reasoning can be applied to ethnic group differences in average intelligence.

Image Not Available

*"I don't know anything about the bell curve,
but I say heredity is everything."*

height of individual corn plants. This variation will be due largely to genetic factors (seed differences). We will also observe, however, that the average height of plants in Field A is greater than that in Field B. That difference will be entirely due to environmental factors (the soil). The same is true of IQs: differences in the average IQ of various human populations could be entirely due to environmental differences, even if within each population all variation were due to genetic differences! (Eysenck & Kamin, 1981, p. 97)

This analogy shows that even if *within-group differences* in IQ are highly heritable, *between-groups differences* in average IQ could still be caused *entirely* by environmental factors (Block, 2002). For decades, critics of Jensen's thesis have relied on this analogy rather than actual data to make the point that between-groups differences in IQ do not necessarily reflect genetic differences. They depended on the analogy because no relevant data were available. However, the recent discovery of the Flynn effect has provided compelling new data that are directly relevant (Dickens & Flynn, 2001; Flynn, 2003). Generational gains in IQ scores show that a between-groups disparity in average IQ (in this case the gap is between generations rather than ethnic groups) can be environmental in origin, even though intelligence is highly heritable.

Another problem raised by many theorists is that the concept of race is much fuzzier than generally believed (Helms, Jernigan, & Mascher, 2005; Smedley & Smedley, 2005). The notion that individuals can easily be sorted into a handful of discrete racial categories with distinct ancestries and gene pools makes intuitive sense to most people. However, scientific research has demonstrated that the boundaries between racial groupings are extremely porous and characterized by huge genetic overlap (Cooper, 2005). For example, Puerto Ricans, on average, have an ancestry that is 37% African, 45% European, and 18% Native American, whereas Mexican Americans' average ancestry is 8% African, 61% European, and 18%

Native American (Shields et al., 2005). Thus, theorists argue that race is a *social concept* based on perceived differences in appearance rather than a *biological concept* based on clear disparities in genetic makeup (Sternberg et al., 2005). This analysis does not mean that the concept of race is meaningless, but it does pose problems for heritability explanations of ethnic differences in IQ.

The available evidence certainly does not allow us to rule out the possibility that ethnic and cultural disparities in average intelligence are partly genetic. And the hypothesis should not be dismissed without study simply because many people find it offensive or distasteful. However, there are several alternative explanations for the culture gap in intelligence that seem more plausible. Let's look at them.

Socioeconomic Disadvantage as an Explanation

Some theorists have approached the issue by trying to show that socioeconomic disadvantages are the main cause of ethnic differences in average IQ. Many social scientists argue that minority students' IQ scores are depressed because these children tend to grow up in deprived environments that create a disadvantage—both in school and on IQ tests. Obviously, living circumstances vary greatly within ethnic groups, but there is no question that, on the average, whites and minorities tend to be raised in different circumstances. Most minority groups have endured a long history of economic discrimination and are greatly overrepresented in the lower social classes. A lower-class upbringing tends to carry a number of disadvantages that work against the development of a youngster's full intellectual potential (Evans, 2004; Lareau, 2003; Lott, 2002; McLoyd, 1998; Seifer, 2001). In comparison to the middle and upper classes, lower-class children are more likely to come from large families and from single-parent homes, factors that may often limit the parental attention they receive. Lower-class children also tend to be exposed to fewer books, to have fewer learning supplies, to have less privacy for concentrated study, and to get less parental assistance in learning. Typically, they also have poorer role models for language development, experience less pressure to work hard on intellectual pursuits, and attend poorer-quality schools that are underfunded and understaffed. Many of these children grow up in crime-, drug-, and gang-infested neighborhoods where it is far more important to develop street intelligence than school intelligence. Some theorists also argue that children in the lower classes are more likely to suffer from malnutrition or to be exposed to environmental toxins (Brody, 1992). Either of these circumstances could interfere with young-

Web Link 9.5



Upstream-Issues: The Bell Curve

The editors of *Upstream*, champions of "politically incorrect" conversation, have assembled perhaps the broadest collection of commentaries on the Net regarding Herrnstein and Murray's *The Bell Curve*. Despite the marked political conservatism of this site, it contains a full range of opinion and analyses of the book.

sters' intellectual development (Bellinger & Adams, 2001; Grantham-McGregor, Ani, & Fernald, 2001).

In light of these disadvantages, it's not surprising that average IQ scores among children from lower social classes tend to run about 15 points below the average scores obtained by children from middle- and upper-class homes (Seifer, 2001; Williams & Ceci, 1997). This is the case even if race is factored out of the picture by studying whites exclusively. Admittedly, there is room for argument about the direction of the causal relationships underlying this association between social class and intelligence (Turkheimer, 1994). Nonetheless, given the overrepresentation of minorities in the lower classes, many researchers argue that ethnic differences in intelligence are really social class differences in disguise.

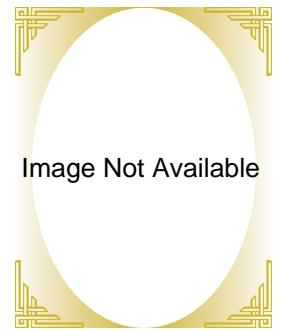
Stereotype Vulnerability as an Explanation

Socioeconomic disadvantages probably are a major factor in various minority groups' poor performance on IQ tests, but some theorists maintain that other factors and processes are also at work. For example, Claude Steele (1992, 1997), a social psychologist at Stanford University, has argued that derogatory stereotypes of stigmatized groups' intellectual capabilities create unique feelings of vulnerability in the educational arena. These feelings of *stereotype vulnerability* can undermine group members' performance on tests, as well as other measures of academic achievement.

Steele points out that demeaning stereotypes of stigmatized groups are widely disseminated, creating a subtle climate of prejudice, even in the absence of overt discrimination. He further notes that members of minority groups are keenly aware of any negative stereotypes that exist regarding their intellect. Hence,

when an African American or Hispanic American does poorly on a test, he or she must confront a disturbing possibility: *that others will attribute the failure to racial inferiority*. Steele maintains that females face the same problem when they venture into academic domains where stereotypes suggest that they are inferior to males, such as mathematics, engineering, and the physical sciences. That is, *they worry about people blaming their failures on their sex*. According to Steele, minorities and women in male-dominated fields are in a no-win situation. When they do well and contradict stereotypes, people tend to view their success with suspicion, but when they do poorly, people readily view their failure as vindication of the stereotypes.

Steele maintains that stigmatized groups' apprehension about "confirming" people's negative stereotypes can contribute to academic underachievement in at least two ways. First, it can undermine their emotional investment in academic work. As Steele notes, "Doing well in school requires a belief that school achievement can be a promising basis of self-esteem, and that belief needs constant reaffirmation even for advantaged students" (1992, p. 72). When this belief is relentlessly undercut instead of frequently reaffirmed, students tend to "disidentify" with school and write off academic pursuits as a source of self-worth. Their academic motivation declines and their performance suffers as a result. Second, standardized tests such as IQ tests may be especially anxiety arousing for members of stigmatized groups because the importance attributed to the tests makes one's stereotype vulnerability particularly salient. This anxiety may impair students' test performance by temporarily disrupting their cognitive functioning. How Steele tested his theory is the topic of our Featured Study.



CLAUDE STEELE

"I believe that in significant part the crisis in black Americans' education stems from the power of this vulnerability to undercut identification with schooling."

Racial Stereotypes and Test Performance

In this article, Steele and Aronson report on a series of four studies that tested various aspects of Steele's theory about the ramifications of stereotype vulnerability. We will examine their first study in some detail and then discuss the remaining studies more briefly. The purpose of the first study was to test the hypothesis that raising the threat of stereotype vulnerability would have a negative impact on African American students' performance on a mental ability test.

Method

Participants. The participants were 114 black and white undergraduates attending Stanford University who were recruited through campus advertisements. As expected, given Stanford's highly selective admissions, both groups

of students were well above average in academic ability, as evidenced by their mean scores on the verbal subtest of the SAT. The study compared black and white students with high and roughly equal ability and preparation (based on their SAT scores) to rule out cultural disadvantage as a factor.

Procedure. The participants were asked to take a challenging, 30-minute test of verbal ability composed of items from the verbal subtest of the Graduate Record Exam (GRE). In one condition, the issue of stereotype vulnerability was not made salient, as the test was presented to subjects as a device to permit the researchers to analyze problem-solving strategies (rather than as a measure of ability). In another condition, the specter of stereotype vulnerability was raised, as the test was presented

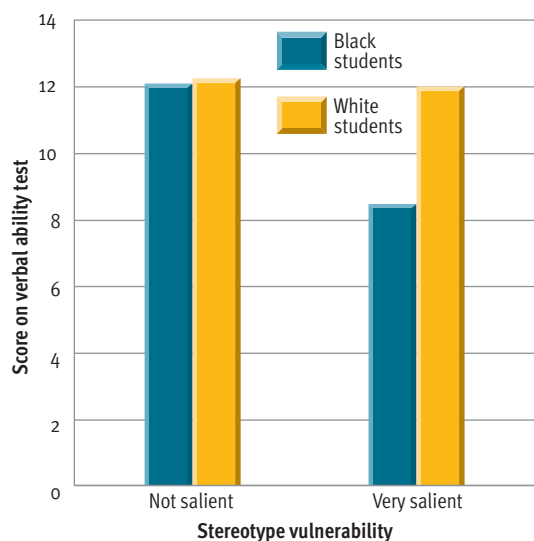
FEATURED Study

Source: Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69, 797–811.

Figure 9.18
Stereotype vulnerability and test performance.

Steele and Aronson (1995) compared the performance of African American and white students of equal ability on a 30-item verbal ability test constructed from difficult GRE questions. When the black students' stereotype vulnerability was not salient, their performance did not differ from that of the white students; but when the specter of stereotype vulnerability was raised, the African American students performed significantly worse than the white students.

Source: Adapted from Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69, 797–811. Copyright © 1995 by the American Psychological Association. Reprinted by permission of the publisher and author.



as an excellent index of one's general verbal ability. The principal dependent variable was subjects' performance on the verbal test.

Results

When the African American students' stereotype vulnerability was not made salient, the performance of the black and white students did not differ, as you can see in **Figure 9.18**. However, when the same test was presented in a way that increased blacks' stereotype vulnerability, the African American students scored significantly lower than their white counterparts (see **Figure 9.18**).

Discussion

Based on their initial study, the authors inferred that stereotype vulnerability does appear to impair minority group members' test performance. They went on to replicate their finding in a second study of 40 black and white female students. In a third study, they demonstrated that their manipulations of stereotype vulnerability were indeed activating thoughts about negative stereotypes, ability-related self-doubts, and performance apprehension in their African American participants. Their fourth study showed that stereotype vulnerability can be activated even when a test is not explicitly presented as an index of one's ability.

Comment

The potential negative effects of stereotype vulnerability have been replicated in numerous studies (Aronson et al., 1999; Croizet et al., 2004; Steele, Spencer, & Aronson, 2002). The concept of stereotype vulnerability has the potential to clear up some of the confusion surrounding the controversial issue of racial disparities in IQ scores. It seems likely that socioeconomic disadvantage makes a substantial contribution to cultural differences in average IQ, but various lines of evidence suggest that this factor cannot account for the culture gap by itself (Neisser et al., 1996). For years, many theorists have argued that test bias accounts for the rest of the culture gap, but as we will discuss momentarily, recent research suggests otherwise. Thus, Steele's groundbreaking research gives scientists an entirely new explanatory tool for understanding the vexing cultural disparities in average IQ.

Cultural Bias on IQ Tests as an Explanation

Some critics of IQ tests have argued that cultural differences in IQ scores are partly due to a cultural bias built into IQ tests. They argue that because IQ tests are constructed by white, middle-class psychologists, they naturally draw on experience and knowledge typical of white, middle-class lifestyles and use language and vocabulary that reflect the white, middle-class origins of their developers (Cohen, 2002; Fagan & Holland, 2002; Helms, 1992; Hilliard, 1984). Given these concerns, many testing experts assert that minority students' IQ scores should be interpreted with extra caution (Puente, 1990). However, the balance of evidence suggests that the cultural slant on IQ tests is modest to negligible. The charges of bias stimulated a great deal of research on the issue in the 1970s and 1980s. *As a whole, the accumulated evidence suggests that cultural bias produces only weak and inconsistent effects on the IQ scores of minority examinees* (Hunter & Schmidt, 2000; Reynolds, 2000; Reynolds & Ramsay, 2003). However, Suzuki and Valencia

(1997) express some caution about this conclusion, noting that the studies of test bias may use culturally biased criteria of academic success to evaluate the tests. They also assert that little research has been done on some widely used tests and with some minority populations.

Taken as a whole, the various alternative explanations for cultural and ethnic disparities in average IQ provide serious challenges to genetic explanations, which appear weak at best—and suspiciously racist at worst. Unfortunately, since the earliest days of IQ testing some people have used IQ tests to further elitist goals. The current controversy about ethnic differences in IQ is just another replay of a record that has been heard before. For instance, beginning in 1913, Henry Goddard tested a great many immigrants to the United States at Ellis Island in New York. Goddard reported that the vast majority of Italian, Hungarian, and Jewish immigrants tested out as *feeble-minded* (Kamin, 1974). As you can see, claims about ethnic deficits in intelligence are nothing new—only the victims have changed.

➤ REVIEW OF KEY POINTS

- The debate about the influence of heredity and environment on intelligence has important sociopolitical implications. Twin studies show that identical twins, even when raised apart, are more similar in IQ than fraternal twins, suggesting that intelligence is inherited. Adoption studies reveal that people resemble their parents in intelligence even when not raised by them. Estimates of the heritability of intelligence range from 40% to 80% with the consensus estimate hovering around 50%, but heritability ratios have certain limitations.
- Many lines of evidence, including adoption studies, studies of environmental deprivation and enrichment, and research on the Flynn effect indicate that environment is also an important determinant of intelligence. The concept of reaction range posits that heredity places limits on one's intellectual potential while the environment determines where one falls within these limits. Scientists are striving to identify the specific genes that influence intelligence, but progress has been slow thus far.
- Arthur Jensen and the authors of *The Bell Curve* sparked great controversy by arguing that cultural differences in average IQ are partly due to heredity. Genetic explanations for cultural differences in IQ have been challenged on a variety of grounds. Even if the heritability of IQ is great, group differences in average intelligence may not be due to heredity. Race is a much fuzzier concept than widely appreciated. Moreover, ethnicity varies with social class, so socioeconomic disadvantage may contribute to low IQ scores among minority students.
- Claude Steele has collected some thought-provoking data suggesting that stereotype vulnerability contributes to the culture gap in average IQ. Cultural bias on IQ tests may also contribute a little to ethnic differences in IQ, but it does not appear to be a crucial factor.

➤ New Directions in the Assessment and Study of Intelligence

Intelligence testing has been through a period of turmoil, and changes are on the horizon. In fact, many changes have occurred already. Let's discuss some of the major new trends and projections for the future.

Exploring Biological Indexes and Correlates of Intelligence

The controversy about cultural disparities in IQ scores has led to increased interest in biological indexes and correlates of intelligence. Arthur Jensen (1987, 1993, 1998), Hans Eysenck (1988, 1989), and other researchers have attempted to find raw physiological indicators of general intelligence. Their search for a "culture-free" measure of intelligence has led them to focus on sensory processes, much as Sir Francis Galton did over a hundred years ago. Armed with much more sophisticated equipment, they hope to succeed where Galton failed.

Jensen's (1982, 1987, 1992) studies of mental speed are representative of this line of inquiry. In his studies, Jensen measures *reaction time* (RT), using a panel of paired buttons and lights. On each trial, the subject rests a hand on a "home button." When one of the lights is activated, the subject is supposed to push the button for that light as quickly as possible. RT is typically averaged over a number of trials involving varied numbers of lights. Modest correlations (.20s to .30s) have been found between faster RTs and higher scores on conventional IQ tests (Deary, 2003).

Jensen's findings suggest an association between raw mental speed and intelligence, as Galton originally suggested. This correlation is theoretically in-

teresting and, in retrospect, not all that surprising. Many conventional IQ tests have imposed demanding time limits on examinees, working under the assumption that "fast is smart." However, the correlation between RT and IQ appears to be too weak to give RT any practical value as an index of intelligence.

However, another approach to measuring mental speed may have more practical potential. Measures of *inspection time* assess how long it takes participants to make simple perceptual discriminations that meet a certain criterion of accuracy (Deary & Stough, 1996). For example, in a series of trials, participants may be asked repeatedly to indicate which of two lines is shorter. The pairs of lines are presented for very brief exposures and participants are told to concentrate on making *accurate* judgments. A person's inspection time is the exposure duration required for that person to achieve a specific level of accuracy, such as 85% correct judgments (see **Figure 9.19** on the next page). Correlations in the .30s and .40s have been found between participants' inspection time scores and their scores on measures of intelligence (Deary, 2000; Nettelbeck, 2003). These correlations are closing in on being high enough to have some practical value, although a great deal of work remains to be done to standardize inspection time measures and to figure out why they are associated with intelligence.

Some researchers have also begun to explore the relations between brain size and intelligence. The early studies in this area used various measures of head size as an indicator of brain size. These studies generally found positive, but very small correlations (average = .15) between head size and IQ (Vernon et al.,

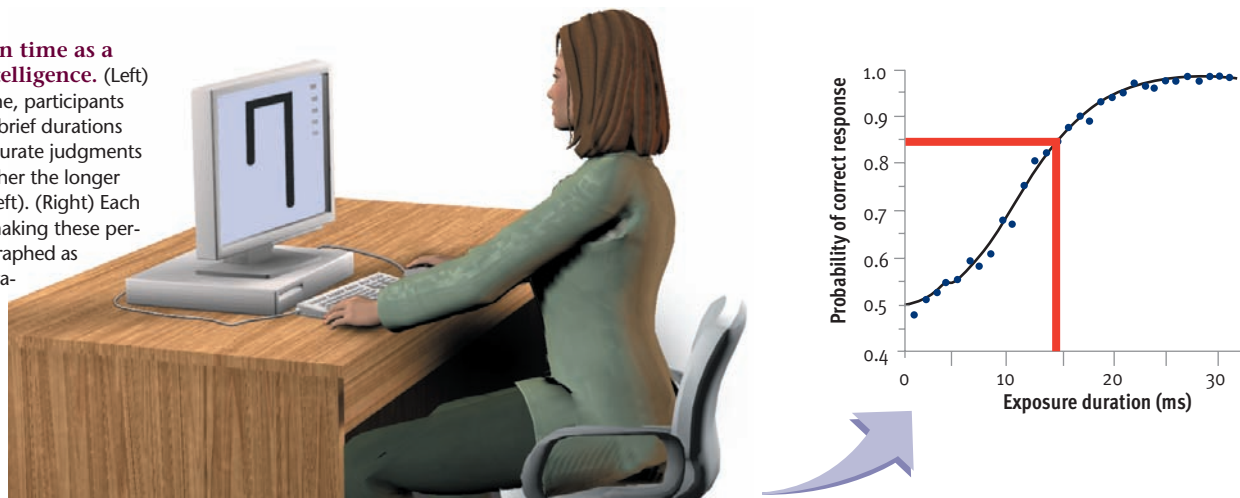
PREVIEW QUESTIONS

- Do measures of mental speed correlate with intelligence?
- Does IQ correlate with brain size or longevity?
- What are the key features of Sternberg's theory of successful intelligence?
- What is Gardner's thesis about the nature of intelligence?
- What is emotional intelligence, and can it be measured?

Figure 9.19

Research on inspection time as a biological index of intelligence.

(Left) In studies of inspection time, participants are shown stimuli for very brief durations and are asked to make accurate judgments about them (such as whether the longer line is on the right or the left). (Right) Each participant's accuracy in making these perceptual discriminations is graphed as a function of exposure duration. A subject's inspection time for a particular task is the exposure duration required to achieve a certain level of accuracy. In this case, 85% accuracy is the criterion and the participant's inspection time for the task is 14 milliseconds.



Source: Graph adapted from Deary, I. J., Caryl, P. G., & Gibson, G. J. (1993). Nonstationarity and the measurement of psychophysical response in a visual inspection time task. *Perception*, 22, 1245–1256. Copyright © 1993 by Pion Ltd. Adapted by permission.

2000), leading researchers to speculate that head size is probably a very crude index of brain size. This line of research might have languished, but the invention of sophisticated brain-imaging technologies gave it a huge shot in the arm. Since the 1990s, quite a few studies have examined the correlation between IQ scores and measures of brain volume based on MRI scans (see Chapter 3), yielding an average correlation of about .35 (Anderson, 2003; McDaniel, 2005). One obvious implication of these findings, eagerly embraced by those who tout the influence of heredity on intelligence, is that genetic inheritance gives some people larger brains than others and that larger brain size promotes greater intelligence (Rushton, 2003). However, as always, we must be cautious about interpreting correlational data. As discussed in Chapter 3, research has demonstrated that an enriched environment can produce denser neural networks and heavier brains in laboratory rats (Rosenzweig & Bennett, 1996). Hence, it is also possible that causation runs in the opposite direction—that developing greater intelligence promotes larger brain size, much like weightlifting can promote larger muscles.

Research on the biological correlates of intelligence has turned up another interesting finding that seems likely to occupy researchers for some time to come. IQ scores measured in childhood correlate with longevity decades later. For example, one study has followed a large cohort of people in Scotland who were given IQ tests in 1932 when they were 11 years old (Deary et al., 2004). People who scored one standard deviation (15 points) below average on the IQ test in 1932 were only 79% as likely as those who scored average or above to be alive in 1997. A handful of other studies have yielded the same conclusion: Smarter people live longer (Gottfredson & Deary, 2004). Based on these findings, Linda Gottfredson

(2004) argues that health self-care is a complicated, mentally challenging lifelong mission, for which brighter people are better prepared. According to her analysis, more-intelligent people are better equipped to assimilate complex information on health risks, monitor subtle symptoms and seek appropriate care, manage health-related habits and behaviors effectively, minimize exposure to various hazards and risks in a prudent manner, and comply with elaborate treatment regimens successfully. Additional research will be needed to test Gottfredson's thesis, as there are other plausible explanations for the link between intelligence and longevity (Whalley & Deary, 2001). One huge complication is that higher socioeconomic class is correlated with both higher IQ and better health outcomes. Thus, it is hard to rule out the possibility that affluence promotes longevity and that higher intelligence is merely an incidental correlate of both.

Investigating Cognitive Processes in Intelligent Behavior

As noted in Chapters 1 and 8, psychologists are increasingly taking a cognitive perspective in their efforts to study many topics. For over a century, the investigation of intelligence has been approached primarily from a *testing perspective*. This perspective emphasizes measuring the *amount* of intelligence people have and figuring out *why* some have more than others. In contrast, the *cognitive perspective* focuses on how people *use* their intelligence. The interest is in process rather than amount. In particular, cognitive psychologists focus on the information-processing strategies that underlie intelligence. The application of the cognitive perspective to intelligence

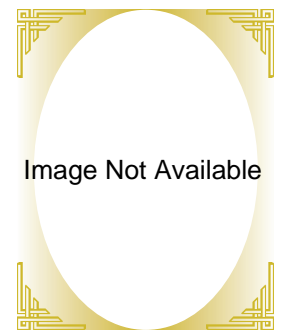
has been spearheaded by Robert Sternberg (1985, 1988b, 1991).

Sternberg's *triarchic theory of human intelligence* consists of three parts: the contextual, experiential, and componential subtheories. In his *contextual subtheory*, Sternberg argues that intelligence is a culturally defined concept. He asserts that different manifestations of intelligent behavior are valued in different contexts. In his *experiential subtheory*, Sternberg explores the relationships between experience and intelligence. He emphasizes two factors as the hallmarks of intelligent behavior. The first is the ability to deal effectively with novelty—new tasks, demands, and situations. The second factor is the ability to learn how to handle familiar tasks automatically and effortlessly. Sternberg's *componential subtheory* describes three types of mental processes that intelligent thought depends on: metacomponents, performance components, and knowledge-acquisition components (see Figure 9.20).

In more recent extensions of his theory, Sternberg (1999, 2000b, 2003a) has asserted that three aspects or facets characterize what he calls “successful intelligence”: analytical intelligence, creative intelligence, and practical intelligence. *Analytical intelligence* involves abstract reasoning, evaluation, and judgment. It is the type of intelligence that is crucial to most schoolwork and that is assessed by conventional IQ tests. *Creative intelligence* involves the ability to generate new ideas and to be inventive in dealing with novel problems. *Practical intelligence* involves the ability to deal effectively with the kinds of problems that

people encounter in everyday life, such as on the job or at home. A big part of practical intelligence involves acquiring *tacit knowledge*—what one needs to know to work efficiently in an environment that is not explicitly taught and that often is not even verbalized.

In a series of studies, Sternberg and his colleagues have gathered data suggesting that (1) all three facets of intelligence can be measured reliably, (2) the three facets of intelligence are relatively independent (uncorrelated), and (3) the assessment of all three aspects of intelligence can improve the prediction of intelligent behavior in the real world (Grigorenko & Sternberg, 2001; Henry, Sternberg, & Grigorenko, 2005; Sternberg et al., 1999, 2001). Some critics doubt that Sternberg's measures will facilitate better prediction of meaningful outcomes than traditional IQ tests (Gottfredson, 2003a), but that is an empirical question that should be resolved by future research. In any event, Sternberg certainly has been an articulate voice arguing for a broader, expanded concept of intelligence, which is a theme that has been echoed by others.



ROBERT STERNBERG

“To understand intelligent behavior, we need to move beyond the fairly restrictive tasks that have been used both in experimental laboratories and in psychometric tests of intelligence.”

Expanding the Concept of Intelligence

In recent years, a number of theorists besides Sternberg have concluded that the focus of traditional IQ tests is too narrow. The most prominent proponent of this view has been Howard Gardner (1983, 1993, 1999, 2004). According to Gardner, IQ tests have gen-

Figure 9.20

Sternberg's triarchic theory of intelligence. Sternberg's model of intelligence consists of three parts: the contextual subtheory, the experiential subtheory, and the componential subtheory. Much of Sternberg's research has been devoted to the componential subtheory, as he has attempted to identify the cognitive processes that contribute to intelligence. He believes that these processes fall into three groups: metacomponents, performance components, and knowledge-acquisition components. All three component processes contribute to each of three aspects or types of intelligence: analytical intelligence, practical intelligence, and creative intelligence.

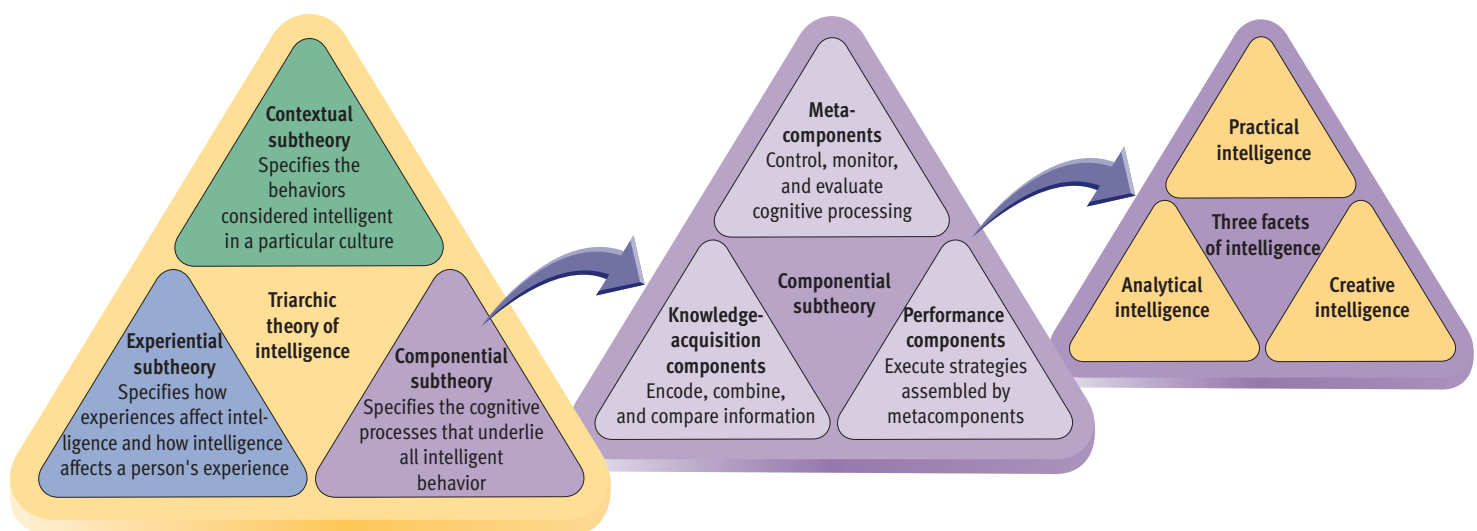
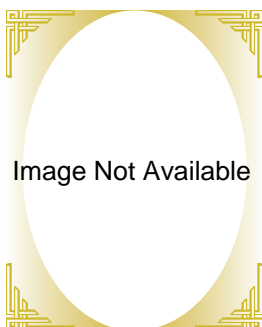


Table 9.3 Gardner's Eight Intelligences

Intelligence	End-States	Core Components
Logical-mathematical	Scientist Mathematician	Sensitivity to, and capacity to discern, logical or numerical patterns; ability to handle long chains of reasoning
Linguistic	Poet Journalist	Sensitivity to the sounds, rhythms, and meanings of words; sensitivity to the different functions of language
Musical	Composer Violinist	Abilities to produce and appreciate rhythm, pitch, and timbre; appreciation of the forms of musical expressiveness
Spatial	Navigator Sculptor	Capacities to perceive the visual-spatial world accurately and to perform transformations on one's initial perceptions
Bodily-kinesthetic	Dancer Athlete	Abilities to control one's body movements and to handle objects skillfully
Interpersonal	Therapist Salesperson	Capacities to discern and respond appropriately to the moods, temperaments, motivations, and desires of other people
Intrapersonal	Person with detailed, accurate self-knowledge	Access to one's own feelings and the ability to discriminate among them and draw upon them to guide behavior; knowledge of one's own strengths, weaknesses, desires, and intelligences
Naturalist	Biologist Naturalist	Abilities to recognize and categorize objects and processes in nature

Source: Adapted from Gardner, H., & Hatch, T. (1989). Multiple intelligences go to school: Educational implications of the theory of multiple intelligences. *Educational Researcher*, 18 (8), 4–10. American Educational Research Association. Additional information from Gardner (1998).



HOWARD GARDNER

"It is high time that the view of intelligence be widened to incorporate a range of human computational capacities. . . . But where is it written that intelligence needs to be determined on the basis of tests?"

Web Link 9.6



HowardGardner.com

You can find a wealth of resources on Gardner's theory of multiple intelligences on this site, including biographical information on Gardner, seminal and recent papers on his multiple intelligence perspective, and links to other relevant sites.

erally emphasized verbal and mathematical skills, to the exclusion of other important skills. He suggests the existence of a number of relatively autonomous human intelligences, which are listed in **Table 9.3**. To build his list of *multiple intelligences*, Gardner reviewed the evidence on cognitive capacities in normal individuals, people suffering from brain damage, and special populations, such as prodigies and idiot savants. He concluded that humans exhibit eight intelligences: logical-mathematical, linguistic, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist. These intelligences obviously include quite a variety of talents that are not assessed by conventional IQ tests. Gardner is investigating the extent to which these intelligences are largely independent, as his theory asserts. For the most part, he has found that people tend to display a mixture of strong, intermediate, and weak abilities, which is consistent with the idea that the various types of intelligence are independent.

Gardner's books have been popular, and his theory clearly resonates with many people (Shearer, 2004). His ideas have had an enormous impact on educators' attitudes and beliefs around the world (Cuban, 2004; Kornhaber, 2004). He has done a superb job of synthesizing research from neuropsychology, developmental psychology, cognitive psychology, and other areas to arrive at fascinating speculations about the structure of human abilities. He has raised thought-provoking questions about what abilities should be included under the rubric of intelligence (Eisner, 2004). However, he has his critics (Hunt, 2001; Klein,

1997; Morgan, 1996). Some argue that his use of the term *intelligence* is so broad, encompassing virtually any valued human ability as to make the term almost meaningless. These critics wonder whether there is any advantage to relabeling talents such as musical ability and motor coordination as forms of intelligence. Critics also note that Gardner's theory has not generated much research on the predictive value of measuring individual differences in the eight intelligences he has described. This research would require the development of tests to measure the eight intelligences, but Gardner is not particularly interested in the matter of assessment and he loathes conventional testing. This situation makes it difficult to predict where Gardner's theory will lead, as research is crucial to the evolution of a theory.

Measuring Emotional Intelligence

In yet another highly publicized effort to expand the concept of intelligence, a variety of theorists have argued that the measurement of *emotional intelligence* can enhance the prediction of success at school, at work, and in interpersonal relationships. The concept of emotional intelligence was originally developed by Peter Salovey and John Mayer (1990). Their concept languished in relative obscurity until Daniel Goleman (1995) wrote a compelling book titled *Emotional Intelligence*, which made the best-seller lists. Since then, empirical research on the measurement of emotional intelligence has increased dramatically.

Emotional intelligence consists of the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion. Emotional intelligence includes four essential components (Salovey, Mayer, & Caruso, 2002). First, people need to be able to accurately perceive emotions in themselves and others and have the ability to express their own emotions effectively. Second, people need to be aware of how their emotions shape their thinking, decisions, and coping with stress. Third, people need to be able to understand and analyze their emotions, which may often be complex and contradictory. Fourth, people need to be able to regulate their emotions so that they can dampen negative emotions and make effective use of positive emotions.

Several tests have been developed to measure the relatively new concept of emotional intelligence. The test that has the strongest empirical foundation is the Mayer-Salovey-Caruso Emotional Intelligence Test (2002). The authors have strived to make this test a performance-based measure of the ability to deal effectively with emotions rather than a measure of personality or temperament. Preliminary results suggest that they have made considerable progress toward this goal, as evidenced by the scale's ability to predict intelligent management of emotions in real-world situations (Ciarrochi, Dean & Anderson, 2002; Lam & Kirby, 2002; Mayer et al., 2001). Illustrating the practical importance of emotional intelligence, scores on the scale also predict the quality of subjects' social interactions (Lopes et al., 2004).

Skeptics have questioned whether sophistication about emotion should be viewed as a form of intelligence, and they have correctly pointed out that a great deal of additional research will be needed to fully validate measures of emotional intelligence and to fully document its adaptive significance (Izard, 2001; Matthews, Zeidner, & Roberts, 2005; Palmer et al., 2005). However, advocates for the concept of emotional intelligence—unlike advocates for the concept of multiple intelligences—seem to relish that chal-

concept check 9.3



Recognizing Theories of Intelligence

Check your understanding of various theories on the nature of intelligence by matching the names of their originators with the brief descriptions of the theories' main themes that appear below. Choose from the following theorists: (a) Sir Francis Galton, (b) Howard Gardner, (c) Arthur Jensen, (d) Sandra Scarr, (e) Robert Sternberg, (f) Alfred Binet, and (g) David Wechsler. The answers are in Appendix A.

- _____ 1. This theorist posited eight human intelligences: logical-mathematical, linguistic, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist.
- _____ 2. On the basis of a study of eminence and success in families, this theorist concluded that intelligence is inherited.
- _____ 3. This theorist stated that the heritability of intelligence is very high and that IQ differences between ethnic groups are mainly due to genetics.
- _____ 4. This theorist stated that heredity sets certain limits on intelligence and that environmental factors determine where one falls within those limits.
- _____ 5. This person's theory of intelligence is divided into contextual, experiential, and componential subtheories and posits three facets of intelligence: analytical, practical, and creative intelligence.

lenge, and serious research on emotional intelligence is flourishing. It will be interesting to see where this research leads over the next decade.

REVIEW OF KEY POINTS

- Although reaction-time indexes of intelligence are being explored, they seem to have little practical utility. Measures of inspection time may prove more useful, although additional research is needed. Recent research has uncovered a moderate positive correlation between IQ and brain volume estimated from MRI scans. Studies have also found that IQ measured in childhood correlates with longevity decades later.
- Research on intelligence increasingly uses a cognitive perspective, which emphasizes the need to understand how people use their intelligence. Many modern theorists, such as Robert Sternberg and Howard Gardner, argue that the concept of intelligence should be expanded to encompass a greater variety of abilities. Researchers have made some progress in their efforts to measure emotional intelligence.

> Reflecting on the Chapter's Themes

As you probably noticed, three of our integrative themes surfaced in this chapter. Our discussions illustrated that cultural factors shape behavior, that psychology evolves in a sociohistorical context, and that heredity and environment jointly influence behavior.

Pervasive psychological testing is largely a Western phenomenon. The concept of general intelli-

gence also has a special, Western flavor to it. Many non-Western cultures have very different ideas about the nature of intelligence. Within Western societies, the observed ethnic differences in average intelligence also illustrate the importance of cultural factors, as these disparities appear to be due in large part to cultural disadvantage and other culture-related considerations. Thus, we see once again that if we hope to



Cultural Heritage



Heredity and Environment



Sociohistorical Context

achieve a sound understanding of behavior, we need to appreciate the cultural contexts in which behavior unfolds.

Human intelligence is shaped by a complex interaction of hereditary and environmental factors. We've drawn similar conclusions before in other chapters where we examined other aspects of behavior. However, this chapter should have enhanced your appreciation of this idea in at least two ways. First, we examined more of the details of how scientists arrive at the conclusion that heredity and environment jointly shape behavior. Second, we encountered dramatic illustrations of the immense importance attached to the nature versus nurture debate. For example, Arthur Jensen has been the target of savage criticism. After his controversial 1969 article, he was widely characterized as a racist. When he gave speeches, he was often greeted by protestors carrying signs, such as "Kill Jensen" and "Jensen Must Perish." As you can see, the debate about the inheritance of intelligence inspires passionate feelings in many people. In part, this is because the debate has far-reaching social and political implications, which brings us to another prominent theme in the chapter.

There may be no other area in psychology where the connections between psychology and society at large are so obvious. Prevailing social attitudes have always exerted some influence on testing practices and the interpretation of test results. In the first half of the 20th century, a strong current of racial and class prejudice was apparent in the United States and Britain. This prejudice supported the idea that IQ tests measured innate ability and that "undesirable" groups scored poorly because of their genetic inferiority. Although these beliefs did not go unchallenged within psychology, their widespread acceptance in the field reflected the social values of the time. It's ironic that IQ tests have sometimes been associated with social prejudice. When used properly, intelligence tests provide relatively objective measures of mental ability that are less prone to bias than the subjective judgments of teachers or employers.

Today, psychological tests serve many diverse purposes. In the upcoming Personal Application, we focus on creativity tests and on the nature of creative thinking and creative people.

PERSONAL Application

Understanding Creativity

Answer the following "true" or "false."

- ___ 1. Creative ideas often come from out of nowhere.
- ___ 2. Creativity usually occurs in a burst of insight.
- ___ 3. Creativity depends on divergent thinking.

Intelligence is not the only type of mental ability that psychologists have studied. They have devised tests to explore a variety of mental abilities. Creativity is certainly one of the most interesting among them. People tend to view creativity as an essential trait for artists, musicians, and writers, but it is important in *many* walks of life. In this Application, we'll discuss psychologists' efforts to measure and understand creativity. As we progress, you'll learn that all of the above statements are false.

The Nature of Creativity

What makes thought creative? **Creativity involves the generation of ideas that are original, novel, and useful.** Creative thinking is fresh, innovative, and inventive. But novelty by itself is not enough. In addition to being unusual, creative thinking must be adaptive. It must be appropriate to the situation and problem.

Does Creativity Occur in a Burst of Insight?

It is widely believed that creativity usually involves sudden flashes of insight and great leaps of imagination. Robert Weisberg (1986) calls this belief the "aha! myth." Undeniably, creative bursts of insight do occur (Feldman, 1988). However, the evidence suggests that

major creative achievements generally are logical extensions of existing ideas, involving long, hard work and many small, faltering steps forward (Weisberg, 1993). Creative ideas do not come out of nowhere. Creative ideas come from a deep well of experience and training in a specific area, whether it's music, painting, business, or science (Weisberg, 1999). As Snow (1986) puts it, "Creativity is not a light bulb in the mind, as most cartoons depict it. It is an accomplishment born of intensive study, long reflection, persistence, and interest" (p. 1033).

Does Creativity Depend on Divergent Thinking?

According to many theorists, the key to creativity lies in *divergent thinking*—thinking "that goes off in different directions," as

J. P. Guilford (1959) put it. Guilford distinguished between convergent thinking and divergent thinking. **In convergent thinking one tries to narrow down a list of alternatives to converge on a single correct answer.** For example, when you take a multiple-choice exam, you try to eliminate incorrect options until you hit on the correct response. Most training in school encourages convergent thinking. **In divergent thinking one tries to expand the range of alternatives by generating many possible solutions.** Imagine that you work for an advertising agency. To come up with as many slogans as possible for a client's product, you must use divergent thinking. Some of your slogans may be clear losers, and eventually you will have to engage in convergent thinking to pick the best, but coming up with the range of new possibilities depends on divergent thinking.

Thirty years of research on divergent thinking has yielded mixed results. As a whole, the evidence suggests that divergent thinking contributes to creativity, but it clearly does not represent the essence of creativity, as originally proposed (Brown, 1989; Plucker & Renzulli, 1999). In retrospect, it was probably unrealistic to expect creativity to depend on a single cognitive skill. According to Sternberg (1988a), the cognitive processes that underlie creativity are multifaceted.

Measuring Creativity



Although its nature may be elusive, creativity clearly is important in today's world. Creative masterpieces in the arts and literature enrich human existence. Creative insights in the sciences illuminate people's understanding of the world. Creative inventions fuel technological progress. Thus, it is understandable that psychologists have been interested in measuring creativity with psychological tests.

How Do Psychological Tests Measure Creativity?



A diverse array of psychological tests have been devised to measure individuals' creativity (Cooper, 1991). Usually, the items on creativity tests assess divergent thinking by giving respondents a specific starting point

and then requiring them to generate as many possibilities as they can in a short period of time. Typical items on a creativity test might include the following: (1) List as many uses as you can for a newspaper. (2) Think of as many fluids that burn as you can. (3) Imagine that people no longer need sleep and think of as many consequences as you can. Subjects' scores on these tests depend on the *number* of alternatives they generate and on the *originality* and *usefulness* of the alternatives.

One seminal test of creativity is the Remote Associates Test (RAT) developed by Sarnoff and Martha Mednick (1967). This test is based on the assumption that creative people see unusual relationships and make nonobvious connections between ideas. Items on the test require subjects to figure out the obscure links (the remote associations) among three words by coming up with a fourth word that is related to the three stimulus words. Examples of items similar to those found on the RAT are shown in **Figure 9.21**.

How Well Do Tests Predict Creative Productivity?

In general, studies indicate that creativity tests are mediocre predictors of creative achievement in the real world (Hocevar & Bachelor, 1989; Plucker & Renzulli, 1999). Why? One reason is that these tests measure creativity in the abstract, as a *general trait*.

However, the accumulation of evidence suggests that *creativity is specific to particular domains* (Amabile, 1996; Feist, 2004; Kaufman & Baer, 2002, 2004). Despite some rare exceptions, creative people usually excel in a single field, in which they typically have considerable training and expertise (Poliastro & Gardner, 1999). A remarkably innovative physicist might have no potential to be a creative poet or an inventive advertising executive. Measuring this person's creativity outside of physics may be meaningless. Thus, creativity tests may have limited value because they measure creativity out of context.

Even if better tests of creativity were devised, predicting creative achievement would probably still prove difficult. Why? Because creative achievement depends on many factors besides creativity (Cropley, 2000). Creative productivity over the course of an individual's career will depend on his or her motivation, personality, and intelligence, as well as situational factors, including training, mentoring, and good fortune (Amabile, 1996; Feldman, 1999; Simonton, 1999a).

Correlates of Creativity

What are creative people like? Are they brighter, or more open minded, or less well adjusted than average? A great deal of research has been conducted on the correlates of creativity.

Instructions: For each set of three words, try to think of a fourth word that is related to all three words. For example, the words ROUGH, RESISTANCE, and BEER suggest the word DRAFT because of the phrases ROUGH DRAFT, DRAFT RESISTANCE, and DRAFT BEER.

1. CHARMING	STUDENT	VALIANT
2. FOOD	CATCHER	HOT
3. HEARTED	FEET	BITTER
4. DARK	SHOT	SUN
5. CANADIAN	GOLF	SANDWICH
6. TUG	GRAVY	SHOW
7. ATTORNEY	SELF	SPENDING
8. MAGIC	PITCH	POWER
9. ARM	COAL	PEACH
10. TYPE	GHOST	STORY

Figure 9.21

Remote associates as an index of creativity. One groundbreaking creativity test is the Remote Associates Test (RAT) developed by Sarnoff and Martha Mednick (1967). The items shown here are similar to those on the RAT. See whether you can identify the remote associations between the three stimulus words by coming up with a fourth word that is related to all three. The answers can be found in Figure 9.22.

Source: Matlin, M. W. (1994). *Cognition* (3rd Ed.). Fort Worth, TX: Harcourt Brace. Reprinted by permission of the author.

- | | |
|------------|------------|
| 1. PRINCE | 6. BOAT |
| 2. DOG | 7. DEFENSE |
| 3. COLD | 8. BLACK |
| 4. GLASSES | 9. PIT |
| 5. CLUB | 10. WRITER |

Figure 9.22
Answers to the remote associates items.

Source: Matlin, M. W. (1994). *Cognition* (3rd Ed.). Fort Worth, TX: Harcourt Brace. Reprinted by permission of the author.

Is There a Creative Personality?

Creative people exhibit the full range of personality traits, but investigators have found modest correlations between certain personality characteristics and creativity (Ochse, 1990). Based on a meta-analysis of over 80 studies, Feist (1998) concludes that highly creative people “are more autonomous, introverted, open to new experiences, norm-doubting, self-confident, self-accepting, driven, ambitious, dominant, hostile, and impulsive” (p. 299). At the core of this set of personality characteristics are the related traits of independence and nonconformity. Creative people tend to think for themselves and are less easily influenced by the opinions of others than the average person is.

Sternberg and Lubart (1992) also suggest that creative people are willing to grow and change and willing to take risks.

Are Creativity and Intelligence Related?

Are creative people exceptionally smart? Conceptually, creativity and intelligence represent different types of mental ability. Thus, it’s not surprising that correlations between measures of creativity and measures of intelligence are generally weak (Sternberg & O’Hara, 1999). Creativity and intelligence are not entirely unrelated, however, as creative achievements in most fields require a minimum level of intelligence. Hence, most highly creative people are probably well above average in intelligence (Simonton, 1999). An IQ of 120 has been proposed as a minimum threshold for creative achievement, but this hypothesis has not been effectively tested yet (Lubart, 2003).

Is There a Connection Between Creativity and Mental Illness?

Some connection may exist between truly exceptional creativity and mental illness. The

list of creative geniuses who suffered from psychological disorders is endless (Prentky, 1989). Kafka, Hemingway, Rembrandt, Van Gogh, Chopin, Tchaikovsky, Descartes, and Newton are but a few examples (see **Figure 9.23**). Of course, a statistical association cannot be demonstrated by citing a handful of examples.

In this case, however, some statistical data are available. And these data *do* suggest a correlation between creative genius and maladjustment—in particular, mood disorders such as depression. When Andreasen (1987) studied 30 accomplished writers who had been invited as visiting faculty to the prestigious Iowa Writers Workshop, she found that 80% of her sample had suffered a mood disorder at some point in their lives. In a similar study of 59 female writers from another writers’ conference, Ludwig (1994) found that 56% had experienced depression. These figures are far above the base rate (roughly 15%) for mood disorders in the general population. Other studies have also found an association between creativity and mood disorders, as well as other kinds of psychological disorders (Jamison, 1988; Ludwig, 1998; Nettle, 2001; Post, 1996). Perhaps

Figure 9.23
Examples of people who achieved creative eminence and suffered from psychological disorders. As these brief lists show, it is easy to compile rosters of great artists, scientists, composers, and writers who struggled with mental illness. However, while interesting, anecdotal evidence such as this cannot demonstrate that there is an association between creative eminence and mental disorder. [Based on information from Prentky (1980) and Rothenberg (1990)]

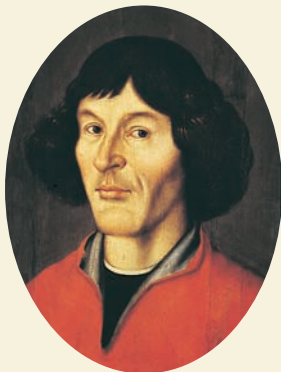
Artists	Scientists	Composers	Writers
Bosch	Copernicus	Beethoven	Blake
Durer	Descartes	Berlioz	Coleridge
Goya	Kepler	Chopin	Dostoyevsky
Kandinsky	Linnaeus	Handel	Hemingway
Raphael	Mendel	Saint-Saens	Kafka
Rembrandt	Newton	Schubert	Poe
Van Gogh	Pascal	Tchaikovsky	Plath



Rembrandt
 Rembrandt, Harmensz, van Rijn, *Self-Portrait with Beard*. Museu de Arte, Sao Paulo, Brazil. Giraudon/Art Resource, NY.



Chopin
 Delacroix, Eugene, *Portrait of Chopin*, Louvre, Paris: Giraudon/Art Resource, NY.



Copernicus
 Pomerian, 16th cent. *Portrait of Nicolas Copernicus*. Museum, Torun, Poland. Erich Lessing/Art Resource, NY.

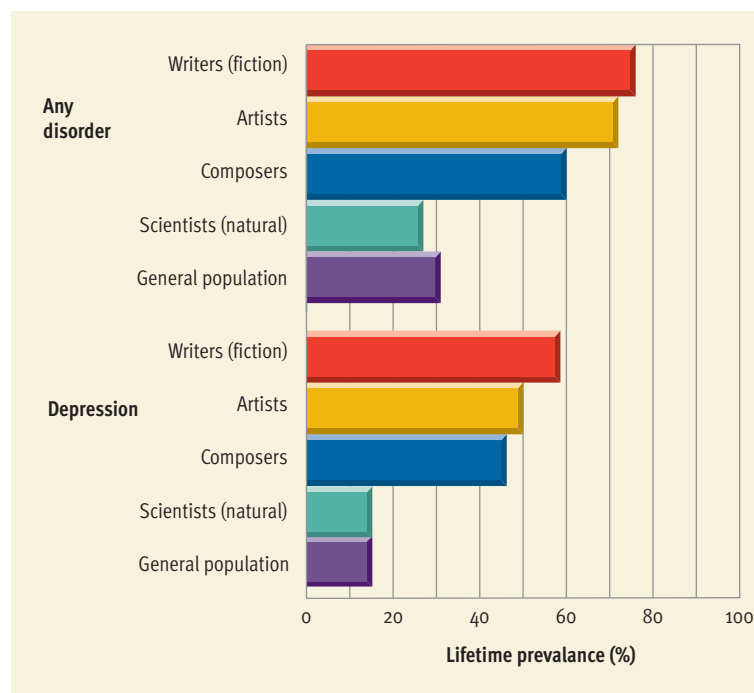


Figure 9.24

Estimated prevalence of psychological disorders among people who achieved creative eminence. Ludwig (1995) studied biographies of 1004 people who had clearly achieved eminence in one of 18 fields and tried to determine whether each person suffered from any specific mental disorders in their lifetimes. The data summarized here show the prevalence rates for depression and for a mental disorder of any kind for four fields where creativity is often the key to achieving eminence. As you can see, the estimated prevalence of mental illness was extremely elevated among eminent writers, artists, and composers (but not natural scientists) in comparison to the general population, with depression accounting for much of this elevation.

the most ambitious examination of the issue has been Arnold Ludwig's (1995) analyses of the biographies of 1004 people who achieved eminence in 18 fields. He found greatly elevated rates of depression and other disorders among eminent writers, artists, and composers (see **Figure 9.24**). Recent studies suggest that mental illness may be especially elevated among poets (Kaufman, 2001, 2005).

Thus, accumulating empirical data tentatively suggest that a correlation may exist between major creative achievement and vulnerability to mood disorders. According to Andreasen (1996), creativity and maladjustment probably are *not* causally related. In-

stead, she speculates that certain personality traits and cognitive styles may both foster creativity and predispose people to psychological disorders. Another, more mundane possibility is that creative individuals' elevated pathology may simply reflect all the difficulty and frustration they experience as they struggle to get their ideas or works accepted in artistic fields that enjoy relatively little public support (Csikszentmihalyi, 1994, 1999).

➤ REVIEW OF KEY POINTS

- Creativity involves the generation of original, novel, and useful ideas. Creativity does not usually

involve sudden insight. Divergent thinking contributes to creativity but does not represent its essence.

- Creativity tests are mediocre predictors of creative productivity in the real world. One problem is that creativity is specific to particular domains of expertise. Another problem is that creative achievement depends on a host of factors besides one's creativity.
- Creative people are more likely than others to exhibit certain personality traits, but the correlations between creativity and personality are weak. The association between creativity and intelligence is also modest, although creativity probably requires above-average intelligence. Recent evidence suggests that creative geniuses may exhibit heightened vulnerability to mood disorders.

CRITICAL THINKING *Application*

The Intelligence Debate, Appeals to Ignorance, and Reification

A *fallacy* is a mistake or error in the process of reasoning. Cognitive scientists who study how people think have developed long lists of common errors that people make in their reasoning processes. One of these fallacies has a curious name, which is the *appeal to ignorance*. It involves misusing the general lack of knowledge or information on an issue (a lack of knowledge is a kind of ignorance) to support an argument. This fallacy often surfaces in the debate about the relative influence of heredity and environment on intelligence. But before we tackle the more difficult issue of how this fallacy shows up in the debate about intelligence, let's start with a simpler example.

Appeal to Ignorance

Do ghosts exist? This is probably not the kind of question you expected to find in your psychology textbook, but it can clarify the appeal to ignorance. Those who assert that ghosts *do* exist will often support their conclusion by arguing that no one can prove that ghosts *do not* exist; therefore ghosts must exist. The lack of evidence or inability to show that ghosts do not exist is used to conclude the opposite. Conversely, those who assert that ghosts *do not* exist often rely on the same logic. They argue that no one can prove that ghosts exist; therefore, they must not exist. Can you see what is wrong with these appeals to ignorance? The lack of information on an issue cannot be used to support any conclusion—other than the conclusion that we are too ignorant to draw a conclusion.

One interesting aspect of the appeal to ignorance is that the same appeal can be used to support two conclusions that are diametrically opposed to each other. This paradox is a telltale clue that appeals to ignorance involve flawed reasoning. It is easy to see what is wrong with appeals to ignorance when the opposite arguments (ghosts exist—ghosts do not exist) are presented together and the lack of evidence on the issue under discussion

is obvious. However, when the same fallacy surfaces in more complex debates and the appeal to ignorance is not as blatant, the strategy can be more difficult to recognize. Now let's see how the appeal to ignorance has been used in the debate about intelligence.

As noted in the main body of the chapter, the debate about the relative contributions of nature and nurture to intelligence is one of psychology's longest-running controversies. This complex and multifaceted debate is exceptionally bitter and acrimonious because it has far-reaching sociopolitical repercussions. In this exchange, one frequently made argument is that we have little or no evidence that intelligence can be increased by environmental (educational) interventions; therefore, intelligence must be mostly inherited. In other words, the argument runs: No one has demonstrated that intelligence is largely shaped by environment, so it must be largely inherited. This argument was part of Jensen's (1969) landmark treatise that greatly intensified the debate about intelligence, and it was one of the arguments made

by Herrnstein and Murray (1994) in their controversial book, *The Bell Curve*. What the argument refers to is the evidence that educational enrichment programs such as Head Start, which have been designed to enhance the cognitive development of underprivileged children, generally have not produced substantial, long-term gains in IQ (Neisser et al., 1996). The programs produce other benefits, including enduring improvements in school achievement, but short-term gains in IQ scores typically have faded by the middle grades (Barnett, 2004). These findings may have some implications for government policy in the educational arena, but the way in which they have been applied to the nature-nurture debate regarding intelligence has resulted in an appeal to ignorance. In its simplest form, the absence of evidence showing that environmental changes can increase intelligence is used to support the conclusion that intelligence is mostly determined by genetic inheritance. But the absence of evidence (ignorance) cannot be used to argue for or against a position.

Do ghosts exist? Littledean Hall, shown below, is said to be the home of 11 ghosts and is reputed to be the most haunted house in Great Britain. Those who believe in ghosts often support their view by arguing that no one can prove that ghosts do not exist. But as your text explains, this appeal to ignorance is logically flawed. This fallacy has also surfaced in some of the debates about the nature of intelligence.

Image Not Available

By the way, if you have assimilated some of the critical thinking skills discussed in earlier chapters, you may be thinking, “Wait a minute. Aren’t there alternative explanations for the failure of educational enrichment programs to increase IQ scores?” Yes, one could argue that the programs failed to yield improvements in IQ scores because they often were poorly executed, too brief, or underfunded (Ramey, 1999; Sigel, 2004). Moreover, Head Start programs are not really designed to increase IQ scores, but rather to enhance deprived students’ readiness for school (Schrag, Styfco, & Zigler, 2004). The inability of the enrichment programs to produce enduring increases in IQ does not necessarily imply that intelligence is unchangeable because it is largely a product of heredity.

You may also be wondering, “Aren’t there contradictory data?” Once again, the answer is yes. Barnett (2004) argues that failures to find enduring gains in intelligence from Head Start programs can often be attributed to flaws and shortcomings in the research design of the studies. Furthermore, studies of some lesser-known educational enrichment programs attempted with smaller groups of children *have* yielded durable gains in IQ and other standardized test scores (Ramey & Ramey, 2004; Reynolds et al., 2001; Woodhead, 2004).

But we’re supposed to be discussing appeals to ignorance, and there was another notable example of this fallacy in the chapter. Can you identify where this slippery logic was used? It surfaced in the discussion of the causes of mental retardation. As you may recall, roughly 25% of the time diagnosticians can pinpoint a biological cause for retardation. The remaining 75% of the cases are of unknown origin, but they are typically assumed to be due to environmental factors. In other words, the reasoning goes, *we don’t have any evidence that these cases are due to biological anomalies, so they must be environmental in origin*. This is an appeal to ignorance, and the assertion that most cases of retardation must be due to environmental factors is open to some questioning.

Reification

The dialogue on intelligence has also been marred by the tendency to engage in reifi-

cation. **Reification occurs when a hypothetical, abstract concept is given a name and then treated as though it were a concrete, tangible object.** Some hypothetical constructs just become so familiar and so taken for granted that we begin to think about them as if they were real. People often fall into this trap with the Freudian personality concepts of id, ego, and superego (see Chapter 12). They begin to think of the *ego*, for instance, as a genuine entity that can be strengthened or controlled, when the ego is really nothing more than a hypothetical abstraction. The concept of intelligence has also been reified in many quarters. Like the ego, intelligence is nothing more than a useful abstraction—a hypothetical construct that is estimated, rather arbitrarily, by a collection of paper-and-pencil measures called IQ tests. Yet people routinely act as if intelligence is a tangible commodity, fighting vitriolic battles over whether it can be measured precisely, whether it can be changed, and whether it can ensure job success. This reification clearly contributes to the tendency for people to attribute excessive importance to the concept of intelligence. It would be wise to remember that intelligence is no more real than the concept of “environment,” or “cyberspace,” or “the American dream.”

Reification has also occurred in the debate about the *degree* to which intelligence is inherited. Arguments about the heritability coefficient for intelligence often imply that a single, true number lurks somewhere “out there” waiting to be discovered. In reality, heritability is a hypothetical construct that can be legitimately estimated in several ways that can lead to somewhat different re-

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Reification occurs when we think of hypothetical constructs as if they were real. Like intelligence, the concept of cyberspace has been subject to reification. The fact that cyberspace is merely an abstraction becomes readily apparent when artists are asked to “draw” cyberspace for conference posters or book covers.

sults. Moreover, heritability ratios will vary from one population to the next, depending on the amount of genetic variability and the extent of environmental variability in the populations. No exactly accurate number that corresponds to “true heritability” awaits discovery. Thus, it is important to understand that hypothetical constructs have great heuristic value in the study of complex phenomena such as human thought and behavior, but they do not actually exist in the world—at least not in the same way that a table or a person exists.

Table 9.4 Critical Thinking Skills Discussed in This Application

Skill	Description
Recognizing and avoiding appeals to ignorance	The critical thinker understands that the lack of information on an issue cannot be used to support an argument.
Recognizing and avoiding reification	The critical thinker is vigilant about the tendency to treat hypothetical constructs as if they were concrete things.
Looking for alternative explanations for findings and events	In evaluating explanations, the critical thinker explores whether there are other explanations that could also account for the findings or events under scrutiny.
Looking for contradictory evidence	In evaluating the evidence presented on an issue, the critical thinker attempts to look for contradictory evidence that may have been left out of the debate.

CHAPTER 9 *Recap*

Key Ideas

Key Concepts in Psychological Testing

- Psychological tests are standardized measures of behavior—usually mental abilities or aspects of personality. Test scores are interpreted by consulting test norms to find out what represents a high or low score. Psychological tests should produce consistent results, a quality called reliability.
- Validity refers to the degree to which there is evidence that a test measures what it was designed to measure. Content validity is crucial on classroom tests. Criterion-related validity is critical when tests are used to predict performance. Construct validity is critical when a test is designed to measure a hypothetical construct.

The Evolution of Intelligence Testing

- The first crude efforts to devise intelligence tests were made by Sir Francis Galton, who wanted to show that intelligence is inherited. Modern intelligence testing began with the work of Alfred Binet, who devised a scale to measure a child's mental age.
- Lewis Terman revised the original Binet scale to produce the Stanford-Binet in 1916. It introduced the intelligence quotient and became the standard of comparison for subsequent tests. David Wechsler devised an improved measure of intelligence for adults and a new scoring system based on the normal distribution.

Basic Questions About Intelligence Testing

- In the modern scoring system, deviation IQ scores indicate where people fall in the normal distribution of intelligence for their age group. Although they are intended to measure potential for learning, IQ tests inevitably assess a blend of potential and knowledge.
- IQ tests are exceptionally reliable. They are reasonably valid measures of academic intelligence, but they do not tap social or practical intelligence.
- IQ scores are correlated with occupational attainment, but their ability to predict performance within occupations is the subject of debate. Intelligence testing is largely a Western enterprise; IQ tests are not widely used in most non-Western cultures.

Extremes of Intelligence

- IQ scores below 70–75 are usually diagnostic of mental retardation, but these diagnoses should not be based solely on test results. Four levels of retardation have been distinguished. Most of the retarded population falls in the mildly retarded category. Although many biological conditions can cause retardation, biological causes can be pinpointed in only about 25% of cases.
- Children who obtain IQ scores above 130 may be viewed as gifted, but cutoffs for accelerated programs vary. Research by Terman showed that gifted children tend to be socially mature and well adjusted, although Winner has raised concerns about the adjustment of profoundly gifted individuals. Extraordinary achievement seems to depend on intensive training and hard work, but innate talent may also contribute.

Heredity and Environment as Determinants of Intelligence

- Twin studies show that identical twins are more similar in IQ than fraternal twins, suggesting that intelligence is inherited, at least in part. Estimates of the heritability of intelligence range from 40% to 80% but converge around 50%. However, heritability ratios have certain limitations.
- Many lines of evidence indicate that environment is also an important determinant of intelligence. Of particular interest is the recent discovery of generational increases in measured IQ, dubbed the Flynn effect. The concept of reaction range posits that heredity places limits on one's intellectual potential while the environment determines where one falls within these limits.
- Genetic explanations for cultural differences in IQ have been challenged on a variety of grounds. Even if the heritability of IQ is great, group differences in average intelligence may not be due to heredity. Moreover, race, which is a fuzzy concept, varies with social class, so socioeconomic disadvantage

may account for low IQ scores among minority students. Some researchers have suggested that stereotype vulnerability and cultural bias on IQ tests may also contribute to ethnic differences in average IQ.

New Directions in the Assessment and Study of Intelligence

- Biological indexes of intelligence are being explored; however, they seem to have little practical utility, although the inspection time measure appears to have potential. IQ scores appear to correlate modestly with brain size and longevity.
- Research on intelligence increasingly takes a cognitive perspective, which emphasizes the need to understand how people use their intelligence. Many modern theorists, such as Robert Sternberg and Howard Gardner, argue that the concept of intelligence should be expanded to encompass a greater variety of skills. Some theorists argue that emotional intelligence is as important as general mental ability.

Reflecting on the Chapter's Themes

- Three of our integrative themes stood out in the chapter. Our discussions of intelligence showed how heredity and environment interact to shape behavior, how psychology evolves in a sociohistorical context, and how one has to consider cultural contexts to fully understand behavior.

PERSONAL APPLICATION • Understanding Creativity

- Creativity involves the generation of original, novel, and useful ideas. Creativity does not usually involve sudden insight, and it consists of more than divergent thinking. Creativity tests are mediocre predictors of creative productivity in the real world.
- Creativity is only weakly related to intelligence. The correlations are modest, but some personality traits are associated with creativity. Recent evidence suggests that creative geniuses may exhibit heightened vulnerability to psychological disorders, especially mood disorders.

CRITICAL THINKING APPLICATION • The Intelligence Debate, Appeals to Ignorance, and Reification

- The appeal to ignorance involves misusing the general lack of knowledge or information on an issue to support an argument. This fallacy has surfaced in the debate about intelligence, wherein it has been argued that because we have little or no evidence that intelligence can be increased by environmental interventions, intelligence must be mostly inherited.
- Reification occurs when a hypothetical construct is treated as though it were a tangible object. The concepts of intelligence and heritability have both been subject to reification.

Key Terms

Achievement tests (p. 336)
Aptitude tests (p. 336)
Construct validity (p. 339)
Content validity (p. 339)
Convergent thinking (p. 367)
Correlation coefficient (p. 338)
Creativity (p. 366)
Criterion-related validity (p. 339)
Deviation IQ scores (p. 344)
Divergent thinking (p. 367)
Emotional intelligence (p. 365)
Heritability ratio (p. 354)
Intelligence quotient (IQ) (p. 341)
Intelligence tests (p. 336)
Mental age (p. 341)
Mental retardation (p. 349)
Normal distribution (p. 343)
Percentile score (p. 336)
Personality tests (p. 336)

Psychological test (p. 336)
Reaction range (p. 356)
Reification (p. 371)
Reliability (p. 338)
Standardization (p. 336)
Test norms (p. 336)
Validity (p. 338)

Key People

Alfred Binet (p. 341)
Francis Galton (p. 341)
Howard Gardner (pp. 363–364)
Arthur Jensen (pp. 356–357)
Sandra Scarr (p. 356)
Claude Steele (pp. 359–360)
Robert Sternberg (p. 363)
Lewis Terman (pp. 341–342)
David Wechsler (p. 342)
Ellen Winner (p. 351)

CHAPTER 9 Practice Test

1. Which of the following does not belong with the others?
 - A. aptitude tests
 - B. personality tests
 - C. intelligence tests
 - D. achievement tests
2. If you score at the 75th percentile on a standardized test, it means that:
 - A. 75% of those who took the test scored better than you did.
 - B. 25% of those who took the test scored less than you did.
 - C. 75% of those who took the test scored the same or less than you did.
 - D. you answered 75% of the questions correctly.
3. If a test has good test-retest reliability:
 - A. there is a strong correlation between items on the test.
 - B. it accurately measures what it says it measures.
 - C. it can be used to predict future performance.
 - D. the test yields similar scores if taken at two different times.
4. Which of the following is a true statement regarding Francis Galton?
 - A. He took the position that intelligence is largely determined by heredity.
 - B. He advocated the development of special programs to tap the intellectual potential of the culturally disadvantaged.
 - C. He developed tests that identified those children who were unable to profit from a normal education.
 - D. He took the position that intelligence is more a matter of environment than heredity.
5. On most modern IQ tests, a score of 115 would be:
 - A. about normal.
 - B. about 15% higher than the average of one's age mates.
 - C. an indication of genius.
 - D. one standard deviation above the mean.
6. IQ tests have proven to be good predictors of:
 - A. social intelligence.
 - B. practical problem-solving intelligence.
 - C. school performance.
 - D. all of the above.
7. Mr. and Mrs. Proudparent are beaming because their son, little Newton, has been selected for a gifted children program at school. They think Newton is a genius. What sort of advice do they need to hear?
 - A. Youngsters with a 130–140 IQ tend to be very maladjusted.
 - B. Most gifted children do not go on to make genius-level, major contributions to society that earn them eminence.
 - C. They should prepare to be famous, based on their parentage of Newton.
 - D. They should be warned that gifted children often have deficits in practical intelligence.
8. Which of the following is a true statement about mental retardation?
 - A. Most retarded people are unable to live normal lives because of their mental deficiencies.
 - B. With special tutoring, a mentally retarded person can attain average intelligence.
 - C. The majority of mentally retarded people fall in the mildly retarded category.
 - D. Diagnoses of mental retardation should be based exclusively on IQ scores.
9. Most school districts consider children who _____ to be gifted.
 - A. have IQ scores above 115
 - B. score in the upper 2%–3% of the IQ distribution
 - C. have parents in professional careers
 - D. demonstrate high levels of leadership and creativity
10. In which of the following cases would you expect to find the greatest similarity in IQ?
 - A. between fraternal twins
 - B. between identical twins
 - C. between nontwin siblings
 - D. between parent and child
11. Evidence indicating that upbringing affects one's mental ability is provided by which of the following findings?
 - A. Identical twins are more similar in IQ than fraternal twins.
 - B. There is more than a chance similarity between adopted children and their biological parents.
 - C. Siblings reared together are more similar in IQ than siblings reared apart.
 - D. Identical twins reared apart are more similar in IQ than siblings reared together.
12. Which of the following is a likely consequence of stereotype vulnerability for members of minority groups?
 - A. Academic motivation declines.
 - B. Academic performance often suffers.
 - C. Standardized tests may be especially anxiety arousing.
 - D. All of the above are likely consequences.
13. The triarchic theory of intelligence, which emphasizes a cognitive perspective, was developed by:
 - A. Howard Gardner.
 - B. Arthur Jensen.
 - C. Claude Steele.
 - D. Robert Sternberg.
14. When you try to narrow down a list of alternatives to arrive at a single correct answer, you engage in:
 - A. convergent thinking.
 - B. divergent thinking.
 - C. creativity.
 - D. insight.
15. Nora has a blind date with Nick who, she's been told, is considered a true genius by the faculty in the art department. Now she's having second thoughts, because she's always heard that geniuses are a little off their rocker. Does she have reason to be concerned?
 - A. Yes. It's been well documented that the stress of creative achievement often leads to schizophrenic symptoms.
 - B. No. Extensive research on creativity and psychological disorders shows no evidence for any connection.
 - C. Perhaps. There is evidence of a correlation between major creative achievement and vulnerability to mood disorders.
 - D. Of course not. The stereotype of the genius who's mentally ill is purely a product of the jealousy of untalented people.

1 B. 336	6 C. 346–347	11 C. 353–354	16 C. 368–369
2 C. 336–337	7 B. 351–352	12 D. 359–360	17 A. 367
3 D. 338	8 C. 349–350	13 D. 363	18 A. 367
4 A. 341	9 B. 350	14 A. 367	19 C. 368–369
5 D. 344–345	10 B. 353	15 C. 368–369	

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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Motivation and Emotion

Motivational Theories and Concepts

- Drive Theories
- Incentive Theories
- Evolutionary Theories
- The Range and Diversity of Human Motives

The Motivation of Hunger and Eating

- Biological Factors in the Regulation of Hunger
- Environmental Factors in the Regulation of Hunger
- Eating and Weight: The Roots of Obesity

Sexual Motivation and Behavior

- Determinants of Sexual Desire
- Evolutionary Analyses of Human Sexual Behavior

FEATURED STUDY • Evolution, Culture, and Mating Priorities

- The Mystery of Sexual Orientation
- The Human Sexual Response

Achievement: In Search of Excellence

- Individual Differences in the Need for Achievement
- Situational Determinants of Achievement Behavior

The Elements of Emotional Experience

- The Cognitive Component: Subjective Feelings
- The Physiological Component:
 - Diffuse and Multifaceted
- The Behavioral Component:
 - Nonverbal Expressiveness
- Culture and the Elements of Emotion

Theories of Emotion

- James-Lange Theory
- Cannon-Bard Theory
- Schachter's Two-Factor Theory
- Evolutionary Theories of Emotion

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Exploring the Ingredients of Happiness

- How Happy Are People?
- Factors That Do Not Predict Happiness
- Moderately Good Predictors of Happiness
- Strong Predictors of Happiness
- Conclusions About Subjective Well-Being

CRITICAL THINKING APPLICATION • Analyzing Arguments: Making Sense out of Controversy

- The Anatomy of an Argument
- Common Fallacies
- Evaluating the Strength of Arguments

Recap

Practice Test



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It was a bright afternoon in May 1996, and 41-year-old Jon Krakauer was on top of the world—literally. Krakauer had just fulfilled a boyhood dream by climbing Mount Everest, the tallest peak on Earth. Clearing the ice from his oxygen mask, he looked down on a sweeping vista of ice, snow, and majestic mountains. His triumph should have brought him intense joy, but he felt strangely detached. “I’d been fantasizing about this moment, and the release of emotion that would accompany it, for many years,” he wrote later. “But now that I was finally here, standing on the summit of Mount Everest, I just couldn’t summon the energy to care” (Krakauer, 1998, p. 6).

Why were Krakauer’s emotions so subdued? A major reason was that he was physically spent. Climbing Mount Everest is an incredibly grueling experience. At just over 29,000 feet, the mountain’s peak is at the altitude flown by jumbo jets. Because such high altitudes wreak havoc on the human body, Krakauer and his fellow climbers couldn’t even approach the summit until they had spent six weeks acclimating at Base Camp, 17,600 feet above sea level. Even getting that far would test the limits of most people’s endurance. At Base Camp, Krakauer found that ordinary bodily functions became painfully difficult. On most nights, he awoke three or four times, gasping for breath and feeling like he was suffocating. His appetite vanished, and his oxygen-starved digestive system failed to metabolize food normally. “My body began consuming itself for sustenance. My arms and legs gradually began to wither to sticklike proportions” (Krakauer, 1998, p. 87).

At this point you may be wondering why anyone would willingly undergo such extreme discomfort, but Base Camp was just the beginning. From Base Camp it is another two vertical miles through the aptly named Death Zone to the summit. Even for a fully acclimated climber, the final leg of the ascent is excruciating. By the time Krakauer reached the summit, every step was labored, every gasping breath hurt. He hadn’t slept in 57 hours, and he had two separated ribs from weeks of violent coughing. He was bitterly cold and utterly exhausted. Instead of elation, he felt only apprehension. Even though his oxygen-starved brain was barely functioning, he understood that getting down from the summit would be fully as dangerous as getting up.

Tragically, events proved just how dangerous an assault on Everest can be. During Krakauer’s descent, a sudden, howling storm hit the mountain. Winds exceeding 100 miles per hour whipped the snow into a blinding white blur and sent the temperature plummeting. While Krakauer barely escaped with his life,

12 men and women died on the mountain, including several in Krakauer’s own party. Some of them perished needlessly because they had fallen victim to “summit fever.” Once they got close to the top, they refused to turn back despite extreme exhaustion and the obvious threat posed by the storm.

The saga of Jon Krakauer and the other climbers is packed with motivation riddles. Why would people push on toward a goal even at the risk of their lives? Why would they choose to endure such a punishing and hazardous ordeal in the first place? In the case of Mount Everest, perhaps the most obvious motive is simply the satisfaction of conquering the world’s tallest peak. When British climber George Leigh Mallory was asked why he wanted to climb Everest in the 1920s, his famous reply was, “Because it is there.” Some people seem to have an intense desire to take on the toughest challenges imaginable, to achieve something incredibly difficult. Yet—as is usually the case with human behavior—things are not quite so simple. Krakauer observed that a wide variety of motives drove the climbers and professional expedition leaders he met on Everest, including desires for “minor celebrity, career advancement, ego massage, ordinary bragging rights, filthy lucre,” and even a quest for “a state of grace” (Krakauer, 1998, p. 177).

Jon Krakauer (the third person) and other climbers are seen here during their ascent of Mount Everest at an elevation of about 28,200 feet.

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Krakauer's story is also filled with strong emotions. He anticipated that he would experience a transcendent emotional high when he reached the summit of Mount Everest. As it turned out, his triumph was accompanied more by anxiety than by ecstasy. And though the harrowing events that followed left him

emotionally numb at first, he was soon flooded with intense feelings of despair, grief, and guilt over the deaths of his companions. His tale illustrates the intimate connection between motivation and emotion—the topics we'll examine in this chapter.

> Motivational Theories and Concepts

PREVIEW QUESTIONS

- What is the distinction between drive and incentive theories of motivation?
- How do evolutionary theories explain various motives?
- What are the two major categories of human motives?

Motives are the needs, wants, interests, and desires that propel people in certain directions. In short, **motivation involves goal-directed behavior**. Psychologists have developed a number of theoretical approaches to motivation. Let's look at some of these theories and the concepts they employ.

Drive Theories

Many theories view motivational forces in terms of *drives*. The drive concept appears in a diverse array of theories that otherwise have little in common, such as psychoanalytic (Freud, 1915) and behaviorist for-

mulations (Hull, 1943). This approach to understanding motivation was explored most fully by Clark Hull in the 1940s and 1950s.

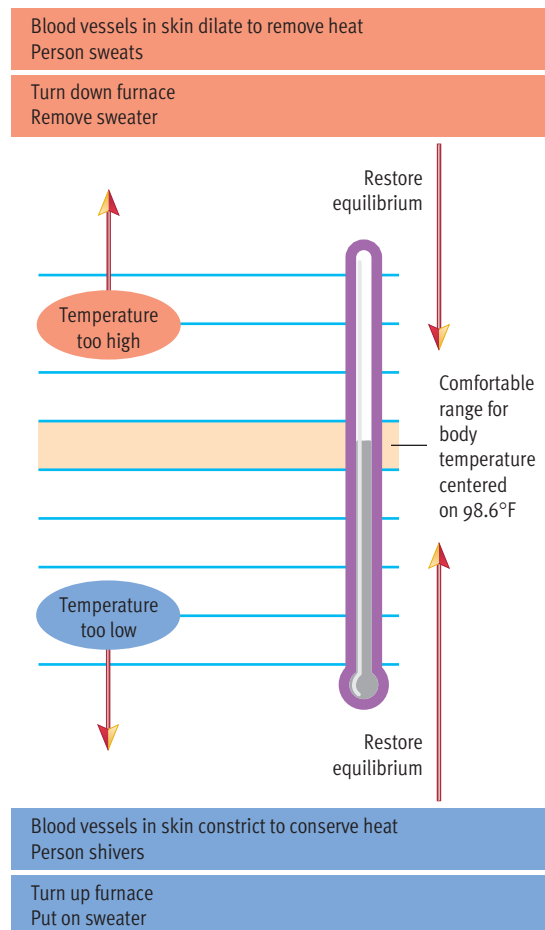
Hull's concept of drive was derived from Walter Cannon's (1932) observation that organisms seek to maintain **homeostasis, a state of physiological equilibrium or stability**. The body maintains homeostasis in various ways. For example, human body temperature normally fluctuates around 98.6 degrees Fahrenheit (see **Figure 10.1**). If your body temperature rises or drops noticeably, automatic responses occur: If your temperature goes up, you'll perspire; if your temperature goes down, you'll shiver. These reactions are designed to move your temperature back toward 98.6 degrees. Thus, your body reacts to many disturbances in physiological stability by trying to restore equilibrium.

Drive theories apply the concept of homeostasis to behavior. **A drive is an internal state of tension that motivates an organism to engage in activities that should reduce this tension**. These unpleasant states of tension are viewed as disruptions of the preferred equilibrium. According to drive theories, when individuals experience a drive, they're motivated to pursue actions that will lead to *drive reduction*. For example, the hunger motive has usually been conceptualized as a drive system. If you go without food for a while, you begin to experience some discomfort. This internal tension (the drive) motivates you to obtain food. Eating reduces the drive and restores physiological equilibrium.

Drive theories have been very influential, and the drive concept continues to be widely used in modern psychology. *However, drive theories were not able to explain all motivation* (Berridge, 2004). Homeostasis appears irrelevant to some human motives, such as a "thirst for knowledge." Also, motivation may exist without drive arousal. This point is easy to illustrate. Think of all the times that you've eaten when you weren't the least bit hungry. You're driving or walking home from class, amply filled by a solid lunch, when an ice cream parlor beckons seductively. You stop in and have a couple of scoops of your favorite flavor.

Figure 10.1

Temperature regulation as an example of homeostasis. The regulation of body temperature provides a simple example of how organisms often seek to maintain homeostasis, or a state of physiological equilibrium. When your temperature moves out of an acceptable range, automatic bodily reactions (such as sweating or shivering) occur that help restore equilibrium. Of course, these automatic reactions may not be sufficient by themselves, so you may have to take other actions (such as turning a furnace up or down) to bring your body temperature back into its comfort zone.



Not only are you motivated to eat in the absence of internal tension, you may cause yourself some internal tension—from overeating. Because drive theories assume that people always try to reduce internal tension, they can’t explain this behavior very well. Incentive theories, which represent a different approach to motivation, can account for this behavior more readily.

Incentive Theories

Incentive theories propose that external stimuli regulate motivational states (Bolles, 1975; McClelland, 1975; Skinner, 1953). **An incentive is an external goal that has the capacity to motivate behavior.** Ice cream, a juicy steak, a monetary prize, approval from friends, an A on an exam, and a promotion at work are all incentives. Some of these incentives may reduce drives, but others may not.

Drive and incentive models of motivation are often contrasted as *push versus pull* theories. Drive theories emphasize how *internal* states of tension *push* people in certain directions. Incentive theories emphasize how *external* stimuli *pull* people in certain directions. According to drive theories, the source of motivation lies *within* the organism. According to incentive theories, the source of motivation lies *outside* the organism, in the environment. This means that incentive models don’t operate according to the principle of homeostasis, which hinges on internal changes in the organism. Thus, in comparison to drive theories, incentive theories emphasize environmental factors and downplay the biological bases of human motivation.

Evolutionary Theories

Psychologists who take an evolutionary perspective assert that human motives and those of other species are the products of natural selection, just as anatomical characteristics are (Durrant & Ellis, 2003). They argue that natural selection favors behaviors that maximize reproductive success—that is, passing on genes to the next generation. Thus, they explain motives such as affiliation, achievement, dominance, aggression, and sex drive in terms of their adaptive value. If dominance is a crucial motive for a species, they say, it’s because dominance provides a reproductive or survival advantage.

Evolutionary analyses of motivation are based on the premise that motives can best be understood in terms of the adaptive problems they solved for our hunter-gatherer ancestors (Tooby & Cosmides, 2005). For example, the need for dominance is thought to be greater in men than in women because it could facilitate males’ reproductive success in a variety of

ways: (1) Females may prefer mating with dominant males, (2) dominant males may poach females from subordinate males, (3) dominant males may intimidate male rivals in competition for sexual access, and (4) dominant males may acquire more material resources, which may increase mating opportunities (Buss, 1999). Consider, also, the *affiliation motive*, or need for belongingness. The adaptive benefits of affiliation for our ancient ancestors probably included help with rearing offspring, collaboration in hunting or defense, opportunities for sexual interaction, and so forth (Baumeister & Leary, 1995). David Buss (1995) points out that it is no accident that achievement, power (dominance), and intimacy are among the most heavily studied social motives, as the satisfaction of each of these motives is likely to affect one’s reproductive success.

The Range and Diversity of Human Motives

Motivational theorists of all persuasions agree on one point: Humans display an enormous diversity of motives. Most theories (evolutionary theories being a notable exception) distinguish between *biological motives* that originate in bodily needs, such as hunger, and *social motives* that originate in social experiences, such as the need for achievement.

People have a limited number of biological needs. According to K. B. Madsen (1968, 1973), most theories identify 10 to 15 such needs, some of which are listed on the left side of **Figure 10.2**. As you can see, most biological motives reflect needs that are essen-

Figure 10.2
The diversity of human motives. People are motivated by a wide range of needs, which can be divided into two broad classes: biological motives and social motives. The list on the left (adapted from Madsen, 1973) shows some important biological motives in humans. The list on the right (adapted from Murray, 1938) provides examples of prominent social motives in humans. The distinction between biological and social motives is not absolute.

Examples of Biological Motives in Humans	Examples of Social Motives in Humans
Hunger motive Thirst motive Sex motive Temperature motive (need for appropriate body temperature) Excretory motive (need to eliminate bodily wastes) Sleep and rest motive Activity motive (need for optimal level of stimulation and arousal) Aggression motive	Achievement motive (need to excel) Affiliation motive (need for social bonds) Autonomy motive (need for independence) Nurturance motive (need to nourish and protect others) Dominance motive (need to influence or control others) Exhibition motive (need to make an impression on others) Order motive (need for orderliness, tidiness, organization) Play motive (need for fun, relaxation, amusement)

tial to survival, such as the needs for food, water, and maintenance of body temperature within an acceptable range.

People all share the same biological motives, but their social motives vary depending on their experiences. For example, we all need to eat, but not everyone acquires a need for orderliness. Although people have a limited number of biological motives, they can acquire an unlimited number of social motives through learning and socialization. Some examples of social motives—from an influential list compiled by Henry Murray (1938)—are shown on the right side

of **Figure 10.2**. He theorized that most people have needs for achievement, autonomy, affiliation, dominance, exhibition, and order, among other things. Of course, the strength of these motives varies from person to person, depending on personal history.

Given the range and diversity of human motives, we can examine only a handful in depth. To a large degree, our choices reflect the motives psychologists have studied the most: hunger, sex, and achievement. After discussing these motivational systems, we will explore the elements of emotional experience and examine various theories of emotion.

> The Motivation of Hunger and Eating

PREVIEW QUESTIONS

- Which brain centers appear to control the experience of hunger?
- How do fluctuations in blood glucose and hormones contribute to hunger?
- How is eating influenced by the availability and palatability of food?
- How is eating influenced by learned habits and stress?
- How common and how dangerous is obesity?
- What have scientists learned about the causes of obesity?

Why do people eat? Because they're hungry. What makes them hungry? A lack of food. Any grade-school child can explain these basic facts. So hunger is a simple motivational system, right? Wrong! Hunger is deceptive. It only looks simple. Actually, it's a puzzling and complex motivational system. Despite extensive studies, scientists are still struggling to understand the factors that regulate hunger and eating behavior. Let's examine a few of these factors.

Biological Factors in the Regulation of Hunger



You have probably had embarrassing occasions when your stomach growled loudly at an inopportune moment. Someone may have commented, "You must be starving!" Most people equate a rumbling stomach with hunger, and, in fact, the first scientific theories of hunger were based on this simple equation. In an elaborate 1912 study, Walter Cannon and A. L. Washburn verified what most people have noticed based on casual observation: There is an association between stomach contractions and the experience of hunger.

Based on this correlation, Cannon theorized that stomach contractions *cause* hunger. However, as we've seen before, correlation is no assurance of causation, and his theory was eventually discredited. Stomach contractions sometimes accompany hunger (the association is actually rather weak), but they don't cause it. How do we know? Because later research showed that people continue to experience hunger even after their stomachs have been removed out of medical necessity (Wangensteen & Carlson, 1931). If hunger can occur without a stomach, then stomach contractions can't be the cause of hunger. This realization led to more complex theories of hunger that focus

on (1) the role of the brain, (2) blood sugar level, and (3) hormones.

Brain Regulation



Research with laboratory animals eventually suggested that the experience of hunger is controlled in the brain—specifically, in two centers in the hypothalamus. As we have noted before, the *hypothalamus* is a tiny structure involved in the regulation of a variety of biological needs related to survival (see **Figure 10.3**). Investigators found that when they lesioned animals' *lateral hypothalamus (LH)*, the animals showed little or no interest in eating, as if their hunger center had been destroyed (Anand & Brobeck, 1951). In contrast, when researchers lesioned animals' *ventromedial nucleus of the hypothalamus (VMH)*, the animals ate excessively and gained weight rapidly, as if their ability to recognize satiety (fullness) had been destroyed (Brobeck, Tepperman, & Long, 1943). Given these results, investigators concluded that the LH and VMH were the brain's on-off switches for the control of hunger (Stellar, 1954). However, over the course of several decades, several empirical findings complicated this simple picture and undermined the dual-centers model of hunger (Valenstein, 1973; Winn,



The rat on the left has had its ventromedial hypothalamus lesioned, resulting in a dramatic increase in weight.

1995). For example, it turns out that VMH lesions trigger physiological reactions that divert incoming nutrients into fat storage so that animals have to continue eating to meet immediate energy needs (Woods & Stricker, 1999). VMH lesions do *not* wipe out the brain's satiety center. In any event, the current thinking is that the lateral and ventromedial areas of the hypothalamus are elements in the neural circuitry that regulates hunger but are not the key elements and are not simple on-off centers. Today, scientists believe that another area of the hypothalamus—the *paraventricular nucleus (PVN)*—plays a larger role in the modulation of hunger (Woods et al., 2000) (see **Figure 10.3**).

Contemporary theories of hunger focus more on *neural circuits* that pass through the hypothalamus rather than on *anatomical centers* in the brain. These circuits depend on a variety of neurotransmitters, with neuropeptide Y and serotonin playing particularly prominent roles (Halford & Blundell, 2000; Seeley & Schwartz, 1997). Accumulating evidence suggests that the hypothalamus contains a confluence of interacting systems that regulate eating by monitoring a diverse array of physiological processes (Leibowitz

& Hoebel, 1998). Let's look at some other physiological processes that appear to provide input to these systems.

Glucose and Digestive Regulation



Much of the food taken into the body is converted into *glucose*, which circulates in the blood. **Glucose is a simple sugar that is an important source of energy.** Manipulations that decrease blood glucose level can increase hunger. Manipulations that increase glucose level can make people feel satiated. Based on these findings, Jean Mayer (1955, 1968) proposed that hunger is regulated by the rise and fall of blood glucose levels. *Glucostatic theory* proposed that fluctuations in blood glucose level are monitored in the brain by **glucostats—neurons sensitive to glucose in the surrounding fluid.** Like the dual-centers theory, the glucostatic theory of hunger gradually ran into a number of complications, not the least of which was that glucose levels in the blood really don't fluctuate all that much or all that fast (LeMagnen, 1981). Nonetheless, some researchers continue to believe that glucostatic mechanisms *contribute* to the modulation of eating (Smith & Campfield, 1993).

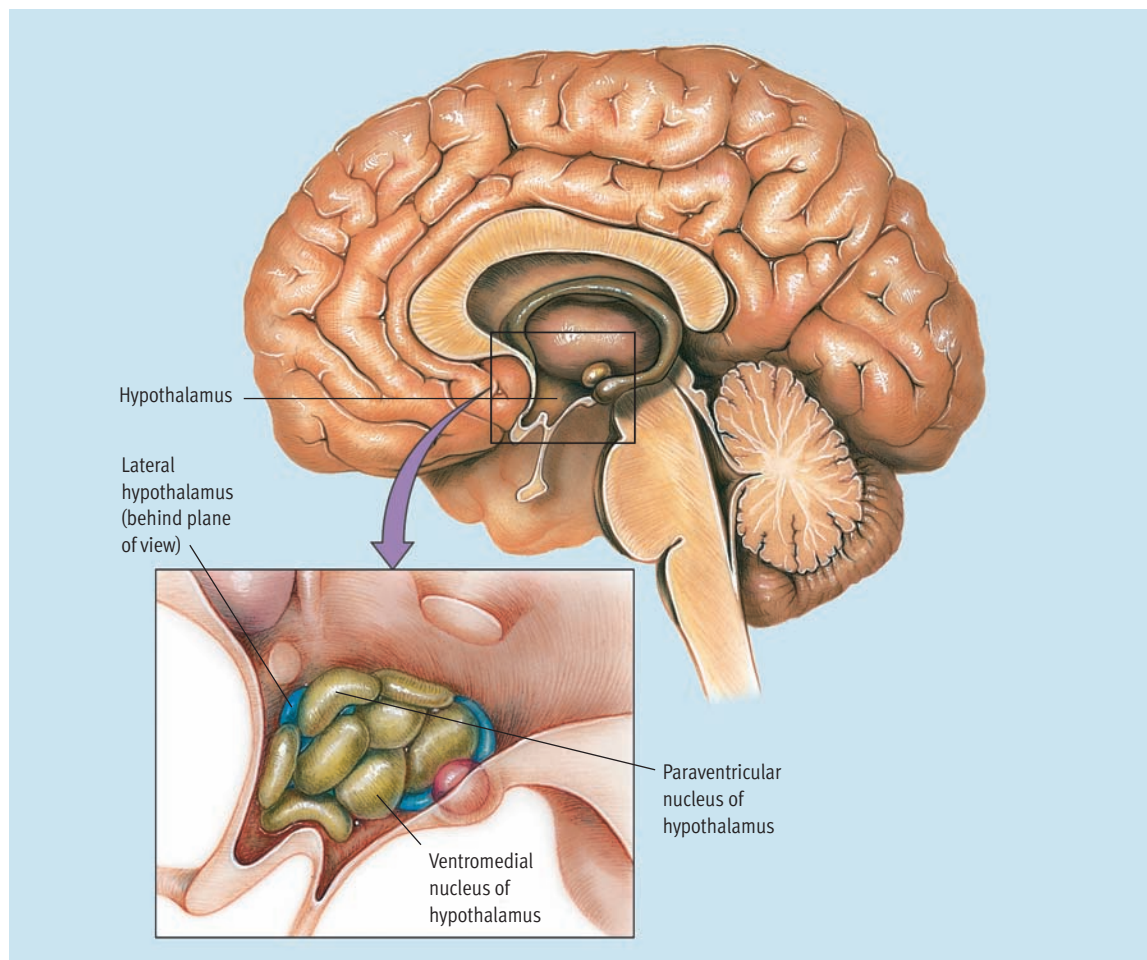


Figure 10.3

The hypothalamus. This small structure at the base of the forebrain plays a role in regulating a variety of human biological needs, including hunger. The detailed blowup shows that the hypothalamus is made up of a variety of discrete areas. Scientists used to believe that the lateral and ventromedial areas were the brain's on-off centers for eating. However, more recent research suggests that the paraventricular nucleus may be more crucial to the regulation of hunger and that thinking in terms of neural circuits rather than anatomical centers makes more sense.

The digestive system also includes a variety of other mechanisms that influence hunger (Ritter, 2004). It turns out that Walter Cannon was not entirely wrong in hypothesizing that the stomach regulates hunger. After you have consumed food, cells in the stomach can send signals to the brain that inhibit further eating (Deutsch, 1990). For example, the vagus nerve carries information about the stretching of the stomach walls that indicates when the stomach is full. Other nerves carry satiety messages that depend on how rich in nutrients the contents of the stomach are.

Hormonal Regulation

A variety of hormones circulating in the bloodstream also appear to contribute to the regulation of hunger. *Insulin* is a hormone secreted by the pancreas. It must be present for cells to extract glucose from the blood. Indeed, an inadequate supply of insulin is what causes diabetes. Insulin levels increase when people eat. And, in landmark research that blurred the distinction between biological and environmental determinants of hunger, Judith Rodin (1985) demonstrated that the mere sight and smell of enticing food can stimulate the secretion of insulin, as people prepare to eat. Moreover, insulin levels appear to be sensitive to fluctuations in the body's fat stores (Schwartz et al., 2000). These findings suggest that insulin secretions play a role in the fluctuation of hunger.

Finally, the discovery of a previously undetected hormone, since christened *leptin*, has shed new light on the hormonal regulation of hunger, as well as the regulation of numerous other bodily functions (Ahima & Osei, 2004). Leptin is produced by fat cells throughout the body and released into the bloodstream. Higher levels of fat generate higher levels of leptin (Schwartz et al., 1996). Leptin circulates through the bloodstream and ultimately provides the hypothalamus with information about the body's fat stores (Campfield, 2002). When leptin levels are high, the propensity to feel hungry diminishes. Leptin apparently activates receptors in the brain that inhibit the release of neuropeptide Y, which leads to activity in the paraventricular nucleus of the hypothalamus, which inhibits eating (Schwartz et al., 2000). Researchers are currently exploring whether leptin itself or drugs that affect leptin levels might be helpful to people trying to lose weight (Heshka & Heymsfield, 2002).

If all this sounds confusing, it is, and I haven't even mentioned *all* the physiological processes involved in the regulation of hunger. Frankly, researchers are still struggling to figure out how all these processes work together, as hunger depends on complex interactions between neural circuits, neurotransmitter systems, digestive processes, and hormonal fluctuations.

Environmental Factors in the Regulation of Hunger



Hunger clearly is a biological need, but eating is not regulated by biological factors alone. Studies show that social and environmental factors govern eating to a considerable extent. Three key environmental factors are (1) the availability and palatability of food, (2) learned preferences and habits, and (3) stress.

Food Availability and Related Cues



Most of the research on the physiological regulation of hunger has been based on the assumption that hunger operates as a drive system in which homeostatic mechanisms are at work. However, some theorists emphasize the incentive value of food and argue that humans and other animals are often motivated to eat not by the need to compensate for energy deficits but by the anticipated pleasure of eating (Hetherington & Rolls, 1996; Ramsay et al., 1996). This perspective has been bolstered by evidence that the following variables exert significant influence over food consumption:

- **Palatability.** As you might expect, the better food tastes, the more of it people consume (de Castro et al., 2000; Pliner & Mann, 2004). This principle is not limited to humans, as the eating behavior of rats and other animals is also influenced by palatability.
- **Quantity available.** A powerful determinant of the amount eaten is the amount available. People tend to consume what is put in front of them. The more people are served, the more they eat (Mrdjenovic & Levitsky, 2005; Rozin et al., 2003). Obviously, the large portions served in modern American restaurants foster increased consumption.
- **Variety.** Humans and animals increase their consumption when a greater variety of foods is available

According to incentive models of hunger, the availability and palatability of food are key factors regulating hunger. An abundance of diverse foods tends to lead to increased eating.



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(Raynor & Epstein, 2001). As you eat a specific food, its incentive value declines (Vandewater & Vickers, 1996). This phenomenon is called *sensory-specific satiety*. If only a few foods are available, the appeal of all of them can decline quickly. But if many foods are available, people can keep shifting to new foods and end up eating more overall. This principle explains why people are especially likely to overeat at buffets where many foods are available.

- *Presence of others.* On average, individuals eat 44% more when they eat with other people than when they eat alone (de Castro, 2000). The more people who are present, the longer the duration of the meal and the more one tends to eat. This curious finding is another example of the disconnect between homeostasis-driven hunger and what people actually eat.

Eating can also be triggered by exposure to environmental cues that have been associated with food. You have no doubt had your hunger aroused by television commercials for delicious-looking food or by seductive odors coming from the kitchen. Consistent with this observation, studies have shown that hunger can be increased by exposure to pictures, written descriptions, and video depictions of attractive foods (Halford et al., 2004; Marcelino et al., 2001; Oakes & Slotterback, 2000). Thus, it's clear that hunger and eating are governed in part by the incentive qualities of food.

Learned Preferences and Habits



Are you fond of eating calves' brains? How about eels or snakes? Could I interest you in a grasshopper or some dog meat? Probably not, but these are delicacies in some regions of the world. Arctic Eskimos like to eat maggots! You probably prefer chicken, apples, eggs, lettuce, potato chips, pizza, cornflakes, or ice cream. These preferences are acquired through learning. People from different cultures display very different patterns of food consumption (Kittler & Sucher, 1998). If you doubt this fact, just visit a grocery store in an ethnic neighborhood (not your own, of course). As Paul Rozin (1996) points out, immigrant groups "seem to retain their ethnic identity through food long after they have become assimilated in most other ways" (p. 20).

Humans do have some innate taste preferences of a general sort. For example, a preference for sweet tastes is present at birth (Menella & Beauchamp, 1996), and humans' preference for high-fat foods appears to be at least partly genetic in origin (Schiffman et al., 1998). Evidence also suggests that an unlearned preference for salt emerges at around four months of age in humans (Birch & Fisher, 1996). Nonetheless, learn-

ing wields a great deal of influence over what people prefer to eat (Booth, 1994). Taste preferences are partly a function of learned associations formed through classical conditioning (Capaldi, 1996). For example, youngsters can be conditioned to prefer flavors paired with high caloric intake or other pleasant events. Of course, as we learned in Chapter 6, taste aversions can also be acquired through conditioning when foods are followed by nausea (Schafe & Bernstein, 1996).

Eating habits are also shaped by observational learning (see Chapter 6). To a large degree, food preferences are a matter of exposure (Rozin, 1990). People generally prefer familiar foods. But geographical, cultural, religious, and ethnic factors limit people's exposure to various foods. Young children are more likely to taste an unfamiliar food if an adult tries it first. Repeated exposures to a new food usually lead to increased liking. However, as many parents have learned the hard way, forcing a child to eat a specific food can backfire—coercion tends to have a negative effect on a youngster's preference for the mandated food (Birch & Fisher, 1996). Learned habits and social considerations also influence *when* and *how much* people eat. For example, a key determinant of when people eat is their memory of how much time has passed since they ate their last meal and what they consumed (Rozin et al., 1998). These expectations about how often and how much one should eat are the product of years of learning.

Stress and Eating



When I have an exceptionally stressful day, I often head for the refrigerator, a grocery store, or a restaurant—usually in pursuit of something chocolate. My response is not particularly unusual. Studies have shown that stress leads to increased eating in a substantial portion of people (Greeno & Wing, 1994; Laitinen, Ek, & Sovio, 2002). Some studies suggest

Food preferences are influenced greatly by culture. For example, the grilled bat shown here would not be a popular treat for most Americans, but it is a delicacy in some cultures.

Image Not Available

that stress-induced eating may be especially common among chronic dieters (Heatherton, Striepe, & Wittenberg, 1998). Some theorists believe that it is stress-induced *physiological arousal* rather than stress itself that stimulates eating (Striegel-Moore & Rodin, 1986). Other researchers suspect that it is the *negative emotions* often evoked by stress that promote additional eating (Macht & Simons, 2000). Some people respond to emotional distress by eating tasty foods because they expect the enjoyable treats to make them feel better (Tice, Bratslavsky, & Baumeister, 2001). Unfortunately, this strategy of emotional regulation does not appear to be very effective, as eating does not usually lead to lasting mood changes (Thayer, 1996). In any event, stress is another environmental factor that can influence hunger, although it's not clear whether the effects are direct or indirect.

Eating and Weight: The Roots of Obesity

As we've seen, hunger is regulated by a complex interaction of biological and psychological factors. The same kinds of complexities emerge when investigators explore the roots of **obesity, the condition of being overweight**. The criteria for obesity vary considerably. One simple criterion is to classify people as obese if their weight exceeds their ideal body weight by 20%. If this criterion is used, 31% of men and 35% of women in the United States qualify as obese (Brownell & Wadden, 2000). Many experts prefer to assess obesity in terms of **body mass index (BMI)—weight (in kilograms) divided by height (in meters) squared (kg/m^2)**. This increasingly used index of weight controls for variations in height. A BMI of 25–29.9 is typically regarded as overweight and a BMI of over 30 as obese (Bjorntorp, 2002). Although American culture seems to be obsessed with slimness, recent surveys show surprisingly sharp increases in the incidence of obesity (Corsica & Perri, 2003; Mokdad et al., 2003). If a BMI over 25 is used as the cutoff, almost two-thirds of American adults are struggling with weight problems (Sarwer, Foster, & Wadden, 2004). Moreover, they are not alone—they have plenty of company from their children, as weight problems among children and adolescents have increased 15%–22% in recent decades (West et al., 2004).

If obesity merely frustrated people's vanity, there would be little cause for concern. Unfortunately, however, obesity is a significant health problem that elevates an individual's mortality risk (Flegal et al., 2005; Fontaine et al., 2003). Overweight people are more vulnerable than others to cardiovascular diseases, diabetes, hypertension, respiratory problems, gallbladder disease, stroke, arthritis, muscle and skeletal

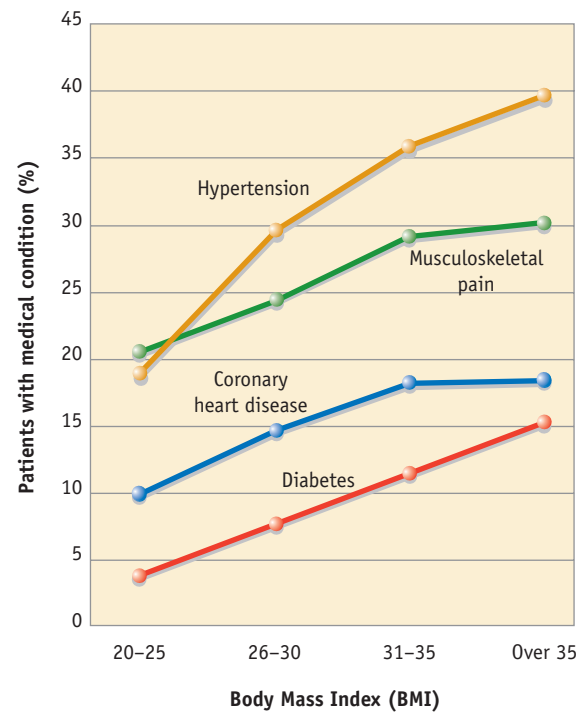


Figure 10.4

Weight and the prevalence of various diseases. This graph shows how obesity, as indexed by BMI, is related to the prevalence of four common types of illness. The prevalence of diabetes, heart disease, muscle pain, and hypertension increases as BMI goes up. Clearly, obesity is a significant health risk. (Based on data in Brownell & Wadden, 2000)

pain, and some types of cancer (Manson, Skerrett, & Willet, 2002; Pi-Sunyer, 2002). For example, **Figure 10.4** shows how the prevalence of diabetes, hypertension, coronary disease, and musculoskeletal pain are elevated as BMI increases.

Evolutionary-oriented researchers have a plausible explanation for the dramatic increase in the prevalence of obesity (Pinel et al., 2000). They point out that over the course of history, most animals and humans have lived in environments characterized by fierce competition for limited, unreliable food resources and in which starvation was a very real threat. Thus, warm-blooded, foraging animals evolved a propensity to consume more food than immediately necessary when the opportunity presented itself because food might not be available later. Excess calories were stored in the body (as fat) to prepare for future food shortages. This approach to eating remains adaptive for most species of (nondomesticated) animals that continue to struggle with the ebb and flow of unpredictable food supplies. However, in today's modern, industrialized societies, the vast majority of humans live in environments that provide an abundant, reliable supply of tasty, high-calorie food. In these environments, humans' evolved tendency to overeat when food is plentiful leads most people down a path of

Web Link 10.1



American Obesity Association

This nonprofit organization's mission is to change public policy and make obesity a public health priority. It has an incredibly rich and well-organized website. In-depth information is available on the causes, consequences, and treatments of obesity.

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chronic, excessive food consumption. According to this line of thinking, most people in food-replete environments tend to overeat in relation to their physiological needs, but because of variations in genetics, metabolism, and other factors only some become overweight.

Cognizant of the health problems associated with obesity, many heavy people attempt to lose weight. At any given time, about 21% of men and 39% of women are dieting (Hill, 2002). Recent research has provided some good news for those who need to lose weight. Studies have demonstrated that relatively modest weight reductions can significantly diminish many of the health risks associated with obesity. For example, a 10% weight loss is associated with reduced health risks (Jeffery et al., 2000). Thus, the traditional objective of obesity treatment—reducing to one's ideal weight—has been replaced by more modest and realistic goals (Sawrer et al., 2004).

Given the health concerns associated with weight problems, scientists have devoted a great deal of attention to the causes of obesity. Let's look at some of the factors they have identified.

Genetic Predisposition

You may know some people who can eat constantly without gaining weight. You may also know less fortunate people who get chubby eating far less. Differences in physiological makeup must be the cause of this paradox. Research suggests that these differences have a genetic basis (Bouchard, 2002).

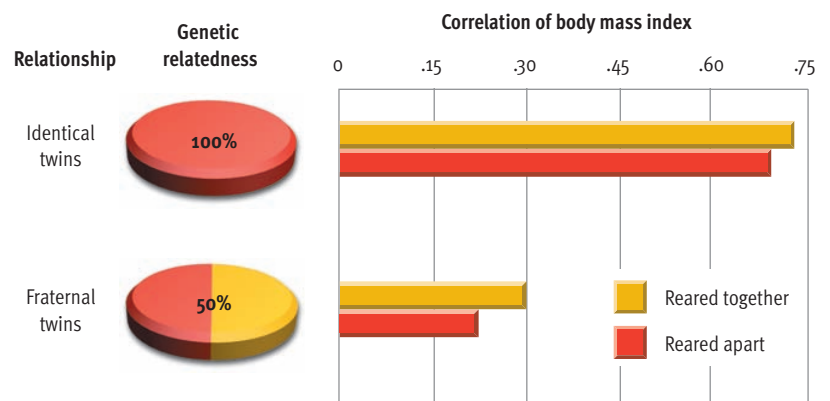
In one influential study, adults raised by foster parents were compared with their biological and foster parents in regard to body mass index (Stunkard et al., 1986). The investigators found that the adoptees resembled their biological parents much more than their adoptive parents. In a subsequent *twin study*, Stunkard and colleagues (1990) found that identical twins reared apart were far more similar in BMI than fraternal twins reared together (see **Figure 10.5**). In another study of over 4000 twins, Allison and colleagues (1994) estimated that genetic factors account

for 61% of the variation in weight among men, and 73% among women. Thus, it appears that some people inherit a genetic *vulnerability* to obesity (Cope, Fernandez, & Allison, 2004).

Excessive Eating and Inadequate Exercise

The bottom line for overweight people is that their energy intake from food consumption chronically exceeds their energy expenditure from physical activities and resting metabolic processes. In other words, they eat too much in relation to their level of exercise (Wing & Polley, 2001). In modern America, the tendency to overeat and exercise too little is easy to understand (Henderson & Brownell, 2004). Tasty, high-calorie, high-fat foods are heavily advertised and readily available nearly everywhere—not just in restaurants and grocery stores, but in shopping malls, airports, gas stations, schools, and workplaces. Nutritious foods can hardly compete with the convenience of highly caloric fast food. And when people eat out, they tend to eat larger meals and consume more high-fat food than they would have at home (French, Harnack, & Jeffery, 2000). Obesity expert Kelly Brownell (2002), argues that modern societies have created a “toxic environment” for eating. Unfortunately, this increasingly toxic environment has been paralleled by declining physical activity (Hill & Peters, 1998). Modern conveniences, such as cars and

Figure 10.5
The heritability of weight. These data from a twin study by Stunkard et al. (1990) reveal that identical twins are much more similar in body mass index than fraternal twins, suggesting that genetic factors account for much of the variation among people in the propensity to become overweight. (Data from Stunkard et al., 1990)



elevators, and changes in the world of work, such as the shift to more desk jobs, have conspired to make American lifestyles more sedentary than ever before.

The Concept of Set Point

People who lose weight on a diet have a rather strong (and depressing) tendency to gain back all the weight they lose. The reverse is also true. People who have to work to put weight on often have trouble keeping it on. According to Richard Keesey (1995), these observations suggest that your body may have a *set point*, or a natural point of stability in body weight. **Set-point theory proposes that the body monitors fat-cell levels to keep them (and weight) fairly stable.** When fat stores slip below a crucial set point, the body supposedly begins to compensate for this change (Keesey, 1993). This compensation apparently leads to increased hunger and decreased metabolism.

Studies have raised some doubts about various details of set-point theory, leading some researchers to propose an alternative called *settling-point theory* (Pinel et al., 2000). **Settling-point theory proposes that weight tends to drift around the level at which the constellation of factors that determine food consumption and energy expenditure achieve an equilibrium.** According to this view, weight tends to remain stable as long as there are no durable changes in any of the factors that influence it. Settling-point theory casts a much wider net than set-point theory,

which attributes weight stability to specific physiological processes. Another difference is that set-point theory asserts that an obese person's body will initiate processes that actively defend an excessive weight, whereas settling-point theory suggests that if an obese person makes long-term changes in eating or exercise, his or her settling point will drift downward without active resistance. Thus, settling-point theory is a little more encouraging to those who hope to lose weight.

Dietary Restraint

Some investigators have proposed that vacillations in *dietary restraint* contribute to obesity (Polivy & Herman, 1995; Wardle et al., 2000). According to this theory, chronic dieters are *restrained eaters*—people who consciously work overtime to control their eating impulses and who feel guilty when they fail. To lose weight, restrained eaters go hungry much of the time, but they are constantly thinking about food. However, when their cognitive control is disrupted, they become *disinhibited* and eat to excess (Lowe, 2002). The crux of the problem is that restrained eaters assume, “Either I am on a diet, or I am out of control.” A variety of events can disrupt restrained eaters’ control. For example, they seem to be more sensitive than others to food cues and to stress (Fedoroff, Polivy, & Herman, 2003; Lattimore & Caswell, 2004). But for many, the most common source of disinhibition is simply the perception that they have cheated on their diet. “I’ve already blown it,” they think to themselves after perhaps just one high-calorie appetizer, “so I might as well enjoy as much as I want.” They then proceed to consume a large meal or to go on an eating binge for the remainder of the day. Paradoxically, then, dietary restraint is thought to lead to frequent overeating and thus contribute to obesity.

concept check 10.1



Understanding Factors in the Regulation of Hunger

Check your understanding of the effects of the various factors that influence hunger by indicating whether hunger would tend to increase or decrease in each of the situations described below. Indicate your choice by marking an I (increase), a D (decrease), or a ? (can't be determined without more information) next to each situation. You'll find the answers in Appendix A at the back of the book.

- _____ 1. The ventromedial nucleus of a rat's brain is destroyed by lesioning.
- _____ 2. The glucose level in Marlene's bloodstream decreases.
- _____ 3. Norman just ate, but his roommate just brought home his favorite food—a pizza that smells great.
- _____ 4. You're offered an exotic, strange-looking food from another culture and told that everyone in that culture loves it.
- _____ 5. You are eating at a huge buffet where an enormous variety of foods are available.
- _____ 6. Elton has been going crazy all day. It seems like everything's happening at once, and he feels totally stressed out. Finally he's been able to break away for a few minutes so he can catch a bite to eat.
- _____ 7. You are a chronic dieter, but you just broke down and ate some appetizers at a party.

➤ REVIEW OF KEY POINTS

- Drive theories apply a homeostatic model to motivation. They assume that organisms seek to reduce unpleasant states of tension called drives. In contrast, incentive theories emphasize how external goals energize behavior.
- Evolutionary theorists explain motives in terms of their adaptive value. Madsen's list of biological needs and Murray's list of social needs illustrate that a diverse array of motives govern human behavior.
- Eating is regulated by a complex interaction of biological and environmental factors. In the brain, the lateral and ventromedial areas of the hypothalamus were once viewed as on-off centers for the control of hunger, but their exact role is now unclear. Recent research suggests that hunger is regulated by neural circuits rather than anatomical centers in the brain.
- Fluctuations in blood glucose also seem to play a role in hunger, but the exact location of the “glucostats” and their mode of functioning have yet to be determined. Hormonal regulation of hunger depends primarily on insulin and leptin.

- Incentive-oriented models assert that eating is regulated by the availability and palatability of food, as well as the quantity served. Learning processes, such as classical conditioning and observational learning, exert a great deal of influence over both what people eat and how much they eat. Cultural traditions also shape food preferences. Stress can stimulate eating.
- Surveys suggest that perhaps as many as two-thirds of people in the United States are struggling with weight problems. Obesity is a serious health problem that elevates the

risk of many diseases. Evidence indicates that there is a genetic predisposition to obesity.

- Weight problems occur when people eat too much in relation to their exercise level. According to set-point theory, the body monitors fat stores to keep them fairly stable. Settling-point theory suggests that a multitude of factors contribute to weight stability. Vacillations in dietary restraint resulting in disinhibition may contribute to obesity in some people.

> Sexual Motivation and Behavior

How does sex resemble food? Sometimes it seems that people are obsessed with both. People joke and gossip about sex constantly. Magazines, novels, movies, and television shows are saturated with sexual activity and innuendo. The advertising industry uses sex to sell everything from mouthwash to designer jeans to automobiles. This intense interest in sex reflects the importance of sexual motivation. In this portion of the chapter, we'll examine the factors that influence sexual desire and sexual orientation, and we'll describe the physiology of the human sexual response.

Determinants of Sexual Desire

Sex is essential for the survival of a species, but it's not essential to an *individual's* survival. Sexual motivation is not driven by deprivation to the extent that hunger is—you can live out a long life without sex, but without food your life will be very short. Like hunger, sexual desire is influenced by a complicated network of biological and social factors.

Hormonal Regulation

Hormones secreted by the *gonads*—the ovaries in females and the testes in males—can influence sexual motivation (consult Chapter 3, **Figure 3.24**). **Estrogens are the principal class of gonadal hormones in females. Androgens are the principal class of gonadal hormones in males.** Actually, both classes of hormones are produced in both sexes, but the relative balance is much different. The hypothalamus and the pituitary gland regulate these hormonal secretions.

The influence of hormones on sexual desire can be seen quite vividly in the animal kingdom (Hull & Dominguez, 2003). In many species, females are sexually receptive only just prior to ovulation, coinciding with an elevation in circulating levels of gonadal hormones. Hormones also influence sexual desire in males. For instance, if a male rat's testes are removed,

the lack of a key androgen (testosterone) results in a lack of sexual interest. Testosterone injections can revive sexual desire in such castrated animals. Thus, it's clear that gonadal hormones regulate the sex drive in many animals.

Moving up the phylogenetic scale from rats to primates, hormones exert less and less influence over sexual behavior (Wallen & Zehr, 2004). However, several lines of evidence suggest that they do *contribute* to the modulation of sexual desire in humans. For example, males who develop an endocrine disorder called *hypogonadism* during adulthood exhibit abnormally low levels of androgens and reduced sexual motivation, which can be revived by hormone replacement therapy (Rabkin, Wagner, & Rabkin, 2000). Curiously, in *both* sexes, it is *androgen* levels that seem to influence sexual motivation. Higher levels of testosterone correlate with higher rates of sexual activity in both males and females (Davis, 2000; Regan, 1999). The correlations are modest, leading some researchers to hypothesize a threshold effect—that sex drive diminishes if androgen levels drop below some threshold, but above this threshold further increases in androgen levels have no influence on sexual motivation. Contrary to the threshold model, however, some studies have found that males with high levels of testosterone tend to start having sex at an earlier age, have greater interest in sex, have more sexual partners, and have more extramarital affairs than other men (Schmitt, 2005). So, the precise relations between hormone levels and sexual behavior are still being worked out.

Erotic Materials

According to some social critics, we live in the golden age of pornography. As Strager (2003, p. 50) puts it, "Following the proliferation of video and the dawn of the Internet, never has so much pornography been available to so many so easily." What effects do erotic photographs and films have on sexual desire? Laboratory studies show that erotic materials stimulate

PREVIEW QUESTIONS

- How much do hormones influence sexual desire in humans?
- How do erotic materials affect sexual behavior?
- How does attraction to a potential partner influence sexual behavior?
- What has evolutionary-oriented research revealed about gender differences in sexual activity?
- How do males and females differ in terms of mating preferences?

sexual desire in many people (Geer & Jansen, 2000). Generally speaking, men are more likely than women to report that they find erotic materials enjoyable and arousing (Gardos & Mosher, 1999; Koukounas & McCabe, 1997). However, this finding may partly reflect the fact that the vast majority of erotic materials are scripted to appeal to males and often portray women in degrading roles that elicit negative reactions from female viewers (Mosher & Maclan, 1994; Pearson & Pollack, 1997). Consistent with this perspective, one study found that when subjects viewed erotic films chosen by males, men rated the films as more arousing than women did, but when subjects viewed erotic films *chosen by females*, gender differences in participants' responsiveness were negligible (Janssen, Carpenter, & Graham, 2003).

How much impact does erotic material have on actual sexual behavior? The empirical data on this hotly debated question are inconsistent and are open to varied interpretations (Seto, Maric, & Barbaree, 2001). The balance of evidence suggests that exposure to erotic material elevates the likelihood of overt sexual activity for a period of hours immediately after the exposure (Both et al., 2004; Donnerstein, Linz, & Penrod, 1987). This relatively modest effect may explain why attempts to find a link between the availability of erotica and sex crime rates have largely yielded negative results. For the most part, researchers have not found correlations between greater availability of pornography and elevated rates of sex crimes (Kimmel & Linders, 1996; Kutchinsky, 1991; Nemes, 1992; Winick & Evans, 1996). Although most sex offenders admit to an extensive history of using pornographic materials, sex offenders typically do not have earlier or more extensive exposure to pornography in childhood or adolescence than other people (Bauserman, 1996), and pornography appears to play a minor role

in the commission of sexual offenses (Langevin & Curnoe, 2004).

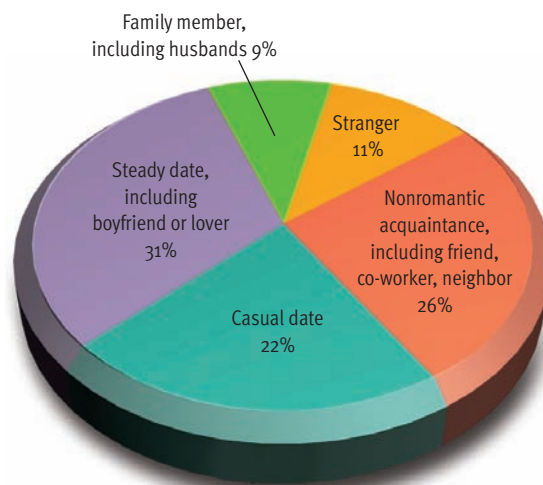
Although erotic materials don't appear to incite overpowering sexual urges, they may alter *attitudes* in ways that eventually influence sexual behavior. Zillmann and Bryant (1984) found that male and female undergraduates exposed to a large dose of pornography (three or six films per week for six weeks) developed more liberal attitudes about sexual practices. For example, they came to view premarital and extramarital sex as more acceptable. Another study by Zillmann and Bryant (1988) suggests that viewing sexually explicit films may make some people dissatisfied with their own sexual interactions. In comparison to control subjects, the subjects exposed to a steady diet of pornography reported less satisfaction with their partners' physical appearance, sexual curiosity, and sexual performance. Thus, pornography may create unrealistic expectations about sexual relations.

Moreover, research on *aggressive pornography* has raised some serious concerns about its effects. Aggressive pornography typically depicts violence against women. Many films show women who gradually give in to and enjoy rape and other sexually degrading acts after some initial resistance. Some studies indicate that this type of material increases male subjects' aggressive behavior toward women, at least in the context of the research laboratory (Donnerstein & Malamuth, 1997; Zillmann & Weaver, 1989). In the typical study, male subjects work on a laboratory task and are led to believe (falsely) that they are delivering electric shocks to other subjects. In this situation, their aggression toward females tends to be elevated after exposure to aggressive pornography. Exposure to aggressive pornography may also make sexual coercion seem less offensive and help perpetuate the myth that women enjoy being raped and ravaged (Allen et al., 1995). And these attitudes can influence actual behavior. Research suggests that males who believe that "women who are raped asked for it" are more likely than others to commit sexual assault (Chiroro et al., 2004).

The effects of aggressive pornography are especially worrisome in light of evidence about rape. It is difficult to obtain accurate information about the prevalence of rape because less than 4% of victims make reports to authorities (Fisher et al., 2003). Despite extensive rape prevention efforts, the incidence of rape appears to be unchanged (Rozee & Koss, 2001). Estimates suggest that as many as one-quarter of young women in the United States may be victims of rape or attempted rape (Campbell & Wasco, 2005; Koss, 1993). Only a minority of reported rapes are committed by strangers (see Figure 10.6). Particularly common is *date rape*, which occurs when a woman is

Figure 10.6

Rape victim-offender relationships. Based on a national survey of 3187 college women, Mary Koss and her colleagues (1988) identified a sample of 468 women who indicated that they had been a victim of rape and who provided information on their relationship to the offender. Contrary to the prevailing stereotype, only a small minority (11%) of these women were raped by a stranger. As you can see, many of the women were raped by men they were dating. (Based on data from Koss et al., 1988)



forced to have sex in the context of dating. Research suggests that date rape is a serious problem on college campuses (Banyard et al., 2005). In one survey of students at 32 colleges, 1 in 7 women reported that they had been victimized by date rape or an attempted date rape (Koss, Gidycz, & Wisniewski, 1987). Moreover, 1 in 12 men admitted either to having forced a date into sex or to having tried to do so. However, *none* of these men identified himself as a rapist. Although other factors are surely at work, many theorists believe that aggressive pornography has contributed to this failure to see sexual coercion for what it is (Malamuth, Addison, & Koss, 2000).

Attraction to a Partner

Obviously, another key consideration governing sexual desire is the availability of a potential partner and attraction to that partner. Humans are not unique in this regard. Many organisms respond to the external stimulus of an available partner. In fact, a *new* partner can revive dwindling sexual interest in many animals. This phenomenon has a curious name, *the Coolidge effect*, which derives from the following story. President Calvin Coolidge and his wife were touring a farm. Mrs. Coolidge was informed that a rooster on the farm often copulated 20 or more times in a day. “Tell that to Mr. Coolidge,” she supposedly said. When informed of the rooster’s feat, the president asked if it was always with the same hen. He was told that the rooster enjoyed a different hen each time. “Tell that to Mrs. Coolidge,” was his reply. Today, no one is sure whether the story is true, but the Coolidge effect refers to the preference for variety in sexual partners that is seen in males of many species, including rats, bulls, and monkeys (Dewsbury, 1981; Fiorino, Coury, & Phillips, 1997).

Most species of animals are *selective* in their attraction to sexual partners. As discussed in Chapter 3, in many species females choose with whom they will mate based on the males’ appearance, courtship behavior, or material assets (Alcock, 1998). Females typically prefer males who have larger or brighter ornaments. For example, female house finches are enticed by redder feathers. In other species, mating opportunities are awarded to males who can provide certain types of material goods. The female African village weaverbird, for instance, sizes up a male’s mating potential by carefully inspecting the quality of the nest he has built. If she decides that the nest isn’t solid enough to protect her offspring, she moves on to look for a male with a better nest (Buss, 1998). The strategies that organisms follow in mate selection appear to be a product of natural selection, which brings us to evolutionary analyses of human sexual behavior.

Evolutionary Analyses of Human Sexual Behavior

As you have already seen in previous chapters, the relatively new evolutionary perspective in psychology has generated intriguing hypotheses related to a variety of topics, including perception, learning, language, and problem solving. However, evolutionary theorists’ analyses of sexual behavior have drawn the most attention. Obviously, the task of explaining sexual behavior is crucial to the evolutionary perspective, given its fundamental thesis that natural selection is fueled by variations in reproductive success. The thinking in this area has been guided by Robert Trivers’s (1972) *parental investment theory*. **Parental investment refers to what each sex has to invest—in terms of time, energy, survival risk, and forgone opportunities—to produce and nurture offspring.** For example, the efforts required to guard eggs, build nests, or nourish offspring represent parental investments. In most species, striking disparities exist between males and females in their parental investment and these discrepancies shape mating strategies. According to Trivers, *members of the sex that makes the smaller investment (males in most species) will pursue mating opportunities vigorously and compete with each other for these opportunities, whereas members of the sex that makes the larger investment (females in most species) will tend to be more conservative and discriminating about mating behavior.* This rule of thumb predicts mating patterns in many types of animals. Let’s look at how this analysis applies to humans.

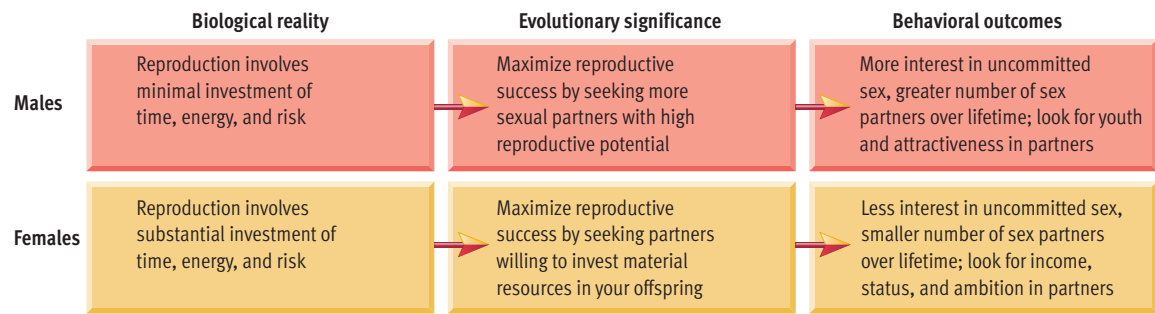
Like many mammalian species, human males are *required* to invest little in the production of offspring beyond the act of copulation, so their reproductive fitness is maximized by mating with as many females as possible. The situation for females is quite different. Females have to invest nine months in pregnancy, and our female ancestors typically had to devote at least several additional years to nourishing offspring through breastfeeding. These realities place a ceiling on the number of offspring women can produce, regardless of how many males they mate with. Hence, females have little or no incentive for mating with many males. Instead, females can optimize their reproductive potential by being selective in mating. Thus, in humans, males are thought to compete with other males for the relatively scarce and valuable “commodity” of reproductive opportunities. Parental investment theory predicts that in comparison to women, men will show more interest in sexual activity, more desire for variety in sexual partners, and more willingness to engage in uncommitted sex (see **Figure 10.7** on the next page). In contrast, females

Web Link 10.2



The Evolutionary Psychology FAQ
Maintained by Edward Hagen (Institute for Theoretical Biology, Humboldt University, Berlin), this site provides answers to a variety of controversial questions on the subject of evolutionary psychology. Covered questions include: What is an adaptation? How can we identify psychological adaptations? Is evolutionary psychology sexist? If my genes made me do it, am I still responsible? Why do some people hate evolutionary psychology?

Figure 10.7
Parental investment theory and mating preferences. Parental investment theory suggests that basic differences between males and females in parental investment have great adaptive significance and lead to gender differences in mating propensities and preferences, as outlined here.



are thought to be the conservative, discriminating sex that is more selective about mating. This selectivity supposedly entails seeking partners who have the greatest ability to contribute toward feeding and caring for offspring. Why? Because in the world of our ancient ancestors, males' greater strength and agility would have been crucial assets in the never-ending struggle to find food and shelter and defend one's territory. A female who chose a mate who was lazy or unreliable or who had no hunting, fighting, building, farming, or other useful economic skills would have suffered a substantial disadvantage in her efforts to raise her children and pass on her genes. Does the empirical evidence mesh with these predictions from parental investment theory? Let's look at some of the evidence.

Figure 10.8
The gender gap in how much people think about sex. This graph summarizes data on how often males and females think about sex, based on a large-scale survey by Laumann, Gagnon, and Michaels (1994). As evolutionary theorists would predict, based on parental investment theory, males seem to manifest more interest in sexual activity than their female counterparts do. (Data from Laumann et al., 1994)

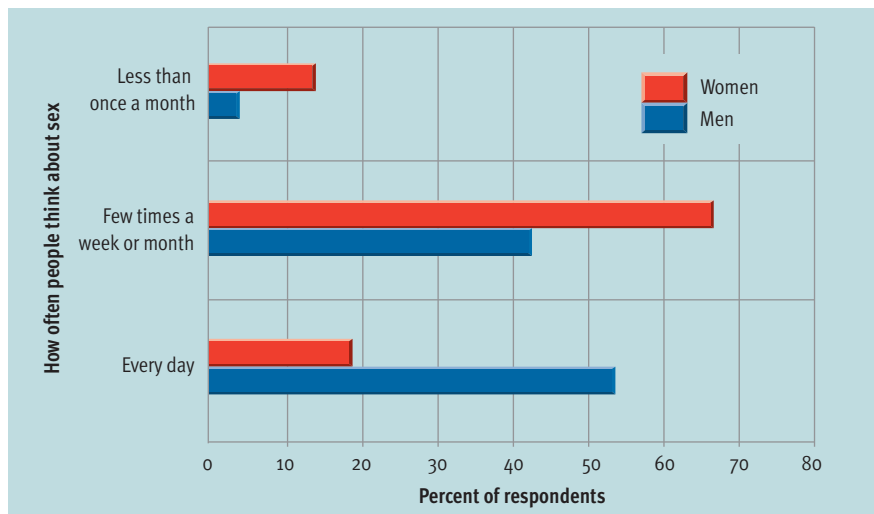
Gender Differences in Patterns of Sexual Activity

Consistent with evolutionary theory, males generally show a greater interest in sex than females do (Peplau, 2003). Men think about sex more often than women (see **Figure 10.8**), and they initiate sex more often (Morokoff et al., 1997). Males have more frequent and varied sexual fantasies (Okami & Shackelford, 2001), and their subjective ratings of their sex

drive tend to be higher than females' (Ostovich & Sabini, 2004). When heterosexual couples are asked about their sex lives, male partners are more likely than their female counterparts to report that they would like to have sex more frequently, and men spend vastly more money than women on sexual entertainment (Baumeister, Catanese, & Vohs, 2001). Men also are more motivated than women to pursue sex with a greater variety of partners. Buss and Schmitt (1993) found that college men indicate that they would ideally like to have 18 sex partners across their lives, whereas college women report that they would prefer only 5 partners (see **Figure 10.9**).

Clear gender disparities are also seen in regard to people's willingness to engage in casual or uncommitted sex. For example, Buss and Schmitt (1993) asked undergraduates about the likelihood that they would consent to sex with someone they found desirable whom they had known for one hour, one day, one week, one month, or longer periods. Men were much more likely than women to have sex with someone they had known for only a brief period. Moreover, a compelling field study, with no concerns about self-report issues, yielded similar results. Clark and Hatfield (1989) had average-looking men approach female (college-age) strangers and ask if they would go back to the man's apartment to have sex with him. None of the women agreed to this proposition. But when Clark and Hatfield had average-looking women approach males with the same proposition 75% of the men eagerly agreed!

In a definitive review of the empirical evidence, Roy Baumeister and colleagues (2001) conclude, "Across many different studies and measures, men have been shown to have more frequent and more intense sexual desires than women, as reflected in spontaneous thoughts about sex, frequency and variety of sexual fantasies, desired frequency of intercourse, desired number of partners, masturbation, liking for various sexual practices, willingness to forgo sex, and other measures. No contrary findings (indicating stronger sexual motivation among women) were found" (p. 242). That said, evidence suggests that the sexual disparities between males and females



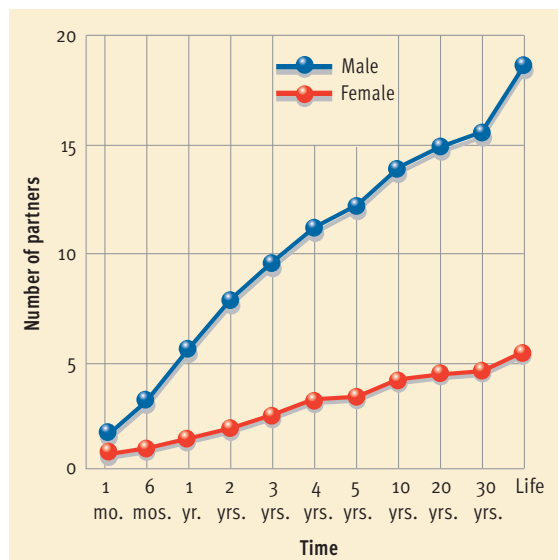


Figure 10.9

The gender gap in desire for a variety of sexual partners. Buss and Schmitt (1993) asked college students about how many sexual partners they ideally would like to have for various time intervals ranging up to one's entire lifetime. As evolutionary theorists would predict, males are interested in having considerably more partners than females are.

Source: Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review*, 100, 204–232. Copyright © 1993 by the American Psychological Association. Reprinted by permission of the publisher and author.

may be exaggerated a little by reliance on subjects' self-reports (Alexander & Fisher, 2003). Because of the “double standard” regarding sexuality, women worry more than men about being viewed as sexually permissive, which may lead them to underestimate or downplay their sexual motivation (Crawford & Popp, 2003).

Gender Differences in Mate Preferences

According to evolutionary theorists, if males were left to their own devices over the course of history, they probably would have shown relatively little interest in long-term mating commitments, but females have generally demanded long-term commitments from males as part of consenting to sex (Buss, 1994a). As a result, long-term mating commitments are a normal part of the social landscape in human societies. However, parental investment theory suggests that there should be some glaring disparities between men and women in what they look for in a long-term mate (consult **Figure 10.7** again).

The adaptive problem for our male ancestors was to find a female with good reproductive potential who would be sexually faithful and effective in nurturing children. Given these needs, evolutionary theory predicts that men should place more emphasis than women on partner characteristics such as youth-



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Evolutionary theory posits that men can maximize their reproductive fitness by seeking youthful partners, whereas women can maximize their reproductive success by searching for mates that are rich in material resources that can be invested in children. Obviously, this theory can explain why attractive young women often become romantically involved with much older men who happen to be wealthy.

fulness (which allows for more reproductive years) and attractiveness (which is assumed to be correlated with health and fertility). In contrast, the adaptive problem for our female ancestors was to find a male who could provide material resources and protect his family and who was dependable and willing to invest his resources in his family. Given these needs, evolutionary theory predicts that women should place more emphasis than men on partner characteristics such as intelligence, ambition, income, and social status (which are associated with the ability to provide more material resources). Evolutionary theorists are quick to point out that these differing priorities *do not reflect conscious strategies*. For the most part, people do not think about sex in terms of maximizing their reproductive potential. Instead, these different priorities are viewed as subconscious preferences that have been hardwired into the human brain by evolutionary forces. In any event, gender differences in mating preferences have been the subject of much research, including our Featured Study for this chapter.

Source: Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences*, 12, 1–49.

Evolution, Culture, and Mating Priorities

According to evolutionary theories, human females enhance their chances of passing on their genes by seeking male partners who possess or are likely to acquire more material resources that can be invested in children. Thus, women should emphasize education, income, status, ambition, and industriousness in potential partners. Men, on the other hand, are assumed to maximize their reproductive outlook by seeking female partners with good breeding potential. Thus, men are thought to look for youth, attractiveness, good health, and other characteristics presumed to be associated with higher fertility. If these evolutionary analyses of sexual motivation are on the mark, gender differences in mating preferences should be virtually universal and thus transcend culture.

Method

To test this hypothesis, David Buss coordinated the efforts of 50 scientists from around the world, who collected data on what people want in a mate. They surveyed more than 10,000 people from 37 cultures distributed across six continents and five islands. Subjects responded to two questionnaires, which asked them to rate the importance of 32 characteristics in potential mates.

Results

The findings revealed that males and females exhibit both similarities and differences in mating preferences. Many characteristics, such as kindness, emotional stability, dependability, and a pleasant disposition, were rated highly by both sexes. However, a few crucial differences between males' and females' priorities were found, and these differences were universal across cultures. As a group, women placed a higher value than men on potential partners' status, ambition, and financial prospects (see **Figure 10.10**). These priorities were not limited to industrialized or capitalist countries; they were apparent in third-world cultures, socialist countries, and all varieties of economic systems. In contrast, men consistently showed more interest than women in potential partners' youthfulness and physical attractiveness (see **Figure 10.11**). Cross-cultural variations in mate preferences were relatively modest. The most prominent variation was in the emphasis placed on female chastity—a woman's lack of previous sexual intercourse. Chastity was highly valued in some societies but viewed with indifference in others.

Discussion

According to Buss, social scientists have traditionally assumed that mating preferences are shaped by learning and that they vary considerably from culture to culture. His findings suggest that culture matters, but only in a limited way. He also concludes that his data provide striking support for evolutionary theories of sexual motivation. As predicted, women emphasized males' prospects for acquisition of material resources, whereas men emphasized females' reproductive capacity.

Comment

Besides supporting evolutionary theories of sexual motivation, this study exemplifies the rich potential of psychology's new commitment to cross-cultural research (see Chapter 1). Interestingly, though, Buss (1994b) noted that his data "were extraordinarily difficult to obtain." Authorities in some countries tried to sabotage the study, while others banned it completely. These nightmares and the logistical difficulties inherent in gathering data from 37 disparate cultures illustrate the extra-challenging nature of cross-cultural research. Of course, sexual behavior is a particularly sensitive topic of study, as we'll see throughout this section.

Figure 10.10

Gender and potential mates' financial prospects. Consistent with evolutionary theory, Buss (1989) found that females place more emphasis on potential partners' financial prospects than males do. Moreover, he found that this trend transcended culture. The specific results for 6 of the 37 cultures studied by Buss are shown here. (Based on data from Buss, 1989)

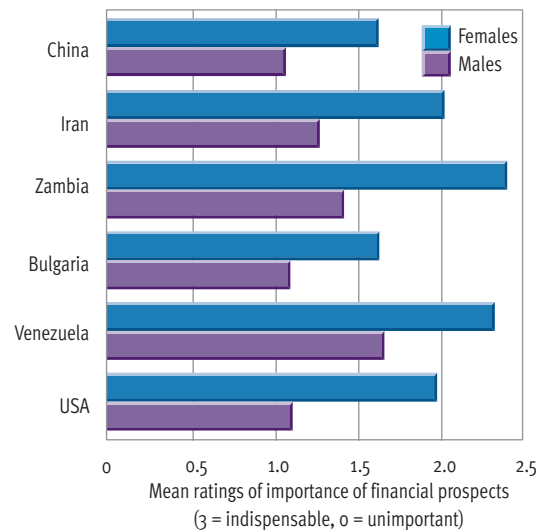


Figure 10.11

Gender and potential mates' physical attractiveness. Consistent with evolutionary theory, Buss (1989) found that all over the world, males place more emphasis on potential partners' good looks than females do. The specific results for 6 of the 37 cultures studied by Buss are shown here. (Based on data from Buss, 1989)

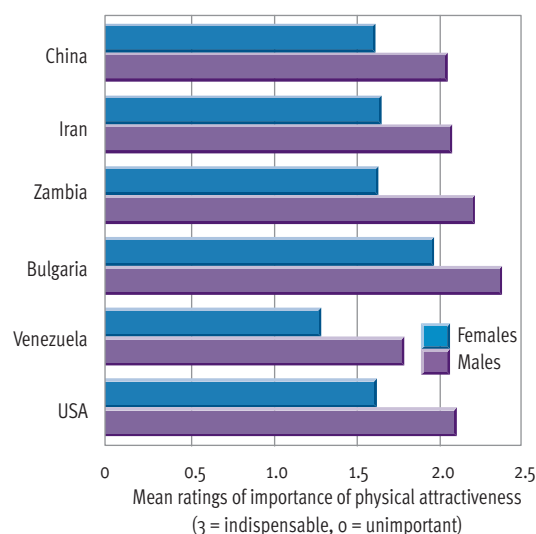


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Subsequent studies have provided additional support for the existence of gender disparities in mating preferences. For example, Sprecher, Sullivan, and Hatfield (1994) examined a large, representative sample of adults in the United States and replicated the findings that men look for youth and attractiveness in partners, whereas women are more concerned about potential partners' education and income potential. In a study of personal ads placed in newspapers and magazines, Wiederman (1993) found that female advertisers explicitly sought financial resources in potential partners eleven times as often as male advertisers did. Numerous studies, using diverse samples and a variety of research methods, have replicated the disparities between males and females in mating priorities and preferences (Okami & Shackelford, 2001; Schmitt, 2005).

Criticism and Alternative Explanations

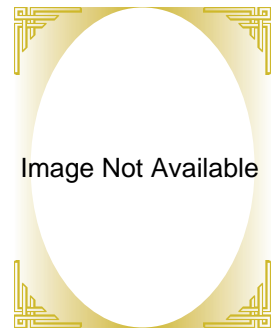
So, the findings on gender differences in sexual behavior mesh nicely with predictions derived from evolutionary theory. But, in the world of science, everyone is a critic—so you may be wondering: What types of criticism has this line of research generated? One set of concerns centers on the fact that the findings do not paint a very flattering picture of human nature. Men end up looking like sordid sexual predators; women come across as cynical, greedy materialists; and evolutionary theory appears to endorse these ideas as the inevitable outcome of natural selection.

As Buss (1998) acknowledges, “Much of what I discovered about human mating is not nice” (p. 408). This controversy demonstrates once again that psychological theories can have far-reaching social and political ramifications, but the sociopolitical fallout has no bearing on evolutionary theory's scientific validity or utility.

However, some critics *have* expressed doubts about the validity of evolutionary explanations of gender differences in sexual behavior. They note that one can posit alternative explanations for the findings. For example, women's emphasis on males' material resources could be a by-product of cultural and economic forces rather than the result of biological imperatives (Eagly & Wood, 1999). Women may have learned to value males' economic clout because their own economic potential has been severely limited in virtually all cultures by a long history of discrimination (Hrdy, 1997; Kasser & Sharma, 1999). In a similar vein, Roy Baumeister, who has convincingly documented that men have stronger sexual motivation than women (Baumeister et al., 2001), has argued that this disparity may be largely attributable to extensive cultural processes that serve to suppress female sexuality (Baumeister & Twenge, 2002). Evolutionary theorists counter these arguments by pointing out that the cultural and economic processes at work may themselves be products of evolution.

REVIEW OF KEY POINTS

- Hormones exert considerable influence over sexual motivation in many animals. Some interesting correlations between testosterone fluctuations and sexual activity in humans suggest that hormonal swings may have a small impact on human sexual desire.
- People respond to a variety of erotic materials, which may elevate sexual desire for only a few hours but may have an enduring impact on attitudes about sex. Aggressive pornography may make sexual coercion seem less offensive to its consumers and may contribute to date rape. Attraction to a potential partner is a critical determinant of sexual interest in both animals and humans.
- According to parental investment theory, males are thought to compete with other males for reproductive opportunities while females are assumed to be the discriminating sex that is selective in choosing partners. Consistent with evolutionary theory, males tend to think about and initiate sex more than females do, and they have more sexual partners and more interest in casual sex than females.
- The Featured Study by Buss demonstrated that there are gender differences in mating preferences that largely transcend cultural boundaries. Males emphasize potential partners' youthfulness and attractiveness, whereas females emphasize potential partners' status and financial prospects.



DAVID BUSS

“Evolutionary psychologists develop hypotheses about the psychological mechanisms that have evolved in humans to solve particular adaptive problems that humans have faced under ancestral conditions.”

PREVIEW QUESTIONS

- Is sexual orientation an either-or distinction?
- How common is homosexuality?
- How have theorists explained the development of homosexuality?
- What are the four phases of the human sexual response?

Web Link 10.3



Queer Resources Directory (QRD)

In its 1994 mission statement, the *Queer Resources Directory* described itself as “an electronic research library specifically dedicated to sexual minorities—groups that have traditionally been labeled as ‘queer’ and systematically discriminated against.” Composed of more than 22,000 files and still growing, QRD offers a rich array of resources.

The Mystery of Sexual Orientation

Sex must be a contentious topic, as the controversy swirling around evolutionary explanations of gender differences in sexuality is easily equaled by the controversy surrounding the determinants of *sexual orientation*. **Sexual orientation refers to a person's preference for emotional and sexual relationships with individuals of the same sex, the other sex, or either sex. Heterosexuals seek emotional-sexual relationships with members of the other sex, bisexuals with members of either sex, and homosexuals with members of the same sex.** In recent years, the terms *gay* and *straight* have become widely used to refer to homosexuals and heterosexuals, respectively. Although *gay* can refer to homosexuals of either sex, most homosexual women prefer to call themselves *lesbians*.

People tend to view heterosexuality and homosexuality as an all-or-none distinction. However, in a large-scale survey of sexual behavior, Alfred Kinsey and his colleagues (1948, 1953) discovered that many people who define themselves as heterosexuals have had homosexual experiences—and vice versa. Thus, Kinsey and others have concluded that it is more accurate to view heterosexuality and homosexuality as end points on a continuum (Haslam, 1997). Indeed, Kinsey devised a seven-point scale, shown in **Figure 10.12**, that can be used to characterize individuals' sexual orientation.

How common is homosexuality? No one knows for sure. Part of the problem is that this question is vastly more complex than it appears at first glance (LeVay, 1996). Given that sexual orientation is best represented as a continuum, where do you draw the lines between heterosexuality, bisexuality, and homosexuality? And how do you handle the distinction between overt behavior and desire? Where, for instance, do you put a person who is married and has never engaged in homosexual behavior but who reports homosexual fantasies and acknowledges being strongly drawn to members of the same sex? The other part of the problem is that many people have

extremely prejudicial attitudes about homosexuality, which makes gays cautious and reluctant to give candid information about their sexuality (Herek, 1996, 2000). Small wonder, then, that estimates of the portion of the population that is homosexual vary widely. A frequently cited estimate of the number of people who are gay is 10%, but recent surveys suggest that this percentage may be an overestimate. Michaels (1996) combined data from two of the better large-scale surveys to arrive at the estimates seen in **Figure 10.13**. As you can see, the numbers are open to varying interpretations, but as a whole they suggest that about 5%–8% of the population could reasonably be characterized as homosexual.

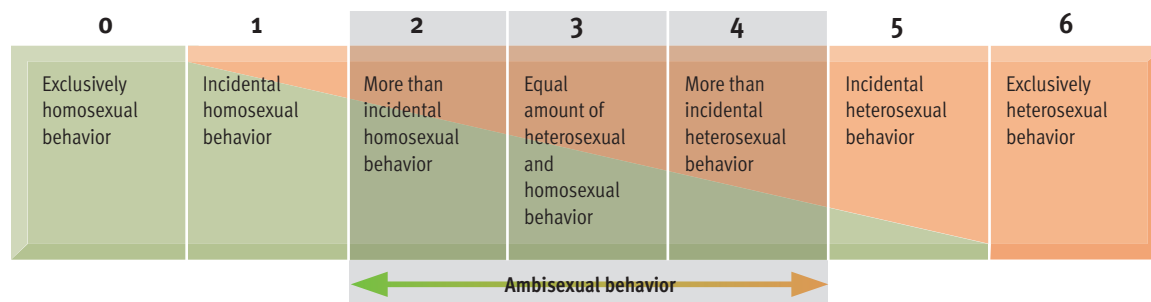
Environmental Theories of Homosexuality

Over the years many environmental theories have been floated to explain the origins of homosexuality, but when tested empirically, these theories have garnered remarkably little support. For example, psychoanalytic and behavioral theorists, who usually agree on very little, both proposed environmental explanations for the development of homosexuality. The Freudian theorists argued that a male is likely to become gay when raised by a weak, detached, ineffectual father who is a poor heterosexual role model and by an overprotective, close-binding mother, with whom the boy identifies. Behavioral theorists argued that homosexuality is a learned preference acquired when same-sex stimuli have been paired with sexual arousal, perhaps through chance seductions by adult homosexuals. Extensive research on homosexuals' upbringing and childhood experiences has failed to support either of these theories (Bell, Weinberg, & Hammersmith, 1981).

However, efforts to research homosexuals' personal histories have yielded a number of interesting insights. Extremely feminine behavior in young boys or masculine behavior in young girls does predict the subsequent development of homosexuality (Bailey & Zucker, 1995; Bem, 2000). For example, 75%–90% of highly feminine young boys eventually turn out to be gay (Blanchard et al., 1995). Consistent with this finding, most gay men and women report that they

Figure 10.12
Homosexuality and heterosexuality as end-points on a continuum.

Sex researchers view heterosexuality and homosexuality as falling on a continuum rather than as an all-or-none distinction. Kinsey and his associates (1948, 1953) created this seven-point scale (from 0 to 6) to describe people's sexual orientation. They used the term *ambisexual* to describe those who fall in the middle of the scale, but such people are commonly called *bisexual* today.



can trace their homosexual leanings back to their early childhood, even before they understood what sex was really about (Bailey, 2003). Most also report that because of negative parental and societal attitudes about homosexuality, they initially struggled to deny their sexual orientation. Thus, they felt that their homosexuality was not a matter of choice and not something that they could readily change (Breedlove, 1994). These findings obviously suggest that the roots of homosexuality are more biological than environmental.

Biological Theories of Homosexuality

Nonetheless, initial efforts to find a biological basis for homosexuality met with little success. Most theorists originally assumed that hormonal differences between heterosexuals and homosexuals must underlie a person's sexual orientation (Doerr et al., 1976; Dörner, 1988). However, studies comparing circulating hormone levels in gays and straights found only small, inconsistent differences that could not be linked to sexual orientation in any convincing way (Bailey, 2003; Banks & Gartrell, 1995).

Thus, like environmental theorists, biological theorists were stymied for quite a while in their efforts to explain the roots of homosexuality. However, that picture changed in the 1990s when a pair of behavioral genetics studies reported findings suggesting that homosexuality has a hereditary basis. In the first study, conducted by Bailey and Pillard (1991), the subjects were gay men who had either a twin brother or an adopted brother. They found that 52% of the subjects' identical twins were gay, that 22% of their fraternal twins were gay, and that 11% of their adoptive brothers were gay. A companion study (Bailey et al., 1993) of lesbians yielded a similar pattern of results (see Figure 10.14). Given that identical twins share more genetic overlap than fraternal twins, who share more genes than unrelated adoptive siblings, these results suggest a genetic predisposition to homosexuality (see Chapter 3 for an explanation of the logic underlying twin and adoption studies). More recent twin studies, with larger and more representative samples, have provided further support for the conclusion that heredity influences sexual orientation (Bailey, Dunne, & Martin, 2000; Kendler et al., 2000). However, these newer studies have yielded smaller estimates of genetic influence, which have been attributed to improved sampling.

Many theorists suspect that the roots of homosexuality may lie in the organizing effects of prenatal hormones on neurological development. Several lines of research suggest that hormonal secretions during critical periods of prenatal development may shape sexual development, organize the brain in a lasting

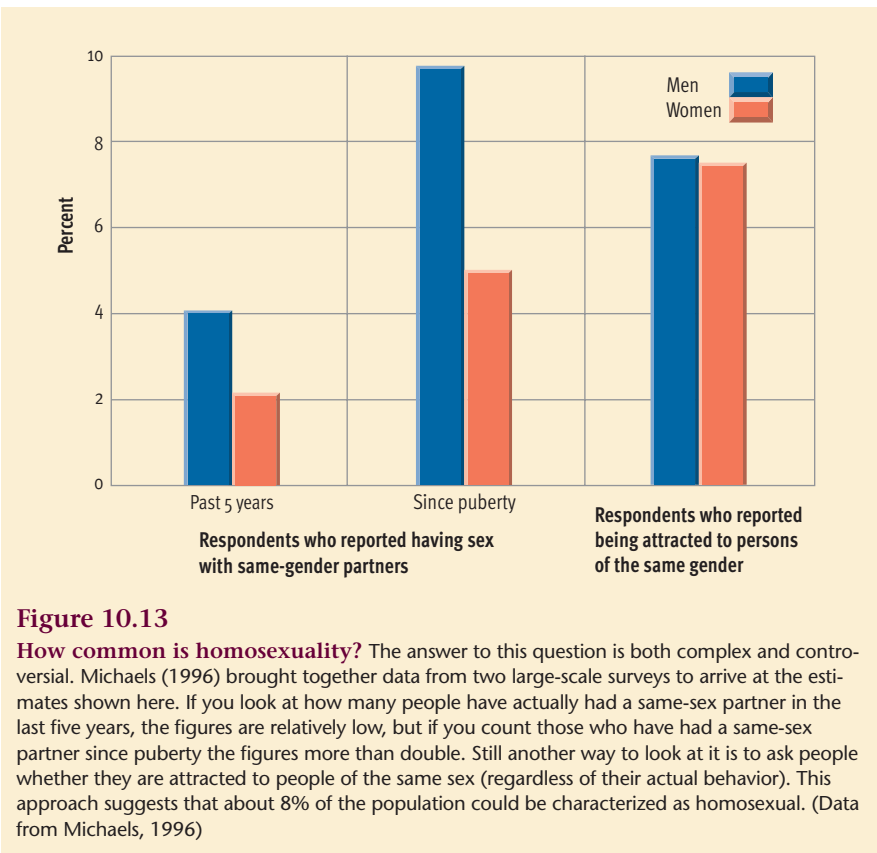


Figure 10.13
How common is homosexuality? The answer to this question is both complex and controversial. Michaels (1996) brought together data from two large-scale surveys to arrive at the estimates shown here. If you look at how many people have actually had a same-sex partner in the last five years, the figures are relatively low, but if you count those who have had a same-sex partner since puberty the figures more than double. Still another way to look at it is to ask people whether they are attracted to people of the same sex (regardless of their actual behavior). This approach suggests that about 8% of the population could be characterized as homosexual. (Data from Michaels, 1996)

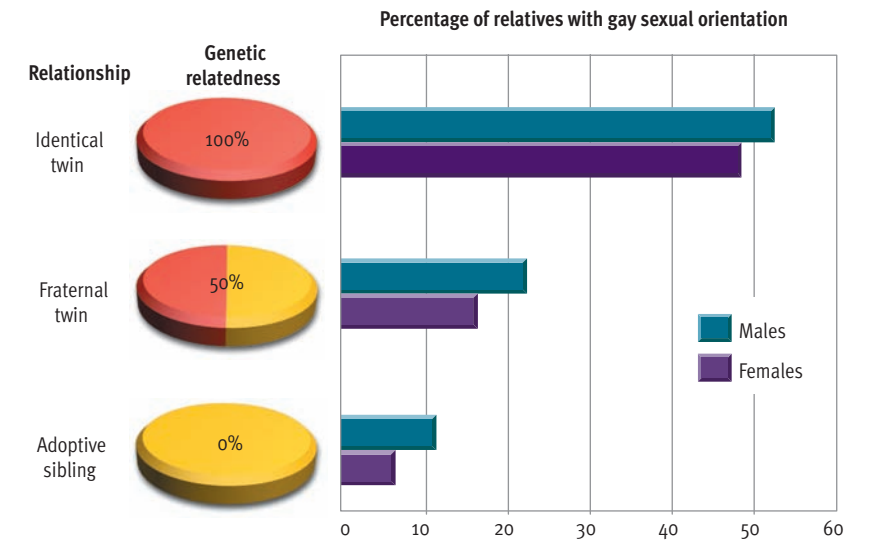


Figure 10.14
Genetics and sexual orientation. If relatives who share more genetic relatedness show greater similarity on a trait than relatives who share less genetic overlap, this evidence suggests a genetic predisposition to the characteristic. Studies of both gay men and lesbian women have found a higher prevalence of homosexuality among their identical twins than their fraternal twins, who, in turn, are more likely to be homosexual than their adoptive siblings. These findings suggest that genetic factors influence sexual orientation. (Data from Bailey & Pillard, 1991; Bailey et al., 1993)

manner, and influence subsequent sexual orientation (Berenbaum & Snyder, 1995). For example, researchers have found elevated rates of homosexuality among women exposed to unusually high androgen



Go Ask Alice!

One of the longest-standing and most popular sources of frank information on the Net has been *Alice!* from Columbia University's Health Education Program. Geared especially to the needs of undergraduate students, the site offers direct answers to questions about relationships, sexuality and sexual health, alcohol and drug consumption, emotional health, and general health.

levels during prenatal development (because their mothers had an adrenal disorder or were given a synthetic hormone to reduce the risk of miscarriage) (Breedlove, 1994; Meyer-Bahlburg et al., 1995). Several other independent lines of research suggest that atypical prenatal hormonal secretions may foster a predisposition to homosexuality (Mustanski, Chivers, & Bailey, 2002).

Despite the recent breakthroughs, much remains to be learned about the determinants of sexual orientation. The behavioral genetics data suggest that the hereditary predisposition to homosexuality is not overpowering. Environmental influences of some kind probably contribute to the development of homosexuality (Bem, 1996, 1998), but the nature of these environmental factors remains a mystery.

Another complication is that the pathways to homosexuality may be somewhat different for males than for females (Gladue, 1994). Females' sexuality appears to be characterized by more *plasticity* than males' sexuality (Baumeister, 2000). In other words, women's sexual behavior may be more easily shaped and modified by sociocultural factors. For example, although sexual orientation is assumed to be a stable characteristic, research shows that lesbian and bisexual women often change their sexual orientation over the course of their adult years (Diamond, 2003). And, in comparison to gay males, lesbians are less likely to trace their homosexuality back to their childhood and more likely to indicate that their attraction to the same sex emerged during adulthood (Tolman & Dia-

mond, 2001). These findings suggest that sexual orientation may be more fluid and malleable in women than in men.

Once again, though, we can see that the nature versus nurture debate can have far-reaching social and political implications. Homosexuals have long been victims of extensive—and in many instances *legal*—discrimination. In most jurisdictions gays cannot legally formalize their unions in marriage, they are not allowed to openly join the U.S. military, and they are barred from some jobs (for example, many school districts will not hire gay teachers). However, if research were to show that being gay is largely a matter of biological destiny, much like being Hispanic or female or short, many of the arguments against equal rights for gays would disintegrate. Why ban gays from teaching, for instance, if their sexual preference cannot “rub off” on their students? Although I would argue that discrimination against gays should be brought to an end either way, many individuals' opinions about gay rights may be swayed by the outcome of the nature-nurture debate on the roots of homosexuality.

The Human Sexual Response

Assuming people are motivated to engage in sexual activity, exactly what happens to them physically? This may sound like a simple question. But scientists really knew very little about the physiology of the human sexual response before William Masters and Virginia Johnson did groundbreaking research in the 1960s. Although our society seems obsessed with sex, until relatively recently (the 1980s) it did not encourage scientists to study sex. At first Masters and Johnson even had difficulty finding journals that were willing to publish their studies.

Masters and Johnson used physiological recording devices to monitor the bodily changes of volunteers engaging in sexual activities. They even equipped an artificial penile device with a camera to study physiological reactions inside the vagina. Their observations of and interviews with subjects yielded a detailed description of the human sexual response that eventually won them widespread acclaim.

Masters and Johnson (1966, 1970) divide the sexual response cycle into four stages: excitement, plateau, orgasm, and resolution. **Figure 10.15** shows how the intensity of sexual arousal changes as women and men progress through these stages. Let's take a closer look at these phases in the human sexual response.

Excitement Phase. During the initial phase of excitement, the level of physical arousal usually escalates rapidly. In both sexes, muscle tension, respiration

Some people are befuddled by the fact that actress Anne Heche (left) had a lengthy intimate relationship with comedian Ellen DeGeneres (right), but now has settled into a conventional heterosexual marriage. Although shifts in sexual orientation like this are uncommon among males, research has shown that females' sexual orientation tends to be characterized by more plasticity than that of males. These findings suggest that males' and females' pathways into homosexuality may be somewhat different.



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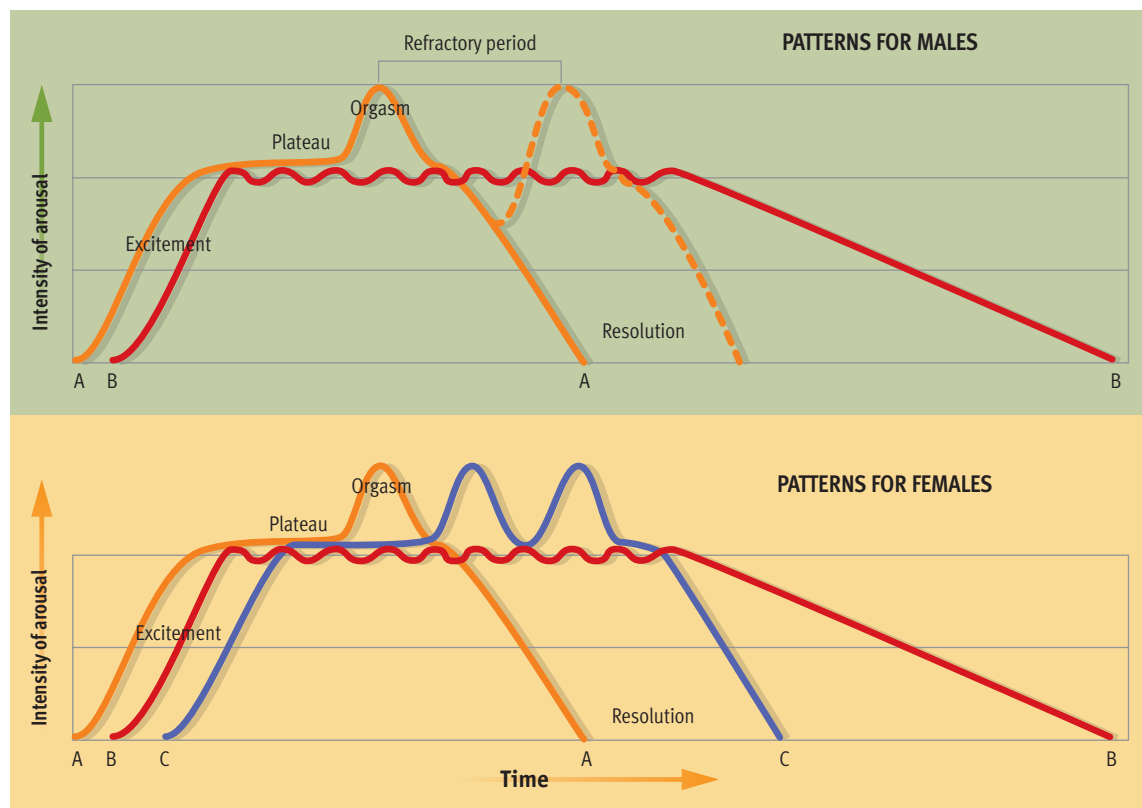


Figure 10.15
The human sexual response cycle. There are similarities and differences between men and women in patterns of sexual arousal. Pattern A, which culminates in orgasm and resolution, is the ideal sequence for both sexes but not something one can count on. Pattern B, which involves sexual arousal without orgasm followed by a slow resolution, is seen in both sexes but is more common among women (see Figure 10.16). Pattern C, which involves multiple orgasms, is seen almost exclusively in women, as men go through a refractory period before they are capable of another orgasm.

Source: Based on Masters, W. H., & Johnson, V. E. (1966). *Human sexual response*. Boston: Little, Brown. Copyright ©1966 Little, Brown and Company.

rate, heart rate, and blood pressure increase quickly. **Vasocongestion—engorgement of blood vessels—**produces penile erection and swollen testes in males. In females, vasocongestion leads to a swelling and hardening of the clitoris, expansion of the vaginal lips, and vaginal lubrication.

Plateau Phase. During the plateau phase, physiological arousal usually continues to build, but at a much slower pace. In women, further vasocongestion produces a tightening of the vaginal entrance, as the clitoris withdraws under the clitoral hood. Many men secrete a bit of fluid at the tip of the penis. This is not ejaculate, but it may contain sperm. When foreplay is lengthy, fluctuation in arousal is normal for both sexes. This fluctuation is more apparent in men; erections may increase and decrease noticeably. In women, this fluctuation may be reflected in changes in vaginal lubrication.

Orgasm Phase. *Orgasm* occurs when sexual arousal reaches its peak intensity and is discharged in a series of muscular contractions that pulsate through the pelvic area. Heart rate, respiration rate, and blood pressure increase sharply during this exceedingly pleasant spasmodic response. In males, orgasm is accompanied by ejaculation of the seminal fluid. The subjective experience of orgasm appears to be very similar for men and women. However, there are some

interesting gender differences in the orgasm phase of the sexual response cycle. On the one hand, women are more likely than men to be *multiorgasmic*. A woman is said to be multiorgasmic if she experiences more than one climax in a time period (pattern C in Figure 10.15). On the other hand, women are more likely than men to engage in intercourse without experiencing an orgasm (see Figure 10.16; Laumann et al., 1994). Whether these differences reflect attitudes and sexual practices versus physiological processes is open to debate. On the one hand, it is easy to argue that males' greater orgasmic consistency must be a

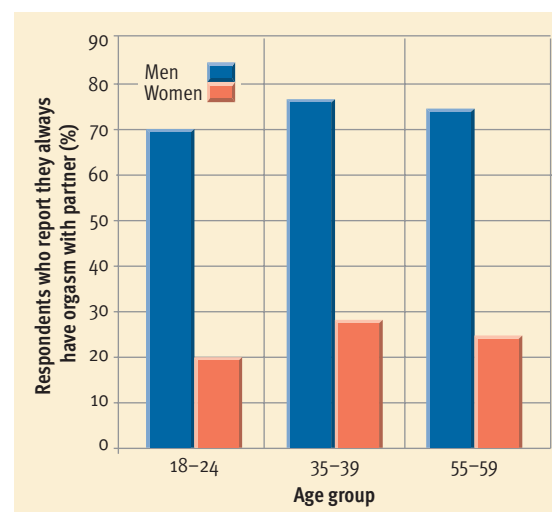


Figure 10.16
The gender gap in orgasm consistency. In their sexual interactions, men seem to reach orgasm more reliably than women. The data shown here suggest that the gender gap in orgasmic consistency is pretty sizable. Both biological and sociocultural factors may contribute to this gender gap. (Data from Laumann et al., 1994)



WILLIAM MASTERS AND VIRGINIA JOHNSON

"The conviction has grown that the most effective treatment of sexual incompatibility involves the technique of working with both members of the family unit."

product of evolution, as it would have obvious adaptive significance for men's reproductive fitness. On the other hand, over the years theorists have come up with a variety of plausible environmental explanations for this disparity, such as gender differences in the socialization of guilt feelings about sex, and sexual scripts and practices that are less than optimal for women (Lott, 1987). Consistent with this view, evidence suggests that lesbian women reach orgasm more easily and consistently in sexual interactions than heterosexual women do (Peplau et al., 2004).

Resolution Phase. During the resolution phase, the physiological changes produced by sexual arousal subside. If orgasm has not occurred, the reduction in sexual tension may be relatively slow and sometimes unpleasant. After orgasm, men experience **a refractory period, a time following orgasm during which males are largely unresponsive to further stimulation.** The length of the refractory period varies from a few minutes to a few hours and increases with age.

Masters and Johnson's exploration of the human sexual response led to major insights into the nature and causes of sexual problems. Ironically, although

Masters and Johnson broke new ground in studying the *physiology* of sexual arousal, their research demonstrated that sexual problems are often caused by *psychological* factors. Their conclusion shows once again that human sexuality involves a fascinating blend of biological and social processes.

➤ REVIEW OF KEY POINTS

- Modern theorists view heterosexuality and homosexuality not as an all-or-none distinction but as endpoints on a continuum. Recent data on the prevalence of homosexuality suggest that 5%–8% of the population may be gay. Although most gays can trace their homosexual leanings back to early childhood, research has not supported Freudian or behavioral theories of sexual orientation.
- Recent studies suggest that there is a genetic predisposition to homosexuality. Idiosyncrasies in prenatal hormonal secretions may also contribute to the development of homosexuality. The pathways into homosexuality may be somewhat different for males and females.
- The human sexual response cycle can be divided into four stages: excitement, plateau, orgasm, and resolution. The subjective experience of orgasm is fairly similar for both sexes. Intercourse leads to orgasm in women less consistently than in men, but women are much more likely to be multiorgasmic.

➤ Achievement: In Search of Excellence

PREVIEW QUESTIONS

- What is the achievement motive, and how is it measured?
- How do those who score high in the need for achievement behave?
- What are some situational factors that can influence achievement strivings?

At the beginning of this chapter, we discussed Jon Krakauer's laborious, grueling effort to reach the summit of Mount Everest. He and the other climbers confronted incredible perils and endured extraordinary hardships to achieve their goal. What motivates people to push themselves so hard? In all likelihood, it's a strong need for achievement. **The achievement motive is the need to master difficult challenges, to outperform others, and to meet high standards of excellence.** Above all else, the need for achievement involves the desire to excel, especially in competition with others.

Research on achievement motivation was pioneered by David McClelland and his colleagues (McClelland, 1985; McClelland et al., 1953). McClelland argued that achievement motivation is of the utmost importance. He viewed the need for achievement as the spark that ignites economic growth, scientific progress, inspirational leadership, and masterpieces in the creative arts.

Individual Differences in the Need for Achievement



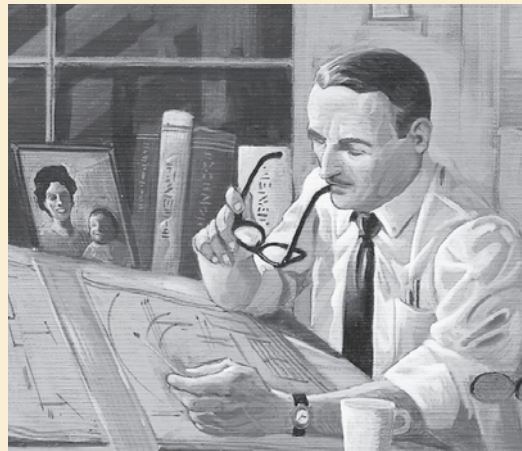
You've no doubt heard the stories of Lincoln as a young boy, reading through the night by firelight.

Find a biography of any high achiever, and you'll probably find a similar drive—throughout the person's life. The need for achievement is a fairly stable aspect of personality. Hence, research in this area has focused mostly on individual differences in achievement motivation. Subjects' need for achievement can be measured effectively with the Thematic Apperception Test (C. Smith, 1992; Spangler, 1992). The Thematic Apperception Test (TAT) is a *projective test*, one that requires subjects to respond to vague, ambiguous stimuli in ways that may reveal personal motives and traits (see Chapter 12). The stimulus materials for the TAT are pictures of people in ambiguous scenes open to interpretation. Examples include a man working at a desk and a woman seated in a chair staring off into space. Subjects are asked to write or tell stories about what's happening in the scenes and what the characters are feeling. The themes of these stories are then scored to measure the strength of various needs. **Figure 10.17** shows examples of stories dominated by the themes of achievement and affiliation (the need for social bonds and belongingness).

The research on individual differences in achievement motivation has yielded interesting findings on the characteristics of people who score high in the need for achievement. They tend to work harder and

Affiliation arousal

George is an engineer who is working late. He is *worried that his wife will be annoyed with him for neglecting her*. She has been *objecting* that he cares more about his work than his wife and family. He seems *unable to satisfy* both his boss and his wife, but he *loves her* very much and will do his best to *finish up* fast and get home to her.



Achievement arousal

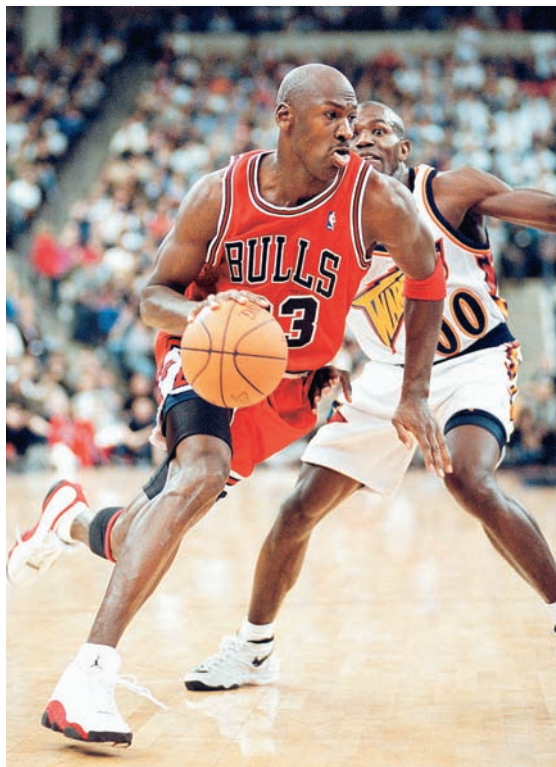
George is an engineer who *wants to win* a competition in which the man with the *most practicable drawing* will be awarded the contract to build a bridge. He is taking a moment to think *how happy he will be* if he wins. He has been *baffled by how to make such a long span strong*, but he remembers to *specify a new steel alloy* of great strength, submits his entry, but does not win, and is very *unhappy*.

Figure 10.17
Measuring motives with the Thematic Apperception Test (TAT). Subjects taking the TAT tell or write stories about what is happening in a scene, such as this one showing a man at work. The two stories shown here illustrate strong affiliation motivation and strong achievement motivation. The italicized parts of the stories are thematic ideas that would be identified by a TAT scorer.

Source: Stories reprinted by permission of Dr. David McClelland.

more persistently on tasks than people low in the need for achievement (Brown, 1974), and they handle negative feedback about task performance more effectively than others (Fodor & Carver, 2000). They also are more future oriented than others and more likely to delay gratification in order to pursue long-term goals (Mischel, 1961; Raynor & Entin, 1982). In terms of careers, they typically go into competitive,

Most people attribute Michael Jordan's success in basketball to his remarkable ability, which was undeniably important. But the contribution of his extremely high need for achievement should not be underestimated. Jordan's competitive zeal was legendary, and he was widely regarded as one of the hardest working athletes in professional sports.



entrepreneurial occupations that provide them with an opportunity to excel (McClelland, 1987). Apparently, their persistence and hard work often pay off. High achievement motivation correlates positively with measures of career success and with upward social mobility among lower-class men (Crockett, 1962; McClelland & Boyatzis, 1982).

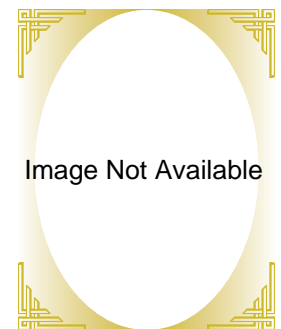
Do people high in achievement need always tackle the biggest challenges available? Not necessarily. A curious finding has emerged in laboratory studies in which subjects have been asked to choose how difficult a task they want to work on. Subjects high in the need for achievement tend to select tasks of intermediate difficulty (McClelland & Koestner, 1992). For instance, in one study, subjects playing a ring-tossing game were allowed to stand as close to or far away from the target peg as they wanted; high achievers tended to prefer a moderate degree of challenge (Atkinson & Litwin, 1960).

Situational Determinants of Achievement Behavior



Your achievement drive is not the only determinant of how hard you work. Situational factors can also influence achievement strivings. John Atkinson (1974, 1981, 1992) has elaborated extensively on McClelland's original theory of achievement motivation and has identified some important situational determinants of achievement behavior. Atkinson theorizes that the tendency to pursue achievement in a particular situation depends on the following factors:

- The strength of one's *motivation to achieve success*. This factor is viewed as a stable aspect of personality.
- One's estimate of the *probability of success* for the task at hand. This factor varies from task to task.



DAVID MCCLELLAND

"People with a high need for achievement are not gamblers; they are challenged to win by personal effort, not by luck."



Understanding the Determinants of Achievement Behavior

According to John Atkinson, one's pursuit of achievement in a particular situation depends on several factors. Check your understanding of these factors by identifying each of the following vignettes as an example of one of the following three determinants of achievement behavior: (a) need for achievement, (b) perceived probability of success, and (c) incentive value of success. The answers can be found in Appendix A.

- _____ 1. Belinda is nervously awaiting the start of the finals of the 200-meter dash in the last meet of her high school career. "I've gotta win this race! This is the most important race of my life!"
- _____ 2. Corey grins as he considers the easy time he's going to have this semester. "This class is supposed to be a snap. I hear the professor gives A's and B's to nearly everyone."
- _____ 3. Diana's just as hard-charging as ever. She's gotten the highest grade on every test throughout the semester, yet she's still up all night studying for the final. "I know I've got an A in the bag, but I want to be the best student Dr. McClelland's ever had!"

- The *incentive value of success*. This factor depends on the tangible and intangible rewards for success on the specific task.

The last two variables are situational determinants of achievement behavior. That is, they vary from one situation to another. According to Atkinson, the pursuit of achievement increases as the probability and incentive value of success go up (and decreases as they go down). Let's apply Atkinson's model to a simple example. Given a certain motivation to achieve success, you will pursue a good grade in calculus less vigorously if your professor gives impossible exams (thus lowering your expectancy of success) or if a good grade in calculus is not required for your major (lowering the incentive value of success).

The joint influence of these situational factors may explain why high achievers prefer tasks of intermediate difficulty. Atkinson notes that the probability of success and the incentive value of success on tasks are interdependent to some degree. As tasks get easier, success becomes less satisfying. As tasks get harder, success becomes more satisfying, but its likelihood obviously declines. When the probability and incentive value of success are weighed together, moderately challenging tasks seem to offer the best overall value in terms of maximizing one's sense of accomplishment.

Motivation and emotion are often intertwined (Zurbriggen & Sturman, 2002). On the one hand, *emotion can cause motivation*. For example, *anger* about your work schedule may motivate you to look for a new job. *Jealousy* of an ex-girlfriend may motivate you to ask out her roommate. On the other hand, *motivation can cause emotion*. For example, your motivation to win a photography contest may lead to great *anxiety* during the judging and either great *joy* if you win or great *gloom* if you don't. Although motivation and emotion are closely related, they're *not* the same thing. We'll analyze the nature of emotion in the next section.

REVIEW OF KEY POINTS

- Achievement involves the need to excel, especially in competition with others. The need for achievement is usually measured with the TAT. People who are relatively high in the need for achievement work harder and more persistently than others. They delay gratification well and pursue competitive careers.
- Situational factors also influence achievement behavior. The pursuit of achievement tends to increase when the probability of success and the incentive value of success are high. The joint influence of these factors may explain why people high in achievement need tend to prefer challenges of intermediate difficulty.

The Elements of Emotional Experience

PREVIEW QUESTIONS

- How do emotions affect autonomic activity?
- Which brain centers contribute to the experience of emotions?
- What is the connection between emotion and body language?
- Are there cultural differences in how people recognize, describe, or express their emotions?

The most profound and important experiences in life are saturated with emotion. Think of the *joy* that people feel at weddings, the *grief* they feel at funerals, the *ecstasy* they feel when they fall in love. Emotions also color everyday experiences. For instance, you might experience *anger* when a professor treats you rudely, *dismay* when you learn that your car needs expensive repairs, and *happiness* when you see that you aced your economics exam. In some respects, emotions lie at the core of mental health. The two most common complaints that lead people to seek psychotherapy are *depression* and *anxiety*. Clearly,

emotions play a pervasive role in people's lives. Reflecting this reality, modern psychologists have increased their research on emotion in recent decades (Cacioppo & Gardner, 1999).

But exactly what is an emotion? Everyone has plenty of personal experience with emotion, but it's an elusive concept to define (LeDoux, 1995). Emotion includes cognitive, physiological, and behavioral components, which are summarized in the following definition: **Emotion involves (1) a subjective conscious experience (the cognitive component) accompanied by (2) bodily arousal (the physiolog-**

ical component) and by (3) characteristic overt expressions (the behavioral component). That's a pretty complex definition. Let's take a closer look at each of these three components of emotion.

The Cognitive Component: Subjective Feelings



Over 550 words in the English language refer to emotions (Averill, 1980). Ironically, however, people often have difficulty describing their emotions to others (Zajonc, 1980). Emotion is a highly personal, subjective experience. In studying the cognitive component of emotions, psychologists generally rely on subjects' verbal reports of what they're experiencing. Their reports indicate that emotions are potentially intense internal feelings that sometimes seem to have a life of their own. People can't click their emotions on and off like a bedroom light. If it was as simple as that, you could choose to be happy whenever you wanted. As Jeremy Gray (2004), puts it, "Some emotions are like fires, seemingly started by a motivational spark" (p. 47). In a similar vein, Joseph LeDoux (1996) notes, "Emotions are things that happen to us rather than things we will to occur" (p. 19). Actually, some degree of emotional control is possible (Thayer, 1996), but emotions tend to involve automatic reactions that are difficult to regulate (Ohman & Wiens, 2003). In some cases these emotional reactions may occur at an unconscious level of processing, outside of one's awareness (Winkielman & Berridge, 2004).

People's cognitive appraisals of events in their lives are key determinants of the emotions they experience (Ellsworth & Scherer, 2003; Lazarus, 1995). A specific event, such as giving a speech, may be highly threatening and thus anxiety arousing for one person but a "ho-hum," routine matter for another. The conscious experience of emotion includes an *evaluative* aspect. People characterize their emotions as pleasant or unpleasant (Lang, 1995; Schlosberg, 1954). These evaluative reactions can be automatic and subconscious (Ferguson & Bargh, 2004). Of course, individuals often experience "mixed emotions" that include both pleasant and unpleasant qualities (Cacioppo & Berntson, 1999). For example, an executive just given a promotion with challenging new responsibilities may experience both happiness and anxiety. The landscape of mixed emotions was explored in a recent study of people's reactions to good outcomes that could have been better and bad outcomes that could have been worse (Larsen et al., 2004). As predicted, these events elicited mixtures of positive and negative emotions. These contrasting emotions tended to occur *simultaneously* rather than alternating back and forth sequentially.



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Emotions involve automatic reactions that can be difficult to control.

For the most part, researchers have paid more attention to negative emotions than positive ones (Fredrickson, 1998). Why have positive emotions been neglected? Two considerations are that there appear to be fewer positive emotions than negative ones and that positive emotions are less clearly differentiated from each other than negative emotions (Fredrickson & Branigan, 2001; Rozin, 2003). Another consideration is that negative emotions appear to have more powerful effects than positive emotions (Baumeister et al., 2001a; Rozin & Royzman, 2001). Although these factors probably have contributed, the neglect of positive emotions is symptomatic of a broad and deeply rooted bias in the field of psychology, which has historically focused on pathology, weaknesses, and suffering (and how to heal these conditions) rather than health, strengths, and resilience (Fredrickson, 2002). In recent years, the architects of the positive psychology movement have set out to shift the field's focus away from negative experiences (Seligman, 2002; Seligman & Csikszentmihalyi, 2000). The advocates of *positive psychology* argue for increased research on contentment, well-being, human strengths, and positive emotions. One outgrowth of this movement has been increased interest in the dynamics of happiness. We will discuss this research in the upcoming Personal Application.

The Physiological Component: Diffuse and Multifaceted



Emotional processes are closely tied to physiological processes, but the interconnections are enormously complex. The biological bases of emotions are dif-

fuse, involving many areas in the brain and many neurotransmitter systems, as well as the autonomic nervous system and the endocrine system.

Autonomic Arousal

Imagine your reaction as your car spins out of control on an icy highway. Your fear is accompanied by a variety of physiological changes. Your heart rate and breathing accelerate. Your blood pressure surges, and your pupils dilate. The hairs on your skin stand erect, giving you “goose bumps,” and you start to perspire. Although the physical reactions may not always be as obvious as in this scenario, *emotions are generally accompanied by visceral arousal* (Cacioppo et al., 1993). Surely you’ve experienced a “knot in your stomach” or a “lump in your throat”—thanks to anxiety.

Much of the discernible physiological arousal associated with emotion occurs through the actions of the *autonomic nervous system* (Janig, 2003), which regulates the activity of glands, smooth muscles, and blood vessels (see Figure 10.18). As you may recall from Chapter 3, the autonomic nervous system is responsible for the highly emotional *fight-or-flight response*, which is largely modulated by the release of adrenal *hormones* that radiate throughout the body. Hormonal changes clearly play a crucial role in emotional responses to stress and may contribute to many other emotions as well.



One notable part of emotional arousal is **the galvanic skin response (GSR), an increase in the electrical conductivity of the skin that occurs when sweat glands increase their activity**. GSR is a convenient and sensitive index of autonomic arousal that has been used as a measure of emotion in many laboratory studies.

The connection between emotion and autonomic arousal provides the basis for the **polygraph, or lie detector, a device that records autonomic fluctuations while a subject is questioned**. The polygraph was invented in 1915 by psychologist William Marston—who also dreamed up the comic book superhero Wonder Woman (Knight, 2004). A polygraph can’t actually detect lies. It’s really an emotion detector. It monitors key indicators of autonomic arousal, typically heart rate, blood pressure, respiration rate, and GSR. The assumption is that when subjects lie, they experience emotion (presumably anxiety) that produces noticeable changes in these physiological indicators (see Figure 10.19). The polygraph examiner asks a subject a number of nonthreatening questions to establish the subject’s baseline on these autonomic indicators. Then the examiner asks the critical questions (for example, “Where were you on the night of the burglary?”) and observes whether the subject’s autonomic arousal changes.

The polygraph has been controversial since its invention (Grubin & Madsen, 2005). Polygraph advocates claim that lie detector tests are about 85%–90%

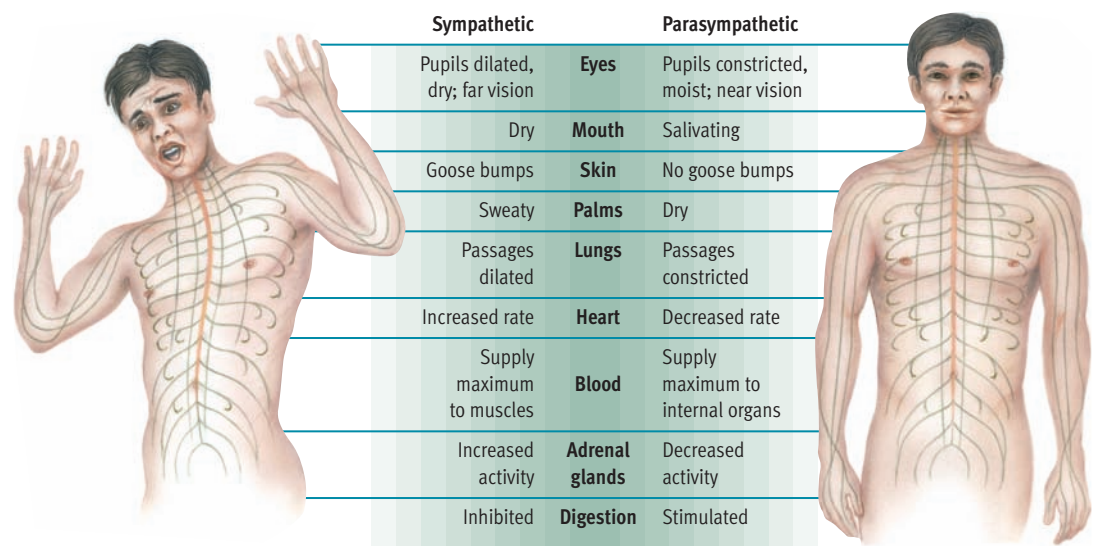


Figure 10.18
Emotion and autonomic arousal. The autonomic nervous system (ANS) is composed of the nerves that connect to the heart, blood vessels, smooth muscles, and glands (consult Figure 3.8 for a more detailed view). The ANS is divided into the *sympathetic system*, which mobilizes bodily resources in response to stress, and the *parasympathetic system*, which conserves bodily resources. Emotions are frequently accompanied by sympathetic ANS activation, which leads to goose bumps, sweaty palms, and the other physical responses listed on the left side of the diagram.

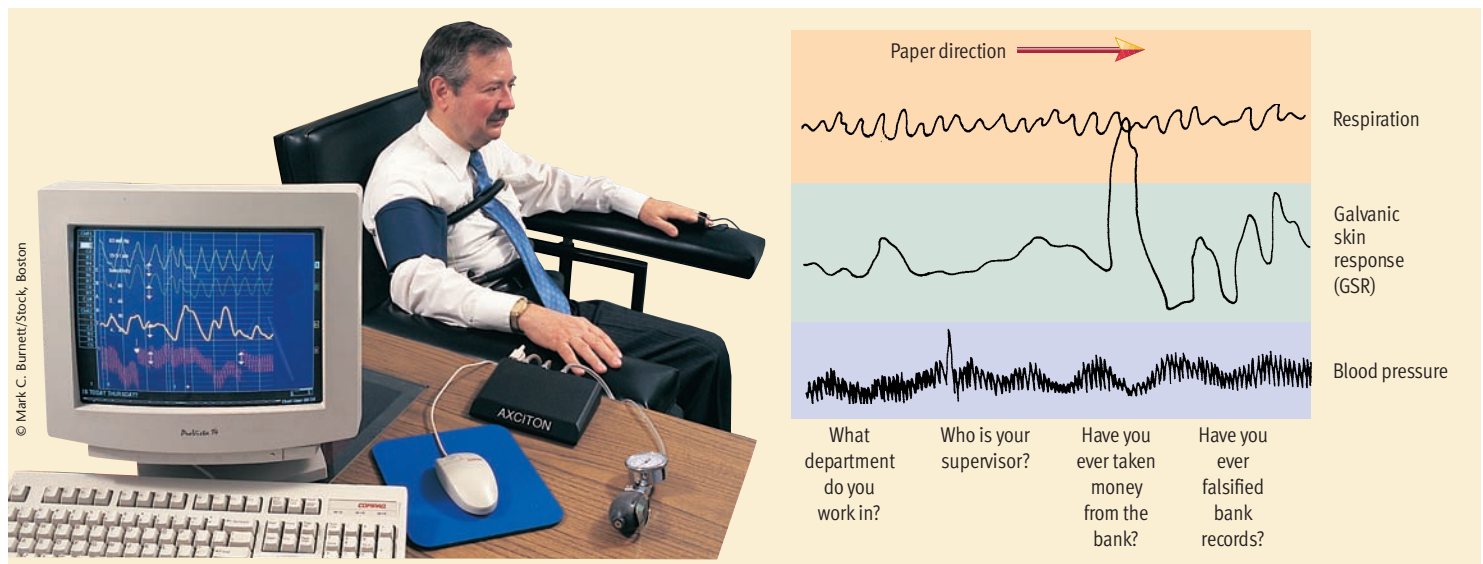


Figure 10.19

Emotion and the polygraph. A lie detector measures the autonomic arousal that most people experience when they tell a lie. After using nonthreatening questions to establish a baseline, a polygraph examiner looks for signs of arousal (such as the sharp change in GSR shown here) on incriminating questions. Unfortunately, the polygraph is not a dependable index of whether people are lying.

accurate and that the validity of polygraph testing has been demonstrated in empirical studies, but these claims clearly are not supported by the evidence (Iacono & Lykken, 1997; Iacono & Patrick, 1999). Methodologically sound research on the validity of polygraph testing is surprisingly sparse (largely because it is difficult research to do), and the limited evidence available is not very impressive (Branaman & Gallagher, 2005; Fiedler, Schmid, & Stahl, 2002; Lykken, 1998). Part of the problem is that people who are telling the truth may experience emotional arousal when they respond to incriminating questions. Thus, polygraph tests sometimes lead to accusations of lying against people who are innocent. Another problem is that some people can lie without experiencing anxiety or autonomic arousal. The crux of the problem, as Leonard Saxe (1994) notes, is that “there is no evidence of a unique physiological reaction to deceit” (p. 71). The polygraph is a potentially useful tool that can help police check out leads and alibis. However, polygraph results are not reliable enough to be submitted as evidence in most types of courtrooms.

Neural Circuits

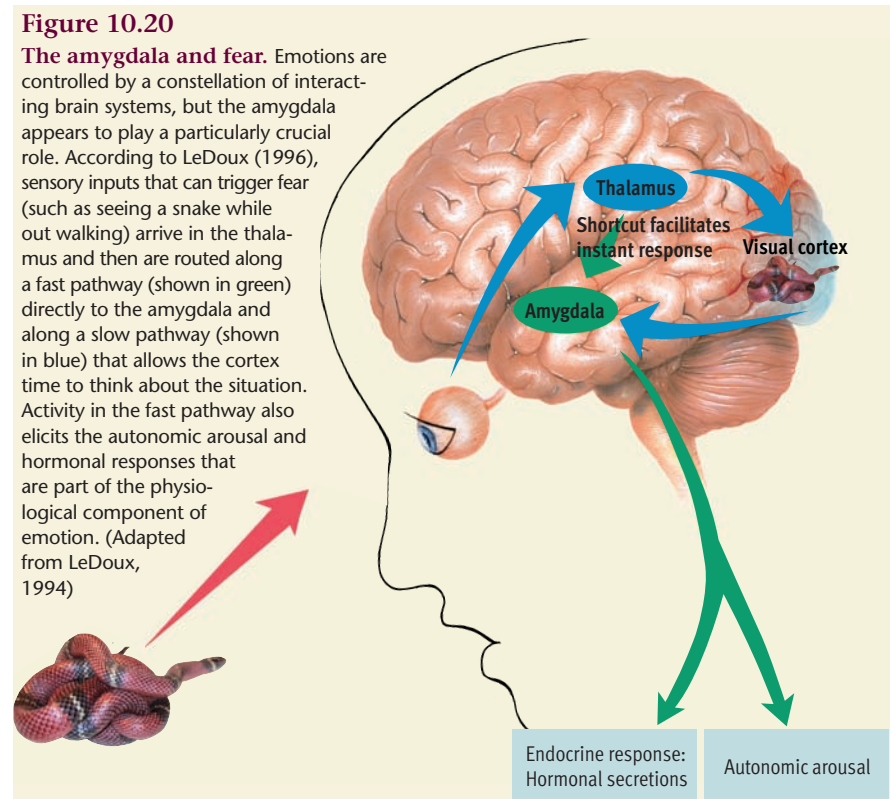
The autonomic responses that accompany emotions are ultimately controlled in the brain. The hypothalamus, amygdala, and adjacent structures in the *limbic system* have long been viewed as the seat of emotions (Izard & Saxton, 1988; MacLean, 1993). Although these structures do contribute to emotion, the limbic

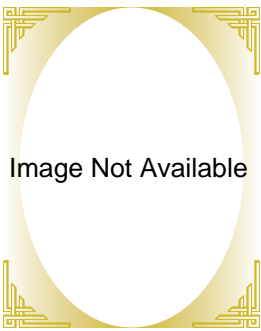
system is not a clearly defined anatomical system, and research has shown that a variety of brain structures that lie outside the limbic system play a crucial role in the regulation of emotion (Berridge, 2003).

Nonetheless, recent evidence suggests that the amygdala (see **Figure 10.20**) plays a central role in

Figure 10.20

The amygdala and fear. Emotions are controlled by a constellation of interacting brain systems, but the amygdala appears to play a particularly crucial role. According to LeDoux (1996), sensory inputs that can trigger fear (such as seeing a snake while out walking) arrive in the thalamus and then are routed along a fast pathway (shown in green) directly to the amygdala and along a slow pathway (shown in blue) that allows the cortex time to think about the situation. Activity in the fast pathway also elicits the autonomic arousal and hormonal responses that are part of the physiological component of emotion. (Adapted from LeDoux, 1994)





JOSEPH LEDOUX

"In situations of danger, it is very useful to be able to respond quickly. The time saved by the amygdala in acting on the thalamic information, rather than waiting for the cortical input, may be the difference between life and death."

the acquisition of conditioned fears (LaBar & LeDoux, 2003; LeDoux, 1986, 1993). According to Joseph LeDoux (1996, 2000), the amygdala lies at the core of a complex set of neural circuits that process emotion. He believes that sensory inputs capable of eliciting emotions arrive in the thalamus, which simultaneously routes the information along two separate pathways: a fast pathway to the nearby amygdala and a slower pathway to areas in the cortex (see **Figure 10.20**). The amygdala processes the information quickly, and if it detects a threat it almost instantly triggers neural activity that leads to the autonomic arousal and endocrine (hormonal) responses associated with emotion. The processing in this pathway is extremely fast, so that emotions may be triggered even before the brain has had a chance to really "think" about the input. Meanwhile, the information shuttled along the other pathway is subjected to a more "leisurely" cognitive appraisal in the cortex. LeDoux believes that the rapid-response pathway evolved because it is a highly adaptive warning system that can "be the difference between life and death." The amygdala has been widely characterized as a brain center for emotion in general, but the research has mainly focused on the single emotion of fear. Hence, Whalen (1998) suggests that it might be more accurate to characterize the amygdala as the hub of a "vigilance" system.

What other areas of the brain are involved in the modulation of emotion? The list is extensive. Much like we saw with sleep and memory (see Chapters 5 and 7), the neural bases of emotion are widely distributed throughout the brain. Some of the more intriguing findings include the following.

- The *prefrontal cortex*, known for its role in planning and executive control, appears to contribute to efforts to voluntarily control emotional reactions (Davidson, Jackson, & Kalin, 2000). The prefrontal cortex also seems to modulate emotions associated with the pursuit of goals (Davidson et al., 2003b).
- The front portion of the *cingulate cortex* has been implicated in the processing of pain-related emotional distress (Berridge, 2003). This area also is activated when people wrestle with emotion-laden conflicts about choices (Miller & Cohen, 2001).
- As noted in Chapters 3 and 5, a neural circuit called the *mesolimbic dopamine pathway* plays a major role in the experience of pleasurable emotions associated with rewarding events (Berridge, 2003). In particular, this circuit is activated by cocaine and other abused drugs (Nestler & Malenka, 2004).
- The *right and left hemispheres* of the brain make different contributions to emotion (see Chapter 3). The right hemisphere plays a larger role than the

left in the *perception* of others' emotions (Damasio, Adolphs, & Damasio, 2003). When people *experience* emotions, the right hemisphere seems to mediate positive emotions, whereas the left hemisphere mediates negative emotions (Canli et al., 1998; Davidson, Shackman, & Maxwell, 2004).

- Quite a variety of other brain structures have been linked to specific facets of emotion, including the hippocampus, the lateral hypothalamus, the septum, and the brainstem (Berridge, 2003). Thus, it is clear that emotion depends on activity in a *constellation of interacting brain centers*.

The Behavioral Component: Nonverbal Expressiveness



At the behavioral level, people reveal their emotions through characteristic overt expressions such as smiles, frowns, furrowed brows, intense vocalizations, clenched fists, and slumped shoulders. In other words, *emotions are expressed in "body language," or nonverbal behavior*.

Facial expressions reveal a variety of basic emotions. In an extensive research project, Paul Ekman and Wallace Friesen have asked subjects to identify what emotion a person was experiencing on the basis of facial cues in photographs. They have found that subjects are generally successful in identifying *six fundamental emotions*: happiness, sadness, anger, fear, surprise, and disgust (Ekman & Friesen, 1975, 1984). People can also identify a number of other emotions from facial expressions, such as contempt, embarrassment, shame, amusement, and sympathy, but less reliably than the basic six emotions (Keltner et al., 2003). These studies have been criticized on the grounds that they have used a rather small set of artificial, highly posed photographs that don't do justice to the variety of facial expressions that can accompany specific emotions (Carroll & Russell, 1997). Still, the overall evidence indicates that people are reasonably skilled at deciphering emotions from others' facial expressions (Galati, Scherer, & Ricci-Bitti, 1997).

Some theorists believe that muscular feedback from one's own facial expressions contributes to one's conscious experience of emotions (Izard, 1990; Tomkins, 1991). Proponents of the *facial-feedback hypothesis* assert that facial muscles send signals to the brain and that these signals help the brain recognize the emotion that one is experiencing (see **Figure 10.21**). According to this view, smiles, frowns, and furrowed brows help create the subjective experience of various emotions. Consistent with this idea, studies show that if subjects are instructed to contract their facial muscles to mimic facial expressions associ-

Web Link 10.5



UCSC Perceptual Science Laboratory Perceptions of other people, especially of speech and facial expression, serve as a primary focus for research at this laboratory at the University of California, Santa Cruz. The site offers a broad set of resources, including a comprehensive guide to nonverbal facial analysis research being conducted in laboratories worldwide.

ated with certain emotions, they tend to report that they actually experience these emotions to some degree (Kleinke, Peterson, & Rutledge, 1998; Levenson, 1992).

Culture and the Elements of Emotion

Are emotions innate reactions that are universal across cultures? Or are they socially learned reactions that are culturally variable? The voluminous research on this lingering question has not yielded a simple answer. Investigators have found both remarkable similarities and dramatic differences between cultures in the experience of emotion.

Cross-Cultural Similarities in Emotional Experience

After demonstrating that Western subjects could discern specific emotions from facial expressions, Ekman and Friesen (1975) took their facial-cue photographs on the road to other societies to see whether non-verbal expressions of emotion transcend cultural boundaries. Testing subjects in Argentina, Spain, Japan, and other countries, they found considerable cross-cultural agreement in the identification of happiness, sadness, anger, fear, surprise, and disgust based on facial expressions (see Figure 10.22). Still, Ekman and Friesen wondered whether this agreement might be the result of learning rather than biology, given that people in different cultures often share considerable exposure to Western mass media (magazines, newspapers, television, and so forth), which provide many visual depictions of people's emotional reactions. To

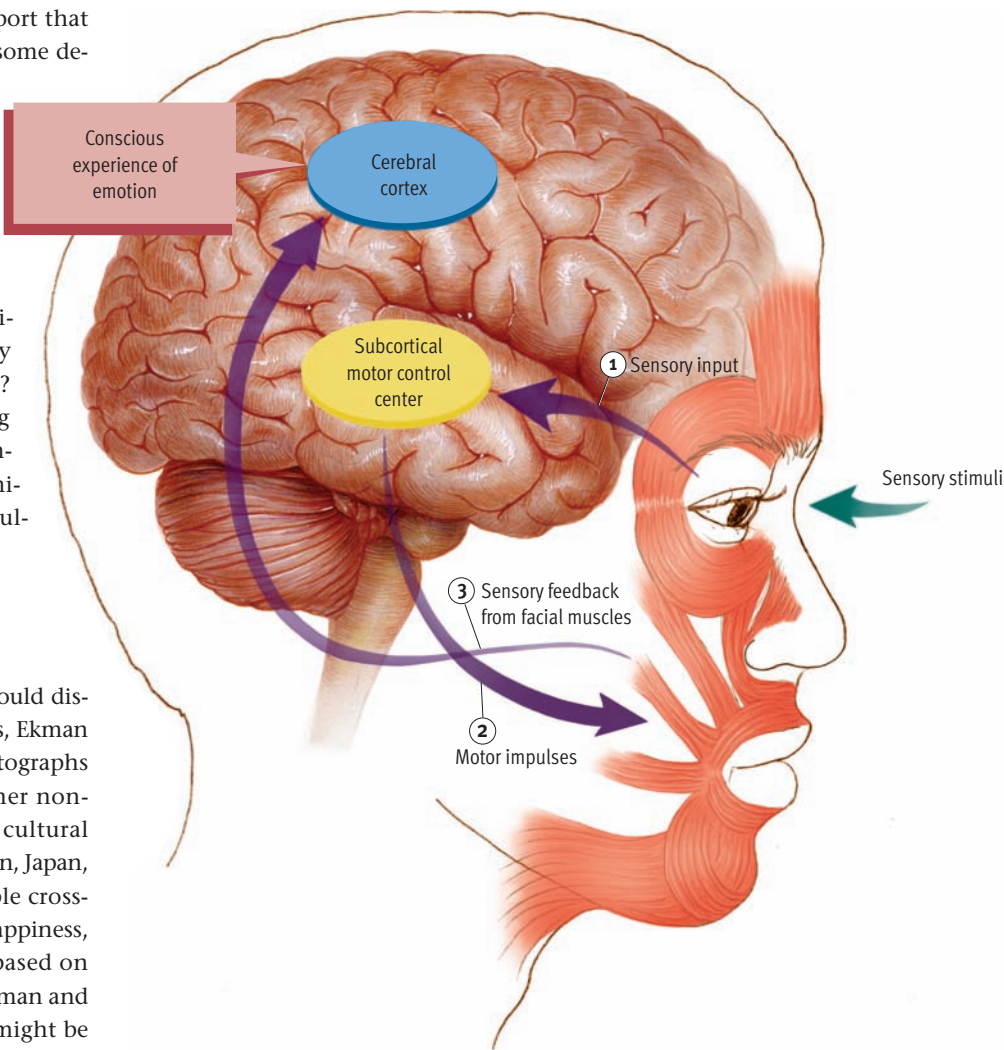


Figure 10.21 The facial feedback hypothesis. According to the facial feedback hypothesis, inputs to subcortical centers automatically evoke facial expressions associated with certain emotions, and the facial muscles then feed signals to the cortex that help it recognize the emotion that one is experiencing. According to this view, facial expressions help create the subjective experience of various emotions.

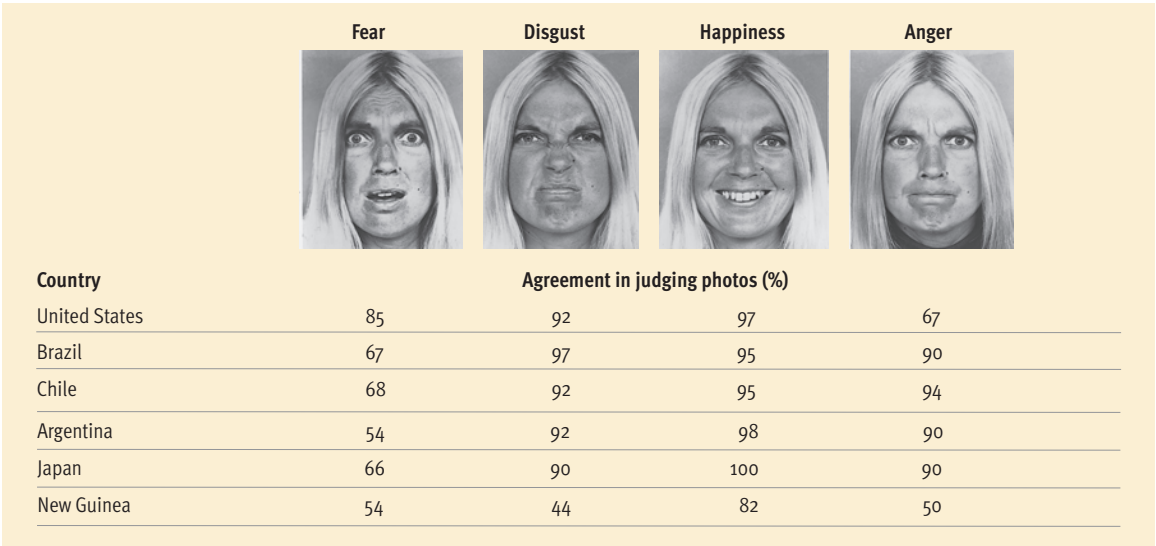


Figure 10.22 Cross-cultural comparisons of people's ability to recognize emotions from facial expressions. Ekman and Friesen (1975) found that people in highly disparate cultures showed fair agreement on the emotions portrayed in these photos. This consensus across cultures suggests that facial expressions of emotions may be universal and that they have a strong biological basis. Source: Data from Ekman, P., & Friesen, W. V. (1975). Unmasking the face. Englewood Cliffs, NJ: Prentice-Hall. © 1975 by Paul Ekman, photographs courtesy of Paul Ekman.



The Emotion Home Page Maintained by Jean-Marc Fellous and Eva Hudlicka of Duke University, this site provides links to a wealth of information on many aspects of emotion. Visitors can learn about emotion research in psychology, neuroscience, and cognitive science. Links to journals, books, conferences, and forums are also available.

rule out this possibility, they took their photos to a remote area in New Guinea and showed them to a group of natives (the Fore) who had had virtually no contact with Western culture. Even the people from this preliterate culture did a fair job of identifying the emotions portrayed in the pictures (see the data in the bottom row of **Figure 10.22**). Subsequent comparisons of many other societies have also shown considerable cross-cultural congruence in the judgment of facial expressions (Biehl et al., 1997; Ekman, 1992, 1993). Although some theorists disagree (J. A. Russell, 1994, 1995), there is reasonably convincing evidence that people in widely disparate cultures express their emotions and interpret those expressions in much the same way (Izard, 1994; Keltner et al., 2003; Matsumoto, 2001). That said, culture is *not* irrelevant to the expression and perception of emotion. Research shows that subjects are somewhat more accurate in recognizing emotions expressed by people from their own culture than they are when asked to identify emotions expressed by a different cultural group (Elfenbein & Ambady, 2002, 2003).

Cross-cultural similarities have also been found in the cognitive and physiological elements of emotional experience (Scherer & Wallbott, 1994). For example, in making cognitive appraisals of events that might elicit emotional reactions, people from different cultures broadly think along the same lines (Mauro, Sato, & Tucker, 1992; Mesquita & Frijda, 1992). That is, they evaluate situations along the same dimensions (pleasant versus unpleasant, expected versus unexpected, fair versus unfair, and so on). Understandably, then, the types of events that trigger specific emotions are fairly similar across cultures (Frijda, 1999; Scherer, 1997). Around the globe, achievements lead to joy, injustices lead to anger, and risky situations lead to fear. Finally, as one might expect, the physiological arousal that accompanies emotion also appears to be largely invariant across cultures (Wallbott & Scherer, 1988). Thus, researchers have found a great deal of cross-cultural continuity and uniformity in the cognitive, physiological, and behavioral (expressive) elements of emotional experience.

Cross-Cultural Differences in Emotional Experience

The cross-cultural similarities in emotional experience are impressive, but researchers have also found many cultural disparities in how people perceive, think about, and express their emotions and in how often they experience specific emotions (Mesquita, 2001, 2003). Foremost among these disparities are the fascinating variations in how cultures categorize emotions. Some basic categories of emotion that are universally understood in Western cultures appear

to go unrecognized—or at least unnamed—in some non-Western cultures. James Russell (1991) has compiled numerous examples of English words for emotions that have no equivalent in other languages. For example, Tahitians have no word that corresponds to *sadness*. Many non-Western groups, including the Yoruba of Nigeria, the Kaluli of New Guinea, and the Chinese, lack a word for *depression*. The concept of *anxiety* seems to go unrecognized among Eskimos, and the Quichua of Ecuador lack a word for *remorse*.

Cultural disparities have also been found in regard to nonverbal expressions of emotion. Although the natural facial expressions associated with basic emotions appear to be pancultural, people can and do learn to control and modify these expressions. **Display rules are norms that regulate the appropriate expression of emotions.** They prescribe when, how, and to whom people can show various emotions. These norms vary from one culture to another (Ekman, 1992), as do attitudes about specific emotions (Eid & Diener, 2001). For instance, the Ifaluk (a Pacific island culture) severely restrict expressions of happiness because they believe that this emotion often leads people to neglect their duties (Lutz, 1987). Japanese culture emphasizes the suppression of negative emotions in public. More so than in other cultures, the Japanese are socialized to mask emotions such as anger, sadness, and disgust with stoic facial expressions or polite smiling. Thus, nonverbal expressions of emotions vary somewhat across cultures because of culture-specific attitudes and display rules.

➤ REVIEW OF KEY POINTS

- Emotion is made up of cognitive, physiological, and behavioral components. The cognitive component involves subjective feelings that have an evaluative aspect.
- The most readily apparent aspect of the physiological component of emotion is autonomic arousal. This arousal is the basis for the lie detector, which is really an emotion detector. Polygraphs are not all that accurate in assessing individuals' veracity.
- The amygdala appears to be the hub of an emotion-processing system in the brain that modulates conditioned fears. The prefrontal cortex, cingulate cortex, and mesolimbic dopamine pathway also contribute to selected aspects of emotion, as do a variety of other areas in the brain.
- At the behavioral level, emotions are expressed through body language, with facial expressions being particularly prominent. Ekman and Friesen have found considerable cross-cultural agreement in the identification of emotions based on facial expressions.
- Cross-cultural similarities have also been found in the cognitive and physiological components of emotion. However, there are some striking cultural variations in how people categorize and display their emotions.

> Theories of Emotion

How do psychologists explain the experience of emotion? A variety of theories and conflicting models exist. Some have been vigorously debated for over a century. As we describe these theories, you'll recognize a familiar bone of contention. Like so many other types of theories, theories of emotion differ in their emphasis on the innate biological basis of emotion versus the social, environmental basis.

James-Lange Theory



As noted in Chapter 1, William James was a prominent early theorist who urged psychologists to explore the functions of consciousness. James (1884) developed a theory of emotion over 120 years ago that remains influential today. At about the same time, he and Carl Lange (1885) independently proposed that *the conscious experience of emotion results from one's perception of autonomic arousal*. Their theory stood common sense on its head. Everyday logic suggests that when you stumble onto a rattlesnake in the woods, the conscious experience of fear leads to visceral arousal (the fight-or-flight response). The James-Lange theory of emotion asserts the opposite:

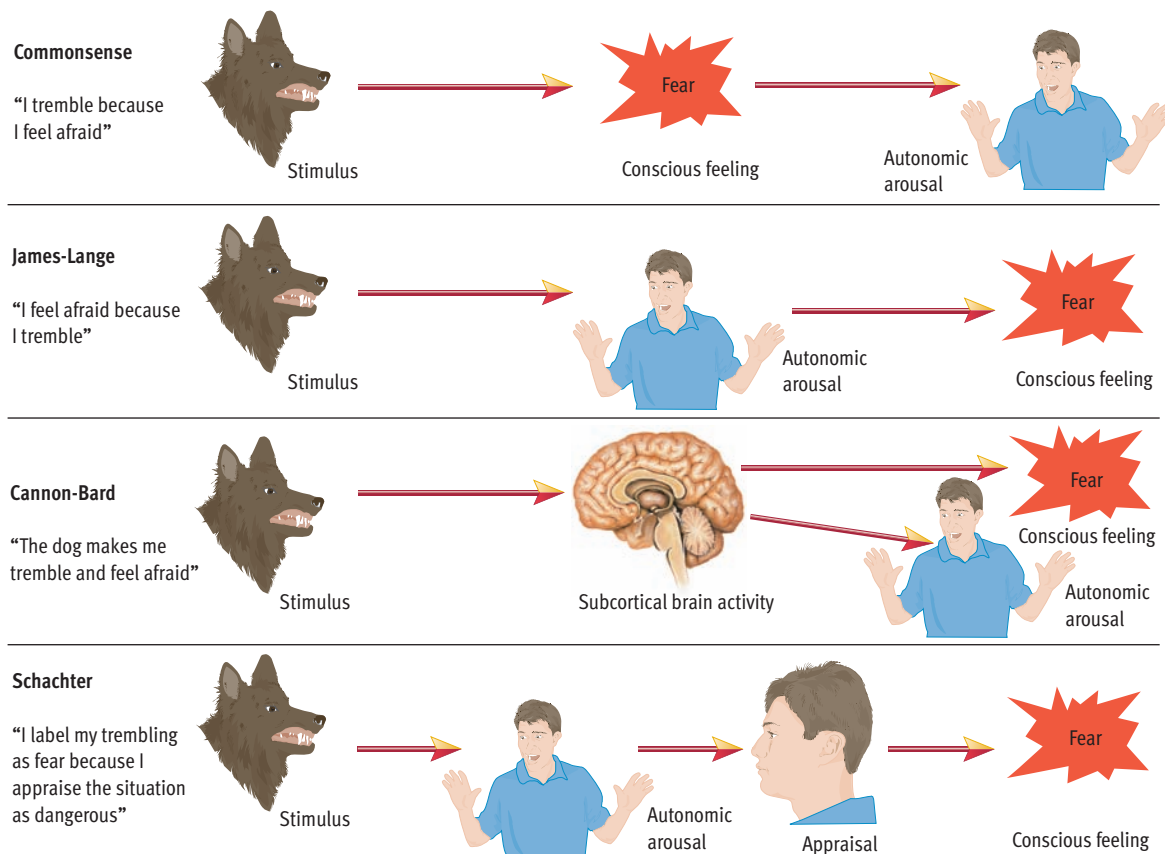
that the perception of visceral arousal leads to the conscious experience of fear (see **Figure 10.23**). In other words, while you might assume that your pulse is racing because you're fearful, James and Lange argued that you're fearful because your pulse is racing.

The James-Lange theory emphasizes the physiological determinants of emotion. According to this view, *different patterns of autonomic activation lead to the experience of different emotions*. Hence, people supposedly distinguish emotions such as fear, joy, and anger on the basis of the exact configuration of autonomic reactions they experience. Decades of research have supported the concept of *autonomic specificity*—that different emotions are accompanied by different patterns of autonomic activation (Janig, 2003; Levenson, 2003). However, the question of whether people identify their emotions based on these varied patterns of autonomic activation remains unresolved.

Cannon-Bard Theory



Walter Cannon (1927) found the James-Lange theory unconvincing. Cannon pointed out that physiologi-



PREVIEW QUESTIONS

- What are the differences between the James-Lange and Cannon-Bard theories of emotion?
- How did the two-factor theory of emotion try to reconcile these differences?
- How do evolutionary theorists explain emotions?

Figure 10.23
Theories of emotion. Three influential theories of emotion are contrasted with one another and with the commonsense view. The James-Lange theory was the first to suggest that feelings of arousal cause emotion, rather than vice versa. Schachter built on this idea by adding a second factor—interpretation (appraisal and labeling) of arousal.

cal arousal may occur without the experience of emotion (if one exercises vigorously, for instance). He also argued that visceral changes are too slow to precede the conscious experience of emotion. Finally, he argued that people experiencing very different emotions, such as fear, joy, and anger, exhibit similar patterns of autonomic arousal that are not readily distinguishable.

Thus, Cannon espoused a different explanation of emotion. Later, Philip Bard (1934) elaborated on it. The resulting Cannon-Bard theory argues that emotion occurs when the thalamus sends signals *simultaneously* to the cortex (creating the conscious experience of emotion) and to the autonomic nervous system (creating visceral arousal). The Cannon-Bard model is compared to the James-Lange model in **Figure 10.23**. Cannon and Bard were off the mark a bit in pinpointing the thalamus as the neural center for emotion. However, many modern theorists agree with the Cannon-Bard view that emotions originate in subcortical brain structures (LeDoux, 1996; Panksepp, 1991; Rolls, 1990) and with the assertion that people do not discern their emotions from different patterns of autonomic activation (Frijda, 1999; Wagner, 1989).

Schachter (1964; Schachter & Singer, 1962, 1979), the experience of emotion depends on two factors: (1) autonomic arousal and (2) cognitive interpretation of that arousal. Schachter proposed that when you experience visceral arousal, you search your environment for an explanation (see **Figure 10.23** again). If you're stuck in a traffic jam, you'll probably label your arousal as anger. If you're taking an important exam, you'll probably label it as anxiety. If you're celebrating your birthday, you'll probably label it as happiness.

Schachter agreed with the James-Lange view that emotion is inferred from arousal. However, he also agreed with the Cannon-Bard position that different emotions yield largely indistinguishable patterns of autonomic activity. He reconciled these views by arguing that people look to external rather than internal cues to differentiate and label their specific emotions. In essence, Schachter suggested that people think along the following lines: "If I'm aroused and you're obnoxious, I must be angry."

Although the two-factor theory has received support, studies have revealed some limitations as well (Leventhal & Tomarken, 1986). Situations can't mold emotions in just any way at any time. And in searching to explain arousal, subjects don't limit themselves to the immediate situation (Sinclair et al., 1994). Thus, emotions are not as pliable as the two-factor theory initially suggested.

Schachter's Two-Factor Theory



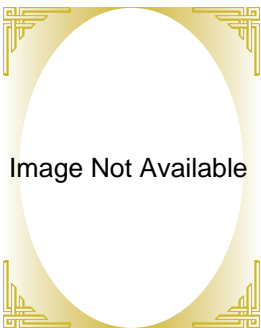
In another influential analysis, Stanley Schachter asserted that people look at situational cues to differentiate between alternative emotions. According to

Evolutionary Theories of Emotion



When the limitations of the two-factor theory were exposed, theorists began returning to ideas espoused by Charles Darwin well over a century ago. Darwin (1872) believed that emotions developed because of their adaptive value. Fear, for instance, would help an organism avoid danger and thus would aid in survival. Hence, Darwin viewed emotions as a product of evolution. This premise serves as the foundation for several prominent theories of emotion developed independently by S. S. Tomkins (1980, 1991), Carroll Izard (1984, 1991), and Robert Plutchik (1984, 1993).

These *evolutionary theories* consider emotions to be largely innate reactions to certain stimuli. As such, emotions should be immediately recognizable under most conditions without much thought. After all, primitive animals that are incapable of complex thought seem to have little difficulty in recognizing their emotions. Evolutionary theorists believe that emotion evolved before thought. They assert that thought plays a relatively small role in emotion, although they admit that learning and cognition may have some influence on human emotions. Evolution-



STANLEY SCHACHTER

"Cognitive factors play a major role in determining how a subject interprets his bodily feelings."

concept check 10.3



Understanding Theories of Emotion

Check your understanding of theories of emotion by matching the theories we discussed with the statements below. Let's borrow William James's classic example: Assume that you just stumbled onto a bear in the woods. The first statement expresses the commonsense explanation of your fear. Each of the remaining statements expresses the essence of a different theory; indicate which theory in the spaces provided. The answers are provided in Appendix A.

1. You tremble because you're afraid.

Common sense

2. You're afraid because you're trembling.


3. You're afraid because situational cues (the bear) suggest that's why you're trembling.

4. You're afraid because the bear has elicited an innate primary emotion.

ary theories generally assume that emotions originate in subcortical brain structures that evolved before the higher brain areas in the cortex associated with complex thought.

Evolutionary theories also assume that evolution has equipped humans with a small number of innate emotions with proven adaptive value. Thus, the principal question that evolutionary theories of emotion wrestle with is, *What are the fundamental emotions?* **Figure 10.24** summarizes the conclusions of the leading theorists in this area. As you can see, Tomkins, Izard, and Plutchik have not come up with identical lists, but there is considerable agreement. All three conclude that people exhibit eight to ten primary emotions. Moreover, six of these emotions appear on all three lists: fear, anger, joy, disgust, interest, and surprise.

Of course, people experience more than just eight to ten emotions. How do evolutionary theories account for this variety? They propose that the many emotions that people experience are produced by blends of primary emotions and variations in intensity. For example, Robert Plutchik (1980, 1993) has devised an elegant model of how primary emotions such as fear and surprise may blend into secondary emotions such as awe. Plutchik’s model also posits that various emotions, such as apprehension, fear, and terror, involve one primary emotion experienced at different levels of intensity (see **Figure 10.25**).

 **REVIEW OF KEY POINTS**

- The James-Lange theory asserts that emotion results from one’s perception of autonomic arousal. The Cannon-Bard theory counters with the proposal that emotions originate in subcortical areas of the brain.
- According to Schachter’s two-factor theory, people infer emotion from arousal and then label the emotion in accordance with their cognitive explanation for the arousal. Evolutionary theories of emotion maintain that emotions are innate reactions that require little cognitive interpretation.

Silvan Tomkins	Carroll Izard	Robert Plutchik
Fear	Fear	Fear
Anger	Anger	Anger
Enjoyment	Joy	Joy
Disgust	Disgust	Disgust
Interest	Interest	Anticipation
Surprise	Surprise	Surprise
Contempt	Contempt	
Shame	Shame	
	Sadness	Sadness
Distress		
	Guilt	
		Acceptance

Figure 10.24
Primary emotions. Evolutionary theories of emotion attempt to identify primary emotions. Three leading theorists—Silvan Tomkins, Carroll Izard, and Robert Plutchik—have compiled different lists of primary emotions, but this chart shows great overlap among the basic emotions identified by these theorists. (Based on Mandler, 1984)

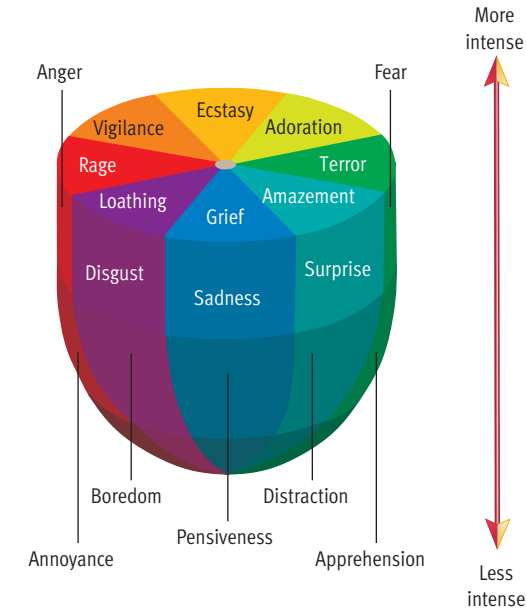


Figure 10.25
Emotional intensity in Plutchik’s model. According to Plutchik, diversity in human emotion is a product of variations in emotional intensity, as well as blendings of primary emotions. Each vertical slice in the diagram is a primary emotion that can be subdivided into emotional expressions of varied intensity, ranging from most intense (top) to least intense (bottom).

Source: Based on art in Plutchik, R. (1980). A language for emotions. *Psychology Today*, 13 (9), 68–78. Reprinted with permission from Psychology Today Magazine. Copyright © 1980 by Sussex Publishers.

➤ Reflecting on the Chapter’s Themes

Five of our organizing themes were particularly prominent in this chapter: the influence of cultural contexts, the dense connections between psychology and society at large, psychology’s theoretical diversity, the interplay of heredity and environment, and the multiple causes of behavior.

Our discussion of motivation and emotion demonstrated once again that there are both similarities and differences across cultures in behavior. The neu-

ral, biochemical, genetic, and hormonal processes underlying hunger and eating, for instance, are universal. But cultural factors influence what people prefer to eat, how much they eat, and whether they worry about dieting. In a similar vein, researchers have found a great deal of cross-cultural congruence in the cognitive, physiological, and expressive elements of emotional experience, but they have also found cultural variations in how people think about and express

 Cultural Heritage

 Sociohistorical Context

 Theoretical Diversity



their emotions. Thus, as we have seen in previous chapters, psychological processes are characterized by both cultural variance and invariance.

Our discussion of the controversies surrounding evolutionary theory, aggressive pornography, and the determinants of sexual orientation show once again that psychology is not an ivory tower enterprise. It evolves in a sociohistorical context that helps shape the debates in the field, and these debates often have far-reaching social and political ramifications for society at large. We ended the chapter with a discussion of various theories of emotion, which showed once again that psychology is characterized by great theoretical diversity.

Finally, we repeatedly saw that biological and environmental factors jointly govern behavior. For example, we learned that eating behavior, sexual desire, and the experience of emotion all depend on complicated interactions between biological and environmental determinants. Indeed, complicated interactions permeated the entire chapter, demonstrating that if we want to fully understand behavior, we have to take multiple causes into account. In the upcoming Personal Application, we will continue our discussion of emotion, looking at recent research on the correlates of happiness. In the Critical Thinking Application that follows, we discuss how to carefully analyze the types of arguments that permeated this chapter.

PERSONAL Application

Exploring the Ingredients of Happiness

Answer the following “true” or “false.”

- ___ 1 The empirical evidence indicates that most people are relatively unhappy.
- ___ 2 Although wealth doesn’t *guarantee* happiness, wealthy people are much more likely to be happy than the rest of the population.
- ___ 3 People who have children are happier than people without children.
- ___ 4 Good health is an essential requirement for happiness.
- ___ 5 Good-looking people are happier than those who are unattractive.

The answer to all these questions is “false.” These assertions are all reasonable and widely believed hypotheses about the correlates of happiness, but they have *not* been supported by empirical research. Recent years have brought a surge of interest in the correlates of *subjective well-being—individuals’ personal perceptions of their overall happiness and life satisfaction*. The findings of these studies are quite interesting. As you have already seen from our true-false questions, many commonsense notions about happiness appear to be inaccurate.

How Happy Are People?

One of these inaccuracies is the apparently widespread assumption that most people

are relatively unhappy. Writers, social scientists, and the general public seem to believe that people around the world are predominantly dissatisfied and unhappy, yet empirical surveys consistently find that the vast majority of respondents—even those who are poor or disabled—characterize themselves as fairly happy (Diener & Diener, 1996; Myers & Diener, 1995). When people are asked to rate their happiness, only a small minority place themselves below the neutral point on the various scales used (see **Figure 10.26**). When the average subjective well-being of entire nations is computed, based on almost 1000 surveys, the means cluster toward the positive end of the scale, as shown in **Figure 10.27** (Veenhoven, 1993). That’s not to say that everyone is equally happy. Researchers find substantial and thought-provoking disparities among people in subjective well-being, which we will analyze momentarily, but the overall picture seems rosier than anticipated.

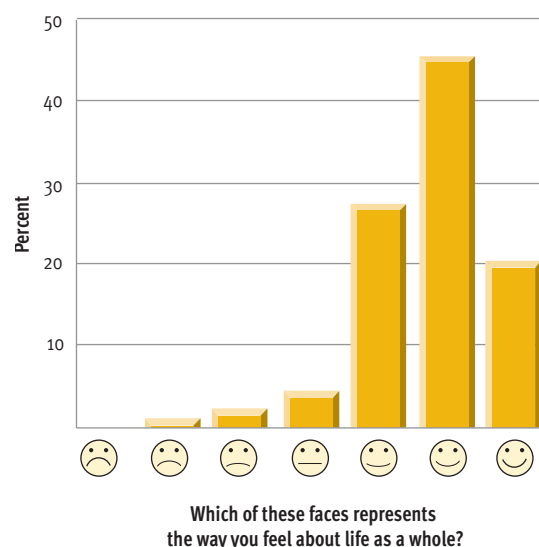
Factors That Do Not Predict Happiness

Let us begin our discussion of individual differences in happiness by highlighting those things that turn out to

be relatively unimportant determinants of subjective well-being. Quite a number of factors that you might expect to be influential appear to bear little or no relationship to general happiness.

Figure 10.26

Measuring happiness with a nonverbal scale. Researchers have used a variety of methods to estimate the distribution of happiness. For example, in one study in the United States, respondents were asked to examine the seven facial expressions shown and select the one that “comes closest to expressing how you feel about your life as a whole.” As you can see, the vast majority of participants chose happy faces. (Data adapted from Myers, 1992)



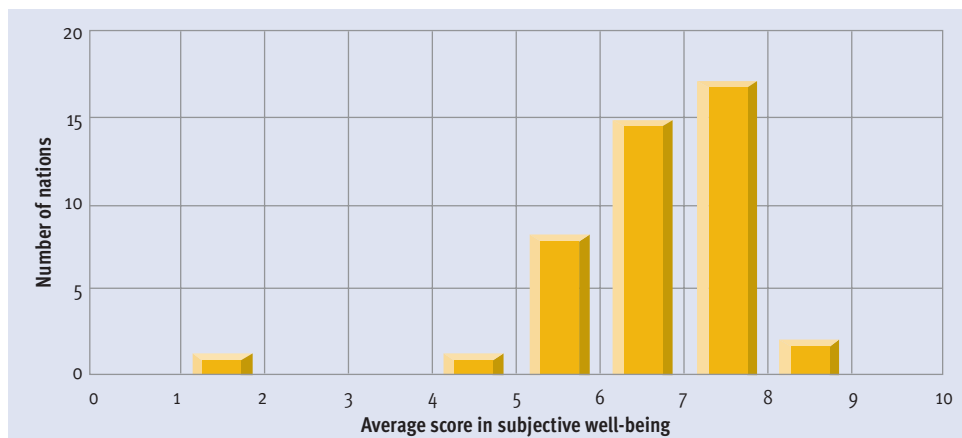


Figure 10.27

The subjective well-being of nations. Veenhoven (1993) combined the results of almost 1000 surveys to calculate the average subjective well-being reported by representative samples from 43 nations. The mean happiness scores clearly pile up at the positive end of the distribution, with only two scores falling below the neutral point of 5. (Data adapted from Diener and Diener, 1996)

Money. There is a positive correlation between income and subjective feelings of happiness, but the association is surprisingly weak (Diener & Seligman, 2004). For example, one study found a correlation of just .13 between income and happiness in the United States (Diener et al., 1993). Admittedly, being very poor can make people unhappy, but once people ascend above the poverty level, little relation is seen between income and happiness. On the average, wealthy people are only marginally happier than those in the middle classes. The problem with money is that in this era of voracious consumption, pervasive advertising and rising income fuel escalating material desires (Frey & Stutzer, 2002; Kasser et al., 2004). When these growing material desires outstrip what people can afford, dissatisfaction is likely (Solberg et al., 2002). Thus, complaints about not having enough money are routine even among people who earn hefty six-figure incomes. Interestingly, there is some evidence that people who place an especially strong emphasis on the pursuit of wealth and materialistic goals tend to be somewhat less happy than others (Kasser, 2002; Ryan & Deci, 2001), perhaps in large part because they are so focused on financial success that they don't derive much satisfaction from their family life (Nickerson et al., 2003).

Age. Age and happiness are consistently found to be unrelated. Age accounts for less than 1 percent of the variation in people's

happiness (Inglehart, 1990; Myers & Diener, 1997). The key factors influencing subjective well-being may shift some as people grow older—work becomes less important, health more so—but people's average level of happiness tends to remain remarkably stable over the life span.

Parenthood. Children can be a tremendous source of joy and fulfillment, but they can also be a tremendous source of headaches and hassles. Compared to childless couples, parents worry more and experience more marital problems (Argyle, 1987). Apparently, the good and bad aspects of parenthood balance each other out, because the evidence indicates that people who have children are neither more nor less happy than people without children (Argyle, 2001).

Intelligence and attractiveness. Intelligence and physical attractiveness are highly valued traits in modern society, but researchers have not found an association between either characteristic and happiness (Diener, 1984; Diener, Wolsic, & Fujita, 1995).

Moderately Good Predictors of Happiness

Research has identified three facets of life that appear to have a *moderate* association with subjective well-being: health, social activity, and religious belief.

Health. Good physical health would seem to be an essential requirement for happiness, but people adapt to health problems. Research reveals that individuals who develop serious, disabling health conditions aren't as unhappy as one might guess (Myers, 1992; Riis et al., 2005). Good health may not, by itself, produce happiness, because people tend to take good health for granted. Considerations such as these may help explain why researchers find only a moderate positive correlation (average = .32) between health status and subjective well-being (Argyle, 1999).

Social Activity. Humans are social animals, and interpersonal relations *do* appear to contribute to people's happiness. Those who are satisfied with their social support and friendship networks and those who are socially active report above-average levels of happiness (Diener & Seligman, 2004; Myers, 1999). Furthermore, people who are exceptionally happy tend to report greater satisfaction with their social relations than those who are average or low in subjective well-being (Diener & Seligman, 2002).

Religion. The link between religiosity and subjective well-being is modest, but a number of large-scale surveys suggest that people with heartfelt religious convictions are more likely to be happy than people who characterize themselves as nonreligious (Argyle, 1999; Ferriss, 2002). Researchers aren't sure how religious faith fosters happiness, but Myers (1992) offers some interesting conjectures. Among other things, he discusses how religion can give people a sense of purpose and meaning in their lives, help them accept their setbacks gracefully, connect them to a caring, supportive community, and comfort them by putting their ultimate mortality in perspective.

Strong Predictors of Happiness

The list of factors that turn out to have fairly strong associations with happiness is surprisingly short. The key ingredients of happiness appear to involve love, work, and personality.

Love and Marriage. Romantic relationships can be stressful, but people consistently rate being in love as one of the most critical ingredients of happiness (Myers, 1999). Furthermore, although people complain a lot about their marriages, the evidence indicates that marital status is a key correlate of happiness. Among both men and women, married people are happier than people who are single or divorced (see **Figure 10.28**; Myers & Diener, 1995), and this relationship holds around the world in widely different cultures (Diener et al., 2000). However, the causal relations underlying this correlation are unclear. It may be that happiness causes marital satisfaction more than marital satisfaction promotes happiness. Perhaps people who are happy tend to have better intimate relationships and more stable marriages, while people who are unhappy have more difficulty finding and keeping mates.

Work. Given the way people often complain about their jobs, one might not expect work to be a key source of happiness, but it is. Although less critical than love and marriage, job satisfaction has a substantial association with general happiness (Warr, 1999).

Studies also show that unemployment has strong negative effects on subjective well-being (Lucas et al., 2004). It is difficult to sort out whether job satisfaction causes happi-

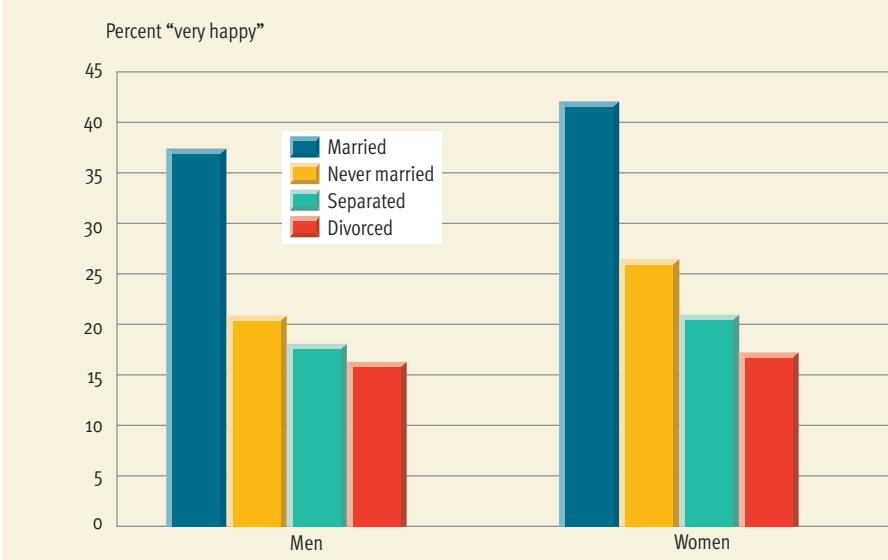
ness or vice versa, but evidence suggests that causation flows both ways (Argyle, 2001).

Personality. The best predictor of individuals' future happiness is their past happiness (Diener & Lucas, 1999). Some people seem destined to be happy and others unhappy, regardless of their triumphs or setbacks. The limited influence of life events was apparent in a stunning study that found only marginal differences in overall happiness between recent lottery winners and recent accident victims who became quadriplegics (Brickman, Coates, & Janoff-Bulman, 1978). Investigators were amazed that such extremely fortuitous and horrible events didn't have a dramatic impact on happiness. Several lines of evidence suggest that happiness does not depend on external circumstances—buying a nice house, getting promoted—so much as internal factors, such as one's outlook on life (Lykken & Tellegen, 1996). With this fact in mind, researchers have begun to look for links between personality and subjective well-being, and they have found some intriguing correlations. For example, *extraversion* is one of the better predictors of happiness. People who are outgoing, upbeat, and sociable tend to be happier than others (Fleeson, Malanos, & Achille,

Image Not Available

Figure 10.28
Happiness and marital status. This graph shows the percentage of adults characterizing themselves as “very happy” as a function of marital status (Myers, 1999). Among both women and men, happiness shows up more in those who are married as opposed to those who are separated, are divorced, or have never married. These data and many others suggest that marital satisfaction is a key ingredient of happiness.

Source: Myers, D. G. (1999). Close relationships and quality of life. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology*. New York: Russell Sage Foundation. Copyright © 1999. Reprinted by permission of the Russell Sage Foundation.



2002). Additional positive correlates of happiness include self-esteem and optimism (Lucas, Diener, & Suh, 1996).

Conclusions About Subjective Well-Being

We must be cautious in drawing inferences about the causes of happiness, because the available data are correlational (see **Figure 10.29**). Nonetheless, the empirical evidence suggests that many popular beliefs about the sources of happiness are unfounded. The data also demonstrate that happiness is shaped by a complex constellation of variables. In spite of this complexity, however, a number of worthwhile insights about the ingredients of happiness can be gleaned from the recent flurry of research.

First, research on happiness demonstrates that the determinants of subjective well-being are precisely that: subjective. *Objective realities are not as important as subjective feelings.* In other words, your health, your wealth, and your job are not as influential as how you *feel* about your health, wealth, and job (Schwarz & Strack, 1999). These feelings are likely to be influenced by what your *expectations* were. Research suggests that bad outcomes feel worse when unexpected than when expected and good outcomes feel better when unexpected than when expected (Shepperd & McNulty, 2002). Thus, the same objective event, such as a pay raise of \$2000 annually, may generate positive feelings in someone who wasn't expecting a raise and

negative feelings in someone expecting a much larger increase in salary.

Second, *when it comes to happiness everything is relative* (Argyle, 1999; Hagerty, 2000). In other words, you evaluate what you have relative to what the people around you have. Generally, we compare ourselves with others who are similar to us. Thus, people who are wealthy assess what they have by comparing themselves with their wealthy friends and neighbors. This is one reason for the low correlation between wealth and happiness. You might have a lovely home, but if it sits next door to a neighbor's palatial mansion, it might be a source of more dissatisfaction than happiness.

Third, *research on subjective well-being indicates that people often adapt to their circumstances.* This adaptation effect is one reason that increases in income don't necessarily bring increases in happiness. Thus **hedonic adaptation occurs when the mental scale that people use to judge the pleasantness-unpleasantness of their experiences shifts so that their neutral point, or baseline for comparison, changes.** Unfortunately, when people's experiences improve, hedonic adaptation may *sometimes* put them on a *hedonic treadmill*—their neutral point moves upward, so that the improvements yield no real benefits (Kahneman, 1999). However, when people have to grapple with major setbacks, hedonic adaptation probably

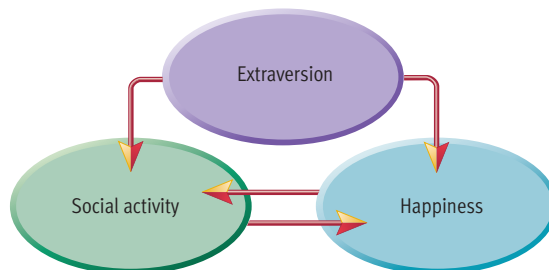


Research shows that happiness does not depend on people's positive and negative experiences as much as one would expect. Some people, presumably because of their personality, seem destined to be happy in spite of major setbacks, and others seem destined to cling to unhappiness even though their lives seem reasonably pleasant.

helps protect their mental and physical health. For example, people who are sent to prison and people who develop debilitating diseases are not as unhappy as one might assume, because they adapt to their changed situations and evaluate events from a new perspective (Frederick & Loewenstein, 1999). That's not to say that hedonic adaptation in the face of life's difficulties is inevitable or complete (Lucas et al., 2003). People who suffer major setbacks, such as the death of a spouse or serious illness, often are not as happy as they were before the setback, but generally they are not nearly as unhappy as they or others would have predicted.

Figure 10.29

Possible causal relations among the correlates of happiness. Although we have considerable data on the correlates of happiness, it is difficult to untangle the possible causal relationships. For example, we know that a moderate positive correlation exists between social activity and happiness, but we can't say for sure whether high social activity causes happiness or whether happiness causes people to be more socially active. Moreover, in light of the research showing that a third variable—extraversion—correlates with both variables, we have to consider the possibility that extraversion causes both greater social activity and greater happiness.



REVIEW OF KEY POINTS

- Research on happiness reveals that many commonsense notions about the roots of happiness appear to be incorrect, including the notion that most people are unhappy. Factors such as income, age, parenthood, intelligence, and attractiveness are largely uncorrelated with subjective well-being.
- Physical health, good social relationships, and religious faith appear to have a modest impact on feelings of happiness. The only factors that are good predictors of happiness are love and marriage, work satisfaction, and personality.
- Research on happiness indicates that objective realities are not as important as subjective feelings and that subjective well-being is a relative concept. The evidence also indicates that people adapt to their circumstances.

CRITICAL THINKING Application

Analyzing Arguments: Making Sense out of Controversy

Consider the following argument. “Dieting is harmful to your health because the tendency to be obese is largely inherited.” What is your reaction to this reasoning? Do you find it convincing? We hope not, as this argument is seriously flawed. Can you see what’s wrong? There is no relationship between the conclusion that “dieting is harmful to your health” and the reason given that “the tendency to be obese is largely inherited.” The argument is initially seductive because you know from reading this chapter that obesity is largely inherited, so the reason provided represents a true statement. But the reason is unrelated to the conclusion advocated. This scenario may strike you as odd, but if you start listening carefully to discussions about controversial issues, you will probably notice that people often cite irrelevant considerations in support of their favored conclusions.

This chapter was loaded with controversial issues that sincere, well-meaning people could argue about for weeks. Does the availability of pornography increase the prevalence of sex crimes? Are gender differences in mating preferences a product of evolution or of modern economic realities? Is there a biological basis for homosexuality? Unfortunately, arguments about issues such as

these typically are unproductive in terms of moving toward resolution or agreement because most people know little about the rules of argumentation. In this application, we will explore what makes arguments sound or unsound in the hope of improving your ability to analyze and think critically about arguments.

The Anatomy of an Argument

In everyday usage, the word *argument* is used to refer to a dispute or disagreement between two or more people, but in the technical language of rhetoric, **an argument consists of one or more premises that are used to provide support for a conclusion. Premises are the reasons that are presented to persuade someone that a conclusion is true or probably true. Assumptions are premises for which no proof or evidence is offered.** Assumptions are often left unstated. For example, suppose that your doctor tells you that you should exercise regularly because regular exercise is good for your heart. In this simple argument, the conclusion is “You should exercise regularly.” The premise that leads to this conclusion is the idea that “exercise is good for your heart.” An

unstated assumption is that everyone wants a healthy heart.

In the language of argument analysis, premises are said to support (or not support) conclusions. A conclusion may be supported by one reason or by many reasons. One way to visualize these possibilities is to draw an analogy between the reasons that support a conclusion and the legs that support a table (Halpern, 2003). As shown in **Figure 10.30**, a table top (conclusion) could be supported by one strong leg (a single strong reason) or many thin legs (lots of weaker reasons). Of course, the reasons provided for a conclusion may fail to support the conclusion. Returning to our table analogy, the table top might not be supported because the legs are too thin (very weak reasons) or because the legs are not attached (irrelevant reasons).

Arguments can get complicated, as they usually have more parts than just reasons and conclusions. In addition, there often are *counterarguments*, which are reasons that take support away from a conclusion. And sometimes the most important part of an argument is a part that is not there—reasons that have been omitted, either deliberately or not, that would lead to a different conclusion if they were supplied. Given all the complex variations that are possible in ar-

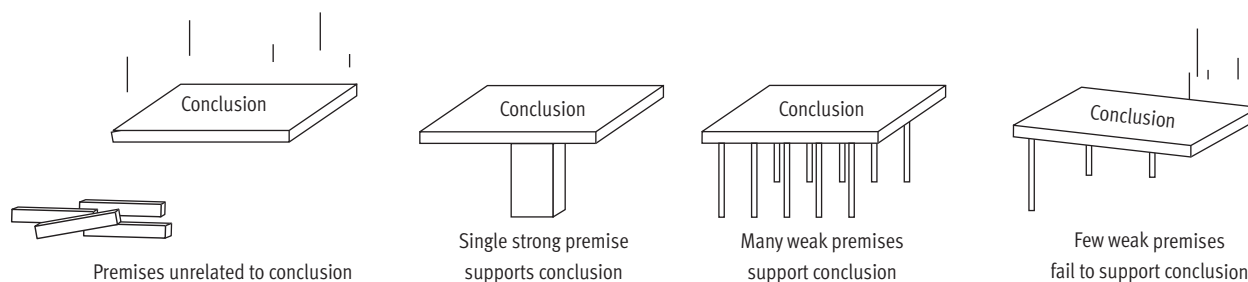


Figure 10.30

An analogy for understanding the strength of arguments. Halpern (2003) draws an analogy between the reasons that support a conclusion and the legs that support a table. She points out that a conclusion may be supported effectively by one strong premise or many weak premises. Of course, the reasons provided for a conclusion may also *fail* to provide adequate support.

Source: Halpern, D. F. (2003). *Thought & knowledge: An introduction to critical thinking*, 4th Ed., p. 199, figure 5.1. Copyright © 2003 Lawrence Erlbaum Associates. Reprinted by permission of Lawrence Erlbaum Associates and the author.

guments, it is impossible to give you simple rules for judging arguments, but we can highlight some common fallacies and then provide some criteria that you can apply in thinking critically about arguments.

Common Fallacies

As noted in previous chapters, cognitive scientists have compiled lengthy lists of fallacies that people frequently display in their reasoning. These fallacies often show up in arguments. In this section we will describe five common fallacies. To illustrate each one, we will assume the role of someone arguing that pornographic material on the Internet (cyberporn) should be banned or heavily regulated.

Irrelevant Reasons. Reasons cannot provide support for an argument unless they are relevant to the conclusion. Arguments that depend on irrelevant reasons—either intentionally or inadvertently—are quite common. You already saw one example at the beginning of this application. The Latin term for this fallacy is *non sequitur*, which literally translates to “it doesn’t follow.” In other words, the conclusion does not follow from the premise. For example, in the debate about Internet pornography, you might hear the following *non sequitur*: “We need to regulate cyberporn because research has shown that most date rapes go unreported.”

Circular Reasoning. In *circular reasoning* the premise and conclusion are simply re-statements of each other. People vary their wording a little so it isn’t obvious, but when you look closely, the conclusion is the premise. For example, in arguments about Internet pornography you might hear someone assert, “We need to control cyberporn because it currently is unregulated.”

Slippery Slope. The concept of *slippery slope* argumentation takes its name from the notion that if you are on a slippery slope and you don’t dig your heels in, you will slide and slide until you reach bottom. A slippery

slope argument typically asserts that if you allow X to happen, things will spin out of control and far worse events will follow. The trick is that there is no inherent connection between X and the events that are predicted to follow. For example, in the debate about medical marijuana, opponents have argued, “If you legalize medical marijuana, the next thing you know cocaine and heroin will be legal.” In the debate about cyberporn, a slippery slope argument might go, “If we don’t ban cyberporn, the next thing you know, grade-school children will be watching smut all day long in their school libraries.”

Weak Analogies. An *analogy* asserts that two concepts or events are similar in some way. Hence, you can draw conclusions about event B because of its similarity to event A. Analogies are useful in thinking about complex issues, but some analogies are weak or inappropriate because the similarity between A and B is superficial, minimal, or irrelevant to the issue at hand. For example, in the debate about Internet erotica, someone might argue, “Cyberporn is morally offensive, just like child molestation. We wouldn’t tolerate child molestation, so we shouldn’t permit cyberporn.”

False Dichotomy. A *false dichotomy* creates an either-or choice between two outcomes: the outcome advocated and some obviously horrible outcome that any sensible person would want to avoid. These outcomes are presented as the only two possibilities, when

in reality there could be other outcomes, including ones that lie somewhere between the extremes depicted in the false dichotomy. In the debate about Internet pornography, someone might argue, “We can ban cyberporn, or we can hasten the moral decay of modern society.”

Evaluating the Strength of Arguments

In everyday life, you may frequently need to assess the strength of arguments made by friends, family, co-workers, politicians, media pundits, and so forth. You may also want to evaluate your own arguments when you write papers or speeches for school or prepare presentations for your work. The following questions can help you make systematic evaluations of arguments (adapted from Halpern, 2003):

- What is the conclusion?
- What are the premises provided to support the conclusion? Are the premises valid?
 - Does the conclusion follow from the premises? Are there any fallacies in the chain of reasoning?
 - What assumptions have been made? Are they valid assumptions? Should they be stated explicitly?
- What are the counterarguments? Do they weaken the argument?
- Is there anything that has been omitted from the argument?

Table 10.1 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding the elements of an argument	The critical thinker understands that an argument consists of premises and assumptions that are used to support a conclusion.
Recognizing and avoiding common fallacies, such as irrelevant reasons, circular reasoning, slippery slope reasoning, weak analogies, and false dichotomies	The critical thinker is vigilant about conclusions based on unrelated premises, conclusions that are rewordings of premises, unwarranted predictions that things will spin out of control, superficial analogies, and contrived dichotomies.
Evaluating arguments systematically	The critical thinker carefully assesses the validity of the premises, assumptions, and conclusions in an argument, and considers counterarguments and missing elements.

CHAPTER 10 *Recap*

Key Ideas

Motivational Theories and Concepts

- Drive theories apply a homeostatic model to motivation. They assume that organisms seek to reduce unpleasant states of tension called drives. In contrast, incentive theories emphasize how external goals energize behavior.
- Evolutionary theorists explain motives in terms of their adaptive value. Madsen's list of biological needs and Murray's list of social needs illustrate that a diverse array of motives govern human behavior.

The Motivation of Hunger and Eating

- Eating is regulated by a complex interaction of biological and environmental factors. In the brain, the lateral, ventromedial, and paraventricular areas of the hypothalamus appear to be involved in the control of hunger, but their exact role is unclear.
- Fluctuations in blood glucose also seem to play a role in hunger. The stomach can send two types of satiety signals to the brain. Hormonal regulation of hunger depends primarily on insulin and leptin secretions.
- Incentive-oriented models assert that eating is regulated by the availability and palatability of food. Learning processes, such as classical conditioning and observational learning, exert a great deal of influence over both what people eat and how much they eat. Cultural traditions also shape food preferences. Stress can stimulate eating.
- Evidence indicates that there is a genetic predisposition to obesity. According to set-point theory, the body monitors fat stores to keep them fairly stable. Settling-point theory suggests that a multitude of factors contribute to weight stability. Vacillations in dietary restraint resulting in disinhibition may contribute to obesity in some people.

Sexual Motivation and Behavior

- Scientists are not sure, but hormonal swings appear to have a modest impact on human sexual desire. People respond to a variety of erotic materials, which may elevate sexual desire for only a few hours but may have an enduring impact on attitudes about sex. Aggressive pornography may make sexual coercion seem less offensive and may contribute to date rape.
- Consistent with evolutionary theory, males tend to think about and initiate sex more than females do and to have more sexual partners and more interest in casual sex than females. The Featured Study by Buss demonstrated that gender differences exist in mating preferences that largely transcend cultural boundaries. Males emphasize potential partners' youthfulness and attractiveness, whereas females emphasize potential partners' financial prospects.
- The determinants of sexual orientation are not well understood. Recent studies suggest that there may be a genetic predisposition to homosexuality and that idiosyncrasies in prenatal hormonal secretions may contribute, but much remains to be learned.
- The human sexual response cycle can be divided into four stages: excitement, plateau, orgasm, and resolution.

Achievement: In Search of Excellence

- McClelland pioneered the use of the TAT to measure achievement motivation. People who are high in the need for achievement work harder and more persistently than others, although they often choose to tackle challenges of intermediate difficulty. The pursuit of achievement tends to increase when the probability of success and the incentive value of success are high.

The Elements of Emotional Experience

- Emotion is made up of cognitive, physiological, and behavioral components. The cognitive component involves subjective feelings that have an evaluative aspect. In the peripheral nervous system, the physiological component is dominated by autonomic arousal. In the brain, the amygdala seems to be the hub of the neural circuits that process fear, but many other brain structures also contribute to emotion. At the behavioral level, emotions are expressed through body language, with facial expressions being particularly prominent.

- Ekman and Friesen have found considerable cross-cultural agreement in the identification of emotions based on facial expressions. Cross-cultural similarities have also been found in the cognitive and physiological components of emotion. However, there are cultural variations in how people categorize and display their emotions.

Theories of Emotion

- The James-Lange theory asserts that emotion results from one's perception of autonomic arousal. The Cannon-Bard theory counters with the proposal that emotions originate in subcortical areas of the brain. According to Schachter's two-factor theory, people infer emotion from arousal and then label the emotion in accordance with their cognitive explanation for the arousal. Evolutionary theories of emotion maintain that emotions are innate reactions that require little cognitive interpretation.

Reflecting on the Chapter's Themes

- Our look at motivation and emotion showed once again that psychology is characterized by theoretical diversity, that biology and environment shape behavior interactively, that behavior is governed by multiple causes, that psychological processes are characterized by both cultural variance and invariance, and that psychology evolves in a sociohistorical context.

PERSONAL APPLICATION • Exploring the Ingredients of Happiness

- Factors such as income, age, parenthood, intelligence, and attractiveness are largely uncorrelated with subjective well-being. Physical health, good social relationships, and religious faith appear to have a modest impact on feelings of happiness.
- Strong predictors of happiness include love and marriage, work satisfaction, and personality. Research on happiness indicates that objective realities are not that important, that happiness is relative, and that people adapt to their circumstances.

CRITICAL THINKING APPLICATION • Analyzing Arguments: Making Sense out of Controversy

- An argument consists of one or more premises used to provide support for a conclusion. Arguments are often marred by fallacies in reasoning, such as irrelevant reasons, circular reasoning, slippery slope scenarios, weak analogies, and false dichotomies. Arguments can be evaluated more effectively by applying systematic criteria.

Key Terms

Achievement motive (p. 396)
Androgens (p. 385)
Argument (p. 412)
Assumptions (p. 412)
Bisexuals (p. 392)
Body mass index (BMI) (p. 382)
Display rules (p. 404)
Drive (p. 376)
Emotion (pp. 398–399)
Estrogens (p. 385)
Galvanic skin response (GSR) (p. 400)
Glucose (p. 379)
Glucostats (p. 379)
Hedonic adaptation (p. 411)
Heterosexuals (p. 392)
Homeostasis (p. 376)
Homosexuals (p. 392)
Incentive (p. 377)
Lie detector (p. 400)
Motivation (p. 376)
Obesity (p. 382)

Parental investment (p. 387)
Polygraph (p. 400)
Premises (p. 412)
Refractory period (p. 396)
Set-point theory (p. 384)
Settling-point theory (p. 384)
Sexual orientation (p. 392)
Subjective well-being (p. 408)
Vasocongestion (p. 395)

Key People

David Buss (pp. 390–391)
Walter Cannon (pp. 376, 405–406)
Paul Ekman and Wallace Friesen (pp. 402–404)
William James (p. 405)
Joseph LeDoux (p. 402)
William Masters and Virginia Johnson (pp. 394–396)
David McClelland (pp. 396–397)
Stanley Schachter (p. 406)

CHAPTER 10 Practice Test

1. Jackson had a huge breakfast this morning and is still feeling stuffed when he arrives at work. However, one of his colleagues has brought some delicious-looking donuts to the morning staff meeting and Jackson just can't resist. Although he feels full, he eats three donuts. His behavior is inconsistent with:
 - A. incentive theories of motivation.
 - B. drive theories of motivation.
 - C. evolutionary theories of motivation.
 - D. the Cannon-Bard theory of motivation.
2. The heritability of weight appears to be:
 - A. virtually impossible to demonstrate.
 - B. very low.
 - C. in the range of 60%–70%.
 - D. irrelevant to the understanding of obesity.
3. Which of the following is the most common source of disinhibition for restrained eaters?
 - A. emotional distress
 - B. the fear of becoming too thin
 - C. drinking alcohol in small quantities
 - D. the perception that they have cheated on their diet
4. Some recent studies suggest that exposure to aggressive pornography:
 - A. may increase males' aggressive behavior toward women.
 - B. may perpetuate the myth that women enjoy being raped.
 - C. does both a and b.
 - D. does neither a nor b.
5. Which of the following has *not* been found in research on gender differences in sexual interest?
 - A. Men think about sex more than women.
 - B. Men initiate sex more frequently than women.
 - C. Women are more interested in having many partners than men are.
 - D. Women are less interested in uncommitted sex.
6. Kinsey maintained that sexual orientation:
 - A. depends on early classical conditioning experiences.
 - B. should be viewed as a continuum.
 - C. depends on normalities and abnormalities in the amygdala.
 - D. should be viewed as an either-or distinction.
7. In research on the need for achievement, individual differences are usually measured:
 - A. by observing subjects' actual behavior in competitive situations.
 - B. by interviewing subjects about their achievement needs.
 - C. with the Thematic Apperception Test.
 - D. with the Minnesota Multiphasic Personality Inventory.
8. The determinant of achievement behavior that increases when a college student enrolls in a class that is *required* for graduation is:
 - A. the probability of success.
 - B. the need to avoid failure.
 - C. the incentive value of success.
 - D. the fear of success.
9. A polygraph (lie detector) works by:
 - A. monitoring physiological indices of autonomic arousal.
 - B. directly assessing the truthfulness of a person's statements.
 - C. monitoring the person's facial expressions.
 - D. all of the above.
10. Which of the following statements about cross-cultural comparisons of emotional experience is *not* true?
 - A. The facial expressions that accompany specific emotions are fairly similar across cultures.
 - B. The physiological reactions that accompany emotions tend to be similar across cultures.
 - C. People of different cultures tend to categorize emotions somewhat differently.
 - D. Display rules do not vary from one culture to another.
11. According to the James-Lange theory of emotion:
 - A. the experience of emotion depends on autonomic arousal and on one's cognitive interpretation of that arousal.
 - B. different patterns of autonomic activation lead to the experience of different emotions.
 - C. emotion occurs when the thalamus sends signals simultaneously to the cortex and to the autonomic nervous system.
 - D. emotions develop because of their adaptive value.
12. Which theory of emotion implies that people can change their emotions simply by changing the way they label their arousal?
 - A. the James-Lange theory
 - B. the Cannon-Bard theory
 - C. Schachter's two-factor theory
 - D. opponent-process theory
13. The fact that eating behavior, sexual desire, and the experience of emotion all depend on interactions between biological and environmental determinants lends evidence to which of this text's organizing themes?
 - A. psychology's theoretical diversity
 - B. psychology's empiricism
 - C. people's experience of the world is subjective
 - D. the joint influence of heredity and experience
14. Which of the following statements is (are) true?
 - A. For the most part, people are pretty happy.
 - B. Age is unrelated to happiness.
 - C. Income is largely unrelated to happiness.
 - D. All of the above.
15. The sales pitch "We're the best dealership in town because the other dealerships just don't stack up against us" is an example of:
 - A. a false dichotomy.
 - B. semantic slanting.
 - C. circular reasoning.
 - D. slippery slope.

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



<http://www.thomsonedu.com>

Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/

Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



Human Development Across the Life Span



Progress Before Birth: Prenatal Development

The Course of Prenatal Development

Environmental Factors and Prenatal Development

The Wondrous Years of Childhood

Exploring the World: Motor Development

Easy and Difficult Babies: Differences in Temperament

Early Emotional Development: Attachment

Becoming Unique: Personality Development

The Growth of Thought: Cognitive Development

FEATURED STUDY • Can Infants Do Arithmetic?

The Development of Moral Reasoning

The Transition of Adolescence

Physiological and Neural Changes

Time of Turmoil?

The Search for Identity

The Expanse of Adulthood

Personality Development

Transitions in Family Life

Aging and Physical Changes

Aging and Cognitive Changes

Illustrated Overview of Human Development

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Understanding Gender Differences

How Do the Sexes Differ in Behavior?

Biological Origins of Gender Differences

Environmental Origins of Gender Differences

Conclusion

CRITICAL THINKING APPLICATION • Are Fathers Essential to Children's Well-Being?

The Basic Argument

Evaluating the Argument

Recap

Practice Test

On July 29, 1981, 20-year-old Diana Spencer stood before more than 2,000 guests at St. Paul's Cathedral in London and fumbled through an exchange of wedding vows, nervously transposing two of her husband's middle names. Diana could hardly believe what was happening. Just a few months before, she had been a giggly teenager with a playful sign on her bedroom door that read "Chief Chick." Dubbed "Shy Di" by the hordes of photographers who followed her every move, she had never even had a boyfriend (Morton, 1998). Now she was marrying Charles, Prince of Wales, the heir to the British throne, in an ostentatious wedding ceremony that was televised around the world.

Marriage—let alone to a future king—is a major transition for most people, but for Diana it was only the beginning of an extraordinary series of changes. When Diana became engaged, she was a pretty if slightly pudgy 19-year-old who was just on the threshold of adulthood. A high school dropout, she had few serious interests or ambitions. Her most obvious talent was her rapport with young children, who adored her. Far from a fashion plate, she owned "one long dress, one silk skirt, one smart pair of shoes, and that was it" (Morton, 1998, p. 66).

Yet, like Cinderella, the "fairy tale princess" soon blossomed. "It happened before our very eyes," said one photographer, "the transformation from this shy teenager who hid beneath big hats, and hung her head, into the self-assured woman and mother, confident in her beauty" (Clayton & Craig, 2001, p. 113). The Shy Di who sometimes burst into tears at the sight of crowds became Disco Di, a svelte beauty celebrated for her stylish clothes and hairstyles. Then came Dynasty Di, the doting mother of Princes William and Harry. Finally, as her marriage to Charles crumbled and she sought a new and more fulfilling role for herself, still another Diana emerged. Now she was Dedicated Di, a poised and effective spokesperson for important causes, such as AIDS and the removal of land mines from war-torn areas. No longer a frightened young princess or her husband's beautiful accessory, by her 30s Diana was a seemingly confident and independent woman who could publicly rebuke the royal family for their treatment of her and declare that she would rather be the "Queen of people's hearts" than the Queen of England (Edwards, 1999, p. 342).

Diana's transformations were startling, yet there was also a strong element of continuity in her life. As an adult, Diana continued to display qualities she had shown as a child, including her mischievous sense of humor, her love of swimming and dancing, and

even her attachment to stuffed animals (S. B. Smith, 2000). Her childhood feeling of destiny ultimately blossomed into a deep sense of mission that took her to homeless shelters, clinics for lepers, and the bedsides of AIDS patients. Although cynics doubted the genuineness of her empathy for society's "outcasts," she had displayed a similar caring and naturalness as a young teenager dancing with patients in wheelchairs at a hospital for the mentally and physically handicapped (Clayton & Craig, 2001).

Other, more troubling, continuities also marked Diana's turbulent passage through life. Despite her growing mastery of her public roles, privately she remained vulnerable, moody, and insecure. Diana's parents had divorced when she was 6, and fears of abandonment never left her. As a young girl being taken to boarding school, she had begged her father, "If you love me, don't leave me here"—a plea she later echoed in tearful arguments with Prince Charles (Smith, 2000, p. 53). Her childhood feelings of intellectual inferiority continued to plague her as an adult. "A brain the size of a pea I've got," she would say (Clayton & Craig, 2001, p. 22). Throughout her marriage, she suffered bouts of bulimia (an eating disorder) and depression. While she projected a new confidence and



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The story of Princess Diana's metamorphosis from an awkward teenager into an elegant, self-assured public figure provides a dramatic demonstration of how human development is marked by both continuity and transition.

maturity after her separation from Prince Charles, some observers felt that she was as needy and insecure as ever. A succession of relationships with men, before and after her divorce, seemed to bring her no closer to the love and security she craved. One biographer argues that in fundamental ways she had changed little, if at all (Smith, 2000). Others, however, believed that a new chapter in her life was just beginning and that many more changes were undoubtedly in store when Diana was tragically killed in an auto accident at the age of 36.

What does Princess Diana have to do with developmental psychology? Although her story is obviously unique in many ways, it provides an interesting illustration of the two themes that permeate the study of human development: *transition* and *continuity*. In investigating human development, psychologists study how people evolve through transitions over time. In looking at these transitions, developmental psychologists inevitably find continuity with the past. This continuity may be the most fascinating element in Diana's story. The metamorphosis of the shy, awkward teenager into an elegant, self-assured public figure was a more radical transformation than most people go through. Nonetheless, the threads of continuity

connecting Diana's childhood to the development of her adult personality were quite obvious.

Development is the sequence of age-related changes that occur as a person progresses from conception to death. It is a reasonably orderly, cumulative process that includes both the biological and behavioral changes that take place as people grow older. An infant's newfound ability to grasp objects, a child's gradual mastery of grammar, an adolescent's spurt in physical growth, a young adult's increasing commitment to a vocation, and an older adult's transition into the role of grandparent all represent development. These transitions are predictable changes that are related to age.

Traditionally, psychologists have been most interested in development during childhood. Our coverage reflects this emphasis. However, decades of research have clearly demonstrated that development is a lifelong process. We'll divide the life span into four broad periods: (1) the prenatal period, between conception and birth, (2) childhood, (3) adolescence, and (4) adulthood. We'll examine aspects of development that are especially dynamic during each period. Let's begin by looking at events that occur before birth, during prenatal development.

> Progress Before Birth: Prenatal Development

PREVIEW QUESTIONS

- What are the three stages of prenatal development, and what happens in each stage?
- Can maternal nutrition affect the fetus?
- How about maternal drug use?
- Which maternal illnesses can be dangerous to the fetus?
- How important is prenatal health care?

Development begins with conception. Conception occurs when fertilization creates a **zygote, a one-celled organism formed by the union of a sperm and an egg**. All the other cells in your body developed from this single cell. Each of your cells contains enduring messages from your parents carried on the *chromosomes* that lie within its nucleus. Each chromosome houses many *genes*, the functional units in hereditary transmission. Genes carry the details of your hereditary blueprints, which are revealed gradually throughout life (see Chapter 3 for more information on genetic transmission).

The prenatal period extends from conception to birth, usually encompassing nine months of pregnancy. A great deal of important development occurs before birth. In fact, development during the prenatal period is remarkably rapid. If you were an average-sized newborn and your physical growth had continued during the first year of your life at a prenatal pace, by your first birthday you would have weighed 200 pounds! Fortunately, you didn't grow at that rate—and no human does—because in the final weeks before birth the frenzied pace of prenatal de-

velopment tapers off dramatically. In this section, we'll examine the usual course of prenatal development and discuss how environmental events can leave their mark on development even before birth exposes the newborn to the outside world.

The Course of Prenatal Development



The prenatal period is divided into three phases: (1) the germinal stage (the first two weeks), (2) the embryonic stage (two weeks to two months), and (3) the fetal stage (two months to birth). Some key developments in these phases are outlined here.

Germinal Stage



The germinal stage is the first phase of prenatal development, encompassing the first two weeks after conception. This brief stage begins when a zygote is created through fertilization. Within 36 hours, rapid cell division begins, and the zygote becomes a microscopic mass of multiplying cells. This mass of cells



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Prenatal development is remarkably rapid. Top left: This 30-day-old embryo is just 6 millimeters in length. Bottom left: At 14 weeks, the fetus is approximately 2 inches long. Note the well-developed fingers. The fetus can already move its legs, feet, hands, and head and displays a variety of basic reflexes. Right: After 4 months of prenatal development, facial features are beginning to emerge.

slowly migrates along the mother's fallopian tube to the uterine cavity. On about the seventh day, the cell mass begins to implant itself in the uterine wall. This process takes about a week and is far from automatic. Many zygotes are rejected at this point. As many as one in five pregnancies end with the woman never being aware that conception has occurred (Simpson, 2002).

During the implantation process, the placenta begins to form (Buster & Carson, 2002). **The placenta is a structure that allows oxygen and nutrients to pass into the fetus from the mother's bloodstream and bodily wastes to pass out to the mother.** This critical exchange takes place across thin membranes that block the passage of blood cells, keeping the fetal and maternal bloodstreams separate.

Embryonic Stage

The *embryonic stage* is the second stage of prenatal development, lasting from two weeks until the end of the second month. During this stage, most of the vital organs and bodily systems begin to form in the developing organism, which is now called an *embryo*. Structures such as the heart, spine, and brain emerge gradually as cell division becomes more specialized.



Although the embryo is typically only about an inch long at the end of this stage, it's already beginning to look human. Arms, legs, hands, feet, fingers, toes, eyes, and ears are already discernible.

The embryonic stage is a period of great vulnerability because virtually all the basic physiological structures are being formed. If anything interferes with normal development during the embryonic phase, the effects can be devastating. Most miscarriages occur during this period (Simpson, 2002). Most major structural birth defects are also due to problems that occur during the embryonic stage (Simpson & Niebyl, 2002).

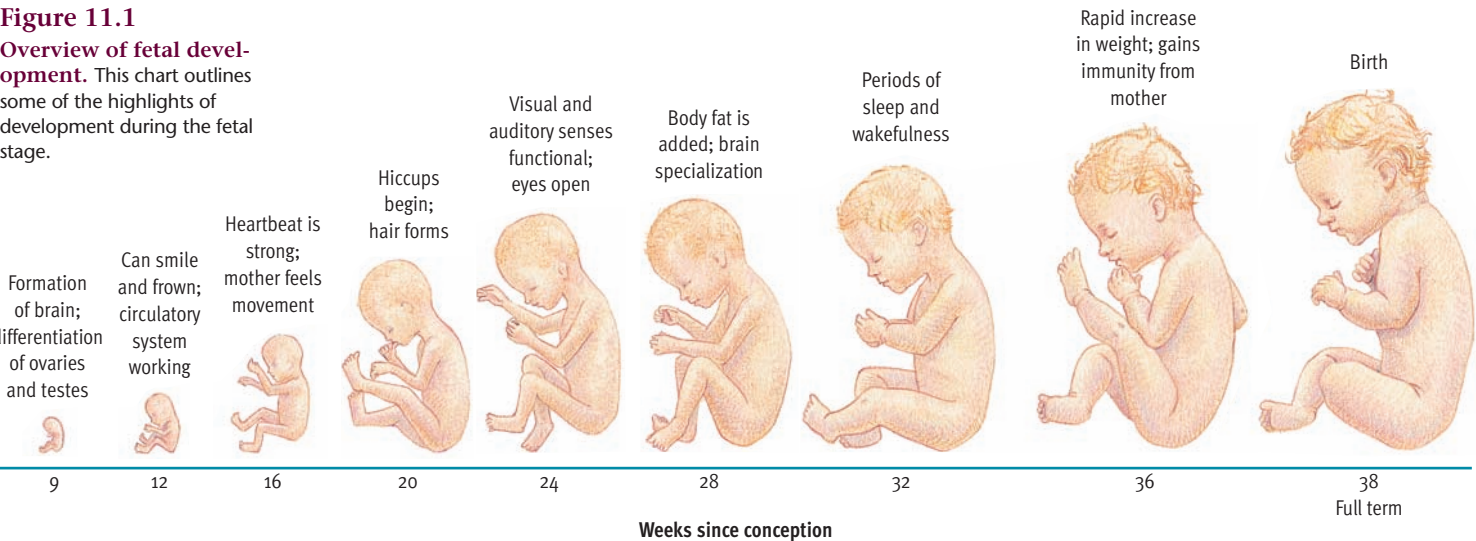
Fetal Stage



The *fetal stage* is the third stage of prenatal development, lasting from two months through birth.

Some highlights of fetal development are summarized in **Figure 11.1** on the next page. The first two months of the fetal stage bring rapid bodily growth, as muscles and bones begin to form (Moore & Persaud, 2003). The developing organism, now called a *fetus*, becomes capable of physical movements as skeletal structures harden. Organs formed in the embryonic stage continue to grow and gradually begin

Figure 11.1
Overview of fetal development. This chart outlines some of the highlights of development during the fetal stage.



to function. The sense of hearing, for example, is functional by around 20–24 weeks (Hepper, 2003)

During the final three months of the prenatal period, brain cells multiply at a brisk pace. A layer of fat is deposited under the skin to provide insulation, and the respiratory and digestive systems mature. All of these changes ready the fetus for life outside the cozy, supportive environment of its mother’s womb. Sometime between 22 weeks and 26 weeks the fetus reaches **the age of viability—the age at which a baby can survive in the event of a premature birth**. Thanks to advances in medical technology, the age of viability has declined in recent decades in modern societies. At 22–23 weeks the probability of survival is still slim (14%–26%), but it climbs steadily over the next month to an 80%–83% survival rate at 26 weeks (Iams, 2002).

Environmental Factors and Prenatal Development

Although the fetus develops in the protective buffer of the womb, events in the external environment can affect it indirectly through the mother. Because the developing organism and its mother are linked through the placenta, a mother’s eating habits, drug use, and physical health, among other things, can affect prenatal development and have long-term health consequences (Hampton, 2004). **Figure 11.2** shows the periods of prenatal development during which various structures are most vulnerable to damage.

Maternal Nutrition

The developing fetus needs a variety of essential nutrients. Thus, it’s not surprising that severe maternal malnutrition increases the risk of birth complications and neurological defects for the newborn (Coutts, 2000; Fifer, Monk, & Grose-Fifer, 2001). The effects of severe malnutrition are a major problem in underdeveloped nations where food shortages are common. The impact of moderate malnutrition, which is more common in modern societies, is more difficult to gauge, in part because maternal malnutrition is often confounded with other risk factors associated with poverty, such as drug abuse and limited access to health care (Worthington-Roberts & Klerman, 1990). Recent research suggests that prenatal malnutrition may have negative effects decades after a child’s birth. For example, prenatal malnutrition has been linked to vulnerability to schizophrenia and other psychiatric disorders in adolescence and early adulthood (Susser, Brown, & Matte, 1999). And low birth weight is associated with an increased risk of heart disease and diabetes in middle adulthood (Forsen et al., 2000; Rich-Edwards et al., 1997). Although birth weight is influenced by

concept check 11.1

Understanding the Stages of Prenatal Development

Check your understanding of the stages of prenatal development by filling in the blanks in the chart below. The first column contains descriptions of a main event from each of the three stages. In the second column, write the name of the stage; in the third column, write the term used to refer to the developing organism during that stage; and in the fourth column, write the time span (in terms of weeks or months) covered by the stage. The answers are in Appendix A at the back of the book.

	Stage	Term for organism	Time span
1. Uterine implantation			
2. Muscle and bone begin to form			
3. Vital organs and body systems begin to form			

factors besides maternal nutrition (Osrin & del Costello, 2000), these findings are alarming.

Maternal Drug Use

A major source of concern about fetal and infant well-being is the mother's consumption of drugs, including such widely used substances as tobacco and alcohol, as well as prescription and recreational drugs. Unfortunately, most drugs consumed by a pregnant woman can pass through the membranes of the placenta.

Virtually all "recreational" drugs (see Chapter 5) can be harmful, with sedatives, narcotics, and cocaine being particularly dangerous. Babies of heroin users are born addicted to narcotics and have an increased risk of early death due to prematurity, birth defects, respiratory difficulties, and problems associated with their addiction (Finnegan & Kandall, 2005). Prenatal exposure to cocaine is associated with increased risk of birth complications (Bendersky & Lewis, 1999) and a variety of cognitive deficits that are apparent in childhood (Singer et al., 2002, 2004). Problems can also be caused by a great variety of drugs prescribed for legitimate medical reasons, and even by some over-the-counter drugs (Niebyl, 2002). The impact of drugs on the embryo or fetus varies greatly depending on the drug, the dose, and the phase of prenatal development.

Alcohol consumption during pregnancy also carries risks. It has long been clear that *heavy* drinking by a mother can be hazardous to a fetus. **Fetal alcohol syndrome is a collection of congenital (inborn) problems associated with excessive alcohol use during pregnancy.** Typical problems include microcephaly (a small head), heart defects, irritability, hyperactivity, and delayed mental and motor development (Hannigan & Armant, 2000). Fetal alcohol syndrome is one of the leading causes of mental retardation (Kaemingk & Paquette, 1999), and it is related to an increased incidence of depression, suicide, and criminal behavior in adulthood (Kelly, Day, & Streissguth, 2000). Furthermore, many children fall short of the criteria for fetal alcohol syndrome but still show serious impairments attributable to their mothers' drinking during pregnancy (Abel, 1998). Even normal social drinking during pregnancy can have enduring negative effects on children, including deficits in IQ, reaction time, motor skills, attention span, and math skills, and increased impulsive, antisocial, and delinquent behavior (Hunt et al., 1995; Streissguth et al., 1999). There appears to be a correlation between the amount of alcohol that pregnant women consume and the severity of the damage inflicted on their offspring (Ott, Tarter, & Ammerman, 1999).

Tobacco use during pregnancy is also hazardous to prenatal development. Smoking produces a num-

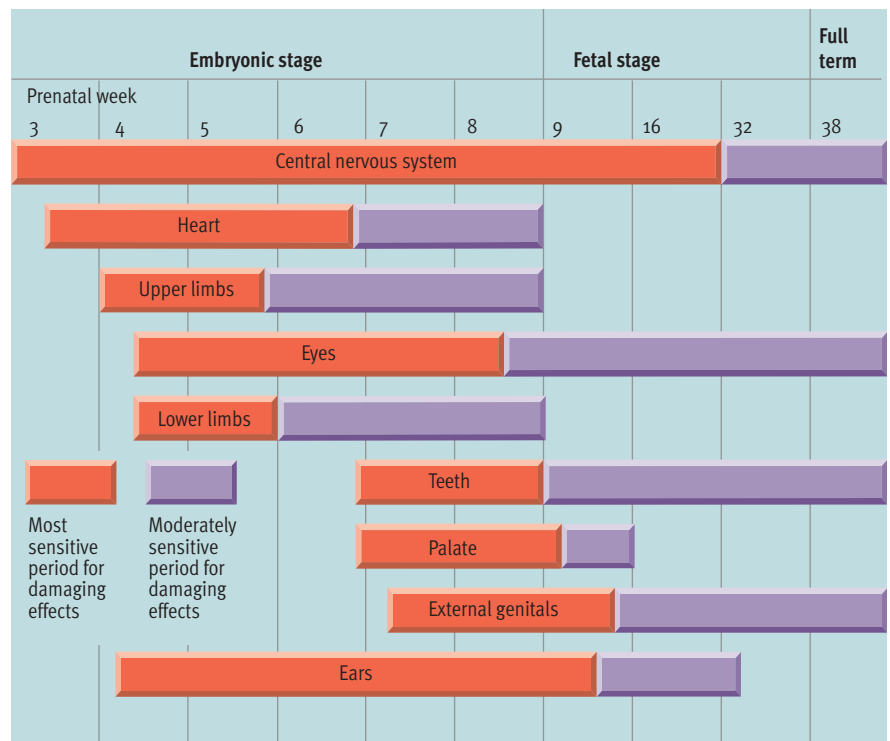


Figure 11.2

Periods of vulnerability in prenatal development. Generally, structures are most susceptible to damage when they are undergoing rapid development. The red regions of the bars indicate the most sensitive periods for various organs and structures, while the purple regions indicate periods of continued, but lessened, vulnerability. As a whole, sensitivity is greatest in the embryonic stage, but some structures remain vulnerable throughout prenatal development.

Source: Adapted from Moore, K. L., & Persaud, T. V. N. (1998). *Before we are born: Essentials of embryology and birth defects*. Philadelphia: W. B. Saunders. Copyright © 1998 Elsevier Science (USA). All rights reserved. Reprinted by permission.

ber of subtle physiological changes in the mother that appear to reduce the flow of oxygen and nutrients to the fetus. Pregnant women who smoke have an increased risk for miscarriage, stillbirth, prematurity, and other birth complications (Andres & Day, 2000). Maternal smoking may also increase a child's risk for sudden infant death syndrome (Fullilove & Dieudonne, 1997), slower than average cognitive development (Trasti, Jacobson, & Bakketeig, 1999), and attention deficit disorder (Linnet et al., 2003). Even maternal exposure to second-hand smoke may be dangerous to a fetus (Windham, Eaton, & Hopkins, 1999).

Maternal Illness

The fetus is largely defenseless against infections because its immune system matures relatively late in the prenatal period. The placenta screens out quite a number of infectious agents, but not all. Thus, many maternal illnesses can interfere with prenatal development. Diseases such as measles, rubella (German measles), syphilis, and chicken pox can be hazardous to the fetus (Duff, 2002), with the nature of any damage depending, in part, on when the mother

contracts the illness. The HIV virus that causes AIDS can also be transmitted by pregnant women to their offspring. The transmission of AIDS may occur prenatally through the placenta, during delivery, or through breastfeeding (Eldred & Chaisson, 1996). About 20%–30% of HIV-positive pregnant women pass the virus on to their babies (Nourse & Butler, 1998), although improved antiretroviral drugs (given to the mother) can reduce this percentage considerably (Culnane et al., 1999). Yet another risk is that a variety of genital infections, such as gonorrhea, chlamydia, and herpes, can be transmitted to newborns during delivery (Duff, 2002). These common diseases can be quite dangerous. Herpes, for instance, can cause microcephaly, paralysis, deafness, blindness, and brain damage and can be fatal for many newborns (Ismail, 1993).

Prenatal Health Care

Many of the prenatal dangers that we have discussed are preventable if pregnant women receive adequate care and guidance from health professionals. Good-quality medical care that begins early in pregnancy is associated with reduced prematurity and higher survival rates for infants (Holian, 2003; Malloy, Kao, & Lee, 1992). Because of poverty and a related constellation of problems, however, many pregnant women in the United States receive little or no prenatal medical care (Cook et al., 1999). This problem is particularly acute among racial minorities, especially African Americans (McAllister & Boyle, 1998). Other factors surely contribute, but the lack of readily available health care for low-income groups is thought to be the main cause of the surprisingly high infant mortality rate in the United States. Despite its relative affluence and its leadership in medical technology, the United States ranks only 20th in the world in the prevention of infant mortality (see Figure 11.3). Experts on child development from psychology, medicine, and many other fields have argued that the U.S. government sorely needs to increase its funding of prenatal health care for low-income groups. Given the high cost of intensive care for prematurely born infants, this investment would almost surely save money in the long run (see Figure 11.4). Unfortunately, in recent years, federal spending on children's programs has *declined* rather than increased.

Science has a long way to go before it uncovers all the factors that shape development before birth. For

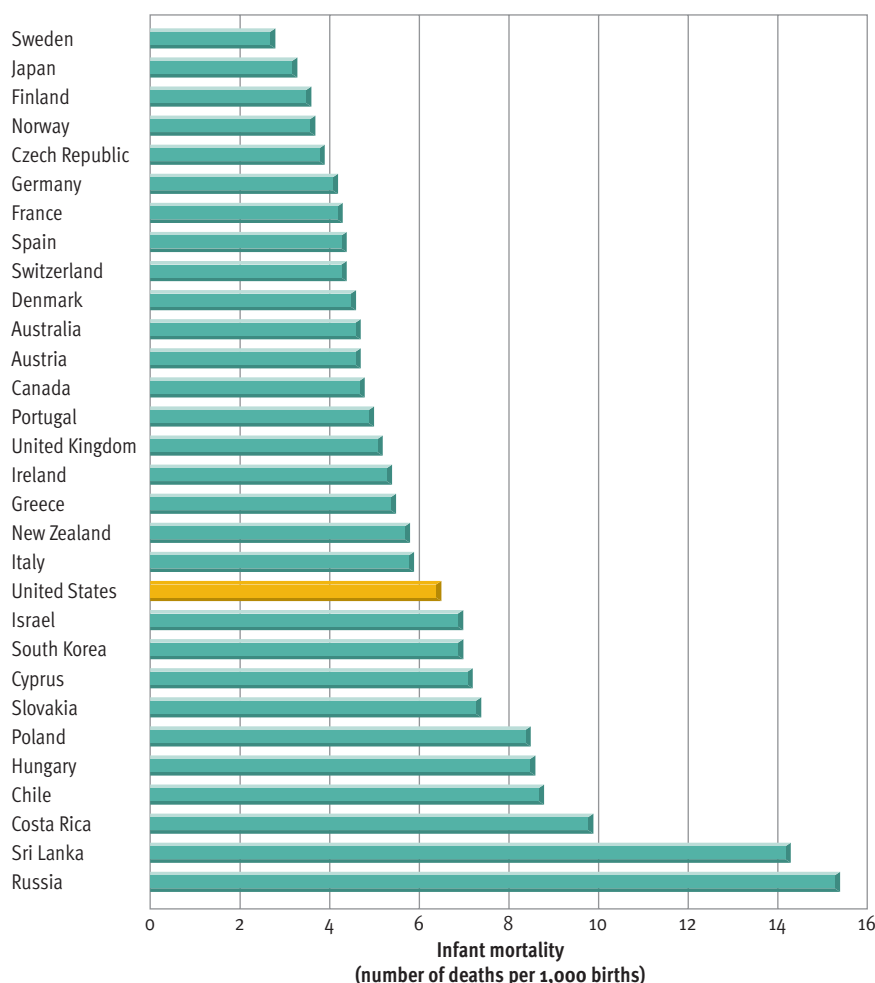
Premature births and infant deaths are much more common in the United States than most people realize. Shown here is the author's son, born prematurely in September 1992, receiving postnatal treatment in a hospital intensive care unit. Although prematurity is associated with a variety of developmental problems, T. J., like a great many premature infants, has matured into a robust, healthy child (see page 303 for a picture of him at age 15 months).



Courtesy of Wayne Weiten

Figure 11.3

Cross-cultural comparisons of infant mortality. Infant mortality is the death rate per 1000 births during the first year of life. Although the United States takes pride in its modern, sophisticated medical system, it ranks only 20th in the prevention of infant mortality. One of the main factors underlying this poor showing appears to be low-income mothers' limited access to medical care during pregnancy. (Data from U. S. Census Bureau, International database)



example, scientists are showing renewed interest in how prenatal maternal stress might have repercussions for children's development, but the effects of fluctuations in maternal emotions are not well understood at present (DiPietro, 2004). Nonetheless, it's clear that critical developments unfold quickly during the prenatal period. In the next section, you'll learn that development continues at a fast pace during the early years of childhood.

➤ REVIEW OF KEY POINTS

- Prenatal development proceeds through the germinal, embryonic, and fetal stages as the zygote is differentiated into a human organism. The embryonic stage is a period of great vulnerability, as most physiological structures are being formed.
- Maternal malnutrition during the prenatal period has been linked to birth complications and other subsequent problems. Maternal drug use can be dangerous to the fetus, although the risks depend on the drug used, the dose, and phase of prenatal development.
- Fetal alcohol syndrome is a collection of congenital problems caused by a mother's excessive alcohol use during pregnancy. A variety of maternal illnesses can interfere with prenatal development. Many problems can be avoided if expectant mothers have access to good health care.

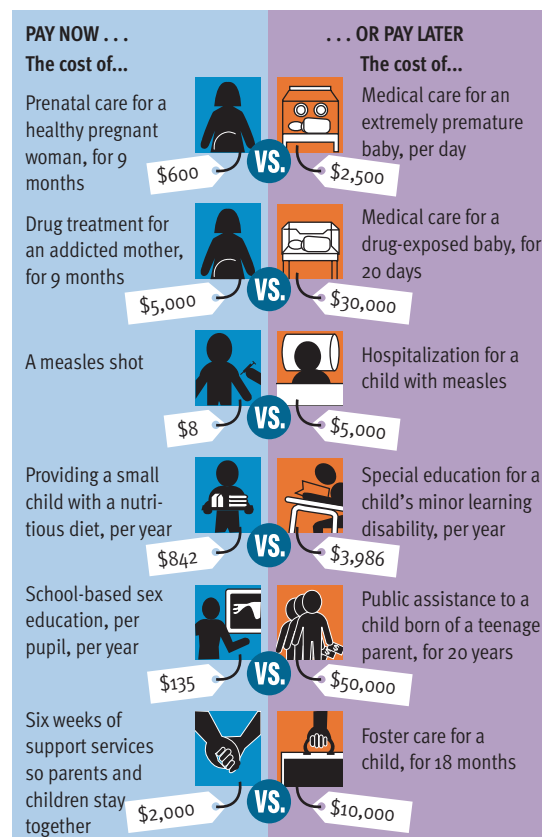


Figure 11.4
The high cost of not investing in preventive care for children. This *Time* magazine graphic shows why it would be financially prudent to spend more public funds on preventive health care measures for young children. As you can see, the cost of providing medical care to pregnant women who cannot afford it is a pittance in comparison to the cost that government agencies often absorb later when a child is born prematurely. Infants born six to eight weeks early often spend a month or more in an intensive care unit, at a cost of \$75,000 to \$100,000.

Source: From a chart by Steve Hart in *Time*, October 8, 1990, p. 45. Copyright © 1990 by Time Inc. Reproduced by permission.

➤ The Wondrous Years of Childhood

A certain magic is associated with childhood. Young children have an extraordinary ability to captivate adults' attention, especially their parents'. Legions of parents apologize repeatedly to friends and strangers alike as they talk on and on about the cute things their kids do. Most wondrous of all are the rapid and momentous developmental changes of the childhood years. Helpless infants become curious toddlers almost overnight. Before parents can catch their breath, these toddlers are schoolchildren engaged in spirited play with young friends. Then, suddenly, they're insecure adolescents, worrying about dates, part-time jobs, cars, and college. The whirlwind transitions of childhood often seem miraculous.

Of course, the transformations that occur in childhood only *seem* magical. In reality, they reflect an orderly, predictable, gradual progression. In this section you'll see what psychologists have learned about this progression. We'll examine various aspects of development that are especially dynamic during childhood. Language development is omitted from this section because we covered it in the chapter on lan-

guage and thought (Chapter 8). Let's begin by looking at motor development.

Exploring the World: Motor Development

One of the earliest topics studied by developmental psychologists was motor development. **Motor development refers to the progression of muscular coordination required for physical activities.** Basic motor skills include grasping and reaching for objects, manipulating objects, sitting up, crawling, walking, and running.

Basic Principles

A number of principles are apparent in motor development. One is **the cephalocaudal trend—the head-to-foot direction of motor development.** Children tend to gain control over the upper part of their bodies before the lower part. You've seen this trend in action if you've seen an infant learn to crawl. Infants gradually shift from using their arms for propelling

PREVIEW QUESTIONS

- How uneven is physical growth during infancy?
- How important is maturation to motor development?
- How much does culture influence motor development?
- What is the difference between cross-sectional and longitudinal research?
- What kinds of temperaments have been observed in infancy?



PBS: The Whole Child Coordinated with the videotape series of the same name, this Public Broadcasting System site assembles a broad collection of information for parents, caregivers, and others about the developing child from birth through age 5. Presented in English and Spanish, the resources here include an interactive timeline of developmental milestones, reading lists, and a guide to other online sites dealing with child development.

themselves to using their legs. **The proximodistal trend is the center-outward direction of motor development.** Children gain control over their torso before their extremities. Thus, infants initially reach for things by twisting their entire body, but gradually they learn to extend just their arms.

Early motor development depends in part on physical growth, which is not only rapid during infancy but apparently more uneven than previously appreciated. Infants typically grow to roughly triple their birth weight during the first year, while height increases by about 45% (Needlman, 2004). The pace of infant growth tends to be irregular. In a study of infants from birth to 21 months, Lampl, Veldhuis, and Johnson (1992) found that lengthy periods of no growth were punctuated by sudden bursts of growth. These growth spurts tended to be accompanied by restlessness and irritability. More research is needed to determine whether this pattern of episodic growth continues beyond infancy, but parents who sometimes feel that their children are changing overnight may not be imagining it!

Early progress in motor skills has traditionally been attributed almost entirely to the process of maturation. **Maturation is development that reflects the gradual unfolding of one's genetic blueprint.** It is a product of genetically programmed physical changes that come with age—as opposed to experience and learning. However, recent research that has taken a closer look at the *process* of motor development suggests that infants are active agents rather than passive organisms waiting for their brain and limbs to mature (Thelen, 1995). According to the new view, the driving force behind motor development is infants' ongoing exploration of their world and their need to master specific tasks (such as grasping a larger toy or looking out a window). Progress in motor development is attributed to infants' experimentation and their learning the consequences of their activities. Although modern researchers acknowledge that maturation facilitates motor development, they argue that its contribution has been oversimplified and overestimated (Bertenthal & Clifton, 1998).

Understanding Developmental Norms

Parents often pay close attention to early motor development, comparing their child's progress with developmental norms. **Developmental norms indicate the median age at which individuals display various behaviors and abilities** (see Chapter 2 for a discussion of the median). For example, the generalizations that “average children” say their first word at about 12 months and start combining words into

sentences at around 24 months are developmental norms. Developmental norms are useful benchmarks as long as parents don't expect their children to progress exactly at the pace specified in the norms.

Some parents get unnecessarily alarmed when their children fall behind developmental norms, but variations from the typical age of accomplishment are entirely normal. This normal variation stands out in **Figure 11.5**, which shows norms for many basic motor skills. The left side, interior mark, and right side of the bars in the diagram indicate the ages at which 25%, 50%, and 90% of youngsters can demonstrate each motor skill. Typically, information on developmental norms includes only the median age of attainment indicated by the interior (50%) mark in each bar. This exclusive focus on the central tendency or typical progress fails to convey the immense variability seen in youngsters' development. As **Figure 11.5** shows, a substantial portion of normal, healthy children often don't achieve a particular milestone until long after the median time cited in norms.

Cultural Variations and Their Significance

Cross-cultural research has highlighted the dynamic interplay between experience and maturation in motor development. Relatively rapid motor development has been observed in some cultures that provide special practice in basic motor skills. For example, the Kipsigis people of Kenya begin active efforts to train their infants to sit up, stand, and walk soon after birth. Thanks to this training, Kipsigis children achieve these developmental milestones (but not oth-

Tribes across the world use a variety of methods to foster rapid development of motor abilities in their children. The Kung San of the Kalahari, Botswana, teach their young to dance quite early, using poles to develop the kinesthetic sense of balance.

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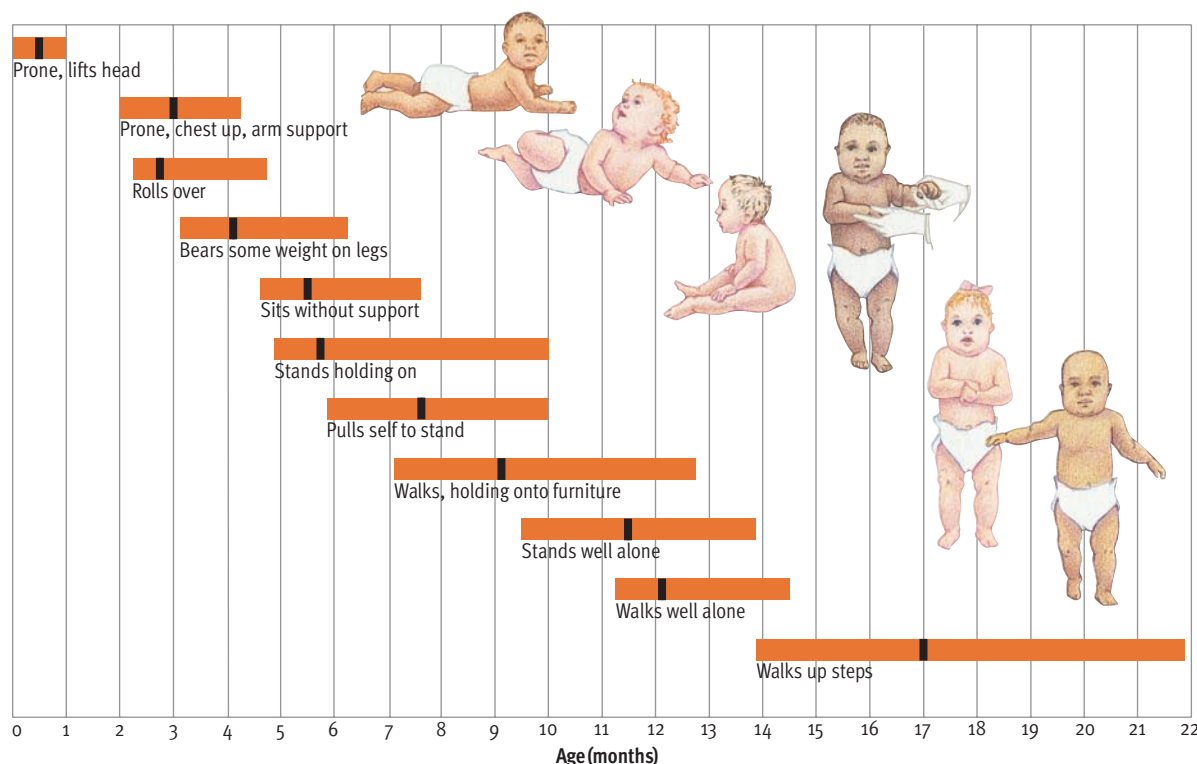


Figure 11.5
Landmarks in motor development. The left edge, interior mark, and right edge of each bar indicate the age at which 25%, 50%, and 90% of infants (in North America) have mastered each motor skill shown. Developmental norms typically report only the median age of mastery (the interior mark), which can be misleading in light of the variability in age of mastery apparent in this chart.

ers) about a month earlier than babies in the United States (Super, 1976). West Indian children in Jamaica also exhibit advanced motor development that has been linked to a special regimen of motor exercises practiced in early infancy (Hopkins & Westra, 1988, 1990). In contrast, relatively slow motor development has been found in some cultures that discourage motor exploration. For example, among the Ache, a nomadic people living in the rain forests of Paraguay, safety concerns dictate that children under age 3 rarely venture more than three feet from their mothers, who carry them virtually everywhere. As a result of these constraints, Ache children are delayed in acquiring a variety of motor skills and typically begin walking about a year later than other children (Kaplan & Dove, 1987).

Cultural variations in the emergence of basic motor skills demonstrate that environmental factors can accelerate or slow motor development in children's first few years. Nonetheless, the similarities across cultures in the sequence and timing of motor development in early childhood outweigh the differences. This fact suggests that motor development in *early childhood* depends to a considerable extent on maturation. Motor development in *later childhood* is another matter, however. As children in any culture grow older, they acquire more specialized motor skills, some of which may be unique to their culture. Mat-

uration becomes less influential and experience becomes more critical. Obviously, maturation by itself will never lead to the development of ballet or football skills, for example, without exposure to appropriate training.

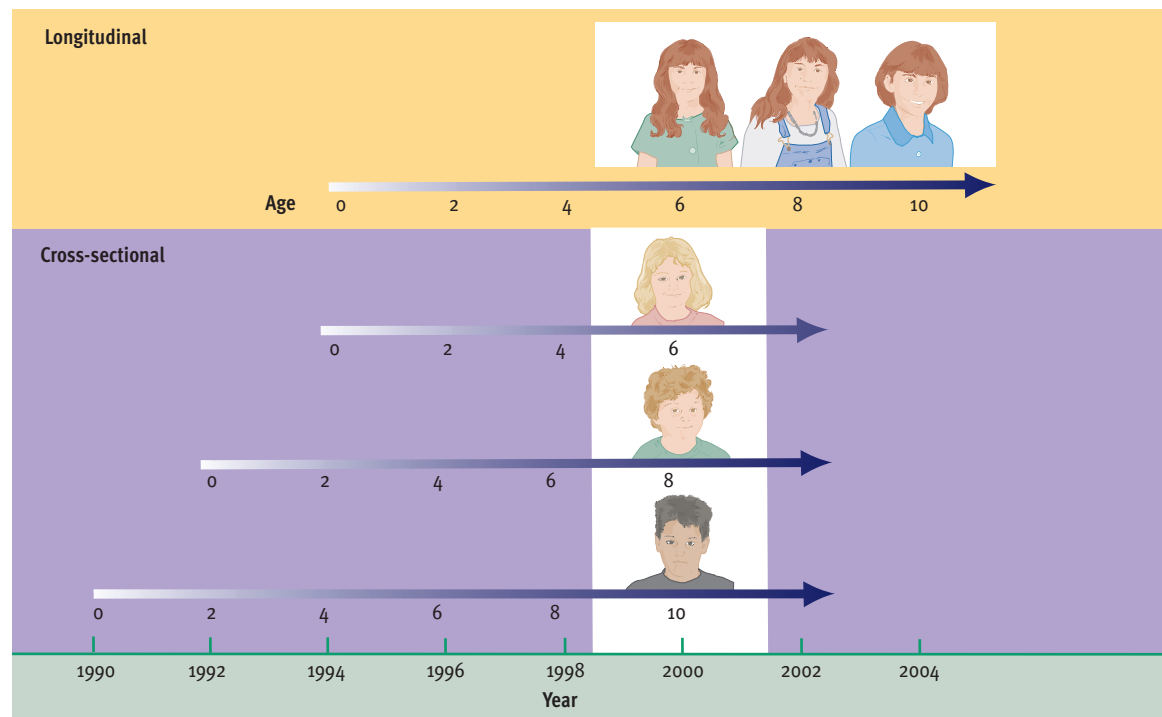
Easy and Difficult Babies: Differences in Temperament

Infants show considerable variability in temperament. **Temperament refers to characteristic mood, activity level, and emotional reactivity.** From the very beginning, some babies seem animated and cheerful while others seem sluggish and ornery. Infants show consistent differences in emotional tone, tempo of activity, and sensitivity to environmental stimuli very early in life (Rothbart & Bates, 1998).

Alexander Thomas and Stella Chess conducted a landmark *longitudinal* study of the development of temperament (Thomas & Chess, 1977, 1989; Thomas, Chess, & Birch, 1970). **In a longitudinal design investigators observe one group of participants repeatedly over a period of time.** This approach to the study of development is usually contrasted with the cross-sectional approach (the logic of both approaches is diagrammed in **Figure 11.6** on the next page). **In a cross-sectional design investigators compare groups of participants of differing age at a**

Figure 11.6
Longitudinal versus cross-sectional research.

In a longitudinal study of development between ages 6 and 10, the same children would be observed at 6, again at 8, and again at 10. In a cross-sectional study of the same age span, a group of 6-year-olds, a group of 8-year-olds, and a group of 10-year-olds would be compared simultaneously. Note that data collection could be completed immediately in the cross-sectional study, whereas the longitudinal study would require 4 years to complete.



single point in time. For example, in a cross-sectional study an investigator tracing the growth of children's vocabulary might compare 50 six-year-olds, 50 eight-year-olds, and 50 ten-year-olds. In contrast, an investigator using the longitudinal method would assemble one group of 50 six-year-olds and measure their vocabulary at age six, again at age eight, and once more at age ten.

Each method has its advantages and disadvantages. Cross-sectional studies can be completed more quickly, easily, and cheaply than longitudinal studies, which often extend over many years. And when a longitudinal study takes years to complete, participants often drop out because they move away or lose interest. However, longitudinal designs tend to be more sensitive to developmental changes than cross-sectional designs (Magnusson & Stattin, 1998). To some extent, the choice of a research design to investigate development depends on what the investigators want to learn about. Thomas and Chess wanted to learn about the long-term stability of children's temperaments. Given this goal, they needed to follow the same children in a longitudinal study to assess their temperamental stability over time.

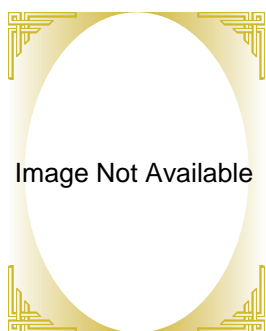
Thomas and Chess identified three basic styles of temperament that were apparent in most of the children. About 40% of the youngsters were *easy children* who tended to be happy, regular in sleep and eating, adaptable, and not readily upset. Another 15% were *slow-to-warm-up children* who tended to be less cheery,

less regular in their sleep and eating, and slower in adapting to change. These children were wary of new experiences, and their emotional reactivity was moderate. *Difficult children* constituted 10% of the group. They tended to be glum, erratic in sleep and eating, resistant to change, and relatively irritable. The remaining 35% of the children showed mixtures of these three temperaments.

A child's temperament at 3 months was a fair predictor of the child's temperament at age 10. Infants categorized as "difficult" developed more emotional problems requiring counseling than other children did. Although basic changes in temperament were seen in some children, temperament was generally stable over time (Chess & Thomas, 1996).

Some critics have expressed concern because Thomas and Chess's data were based on parents' highly subjective ratings of their children's temperament (Mebert, 1991). But other investigators, using a variety of methods to assess infant temperament, have also found it to be fairly stable (Rothbart, Ahadi, & Evans, 2000; Sanson, Hemphill, & Smart, 2002). However, the evidence indicates that temperament tends to stabilize a little later (around age 1 or 2) than Thomas and Chess suggested (Lemery et al., 1999).

One prominent example of contemporary research on temperament is the work of Jerome Kagan and his colleagues, who have relied on direct observations of children in their studies of temperament (Kagan & Snidman, 1991; Kagan, Snidman, & Arcus, 1992).



JEROME KAGAN

"Every psychological quality in an adult can be likened to a pale gray fabric woven from thin black threads representing biology and white threads representing experience, neither visible in the homogeneously gray cloth."

They have found that about 15%–20% of infants display an *inhibited temperament* characterized by shyness, timidity, and wariness of unfamiliar people, objects, and events. In contrast, about 25%–30% of infants exhibit an *uninhibited temperament*. These children are less restrained, approaching unfamiliar people, objects, and events with little trepidation. Evidence suggests that these temperamental styles have a genetic basis and are reasonably stable into young adulthood (Kagan, 2004; Kagan, Reznick, & Snidman, 1999).

One recent study examined the reactions of young adults who had been classified as inhibited or uninhibited 20 years earlier (Schwartz et al., 2003). The investigators used functional MRI scans to measure reactions in the *amygdala*—the brain’s fear center (see Chapter 10)—to familiar and novel faces. As hypothesized, the inhibited subjects exhibited stronger reactions in response to the novel stimuli. Research also indicates that children who exhibit an inhibited temperament in their second year of life have an elevated likelihood of developing problems with anxiety and shyness during their adolescent years (Kagan & Snidman, 1999).

Although temperament is heavily influenced by heredity and tends to be fairly stable over time, theorists emphasize that temperament is not unchangeable (Thompson, Easterbrooks, & Padilla-Walker, 2003). Parental reactions and other social experiences can gradually massage a child’s temperamental characteristics. As Kagan (2004) puts it, “There is no fixed determinism between an infant temperament and what that child will become 20 years later. Temperament is not destiny” (p. 65).

➤ REVIEW OF KEY POINTS

- Motor development follows cephalocaudal (head-to-foot) and proximodistal (center-outward) trends and depends in part on physical growth, which appears to be more uneven than previously appreciated.
- Early motor development depends on both maturation and learning. Developmental norms for motor skills and other types of development are only group averages, and parents should not be alarmed if their children’s progress does not match these norms exactly. Cultural variations in the pacing of motor development demonstrate the importance of learning.
- Cross-sectional and longitudinal studies are both well suited to developmental research. Cross-sectional studies are quicker, easier, and less expensive to conduct. Longitudinal studies are more sensitive to developmental changes.
- Temperamental differences among children are apparent during the first few months of life. Thomas and Chess found that most infants could be classified as easy, slow-to-warm-up, or difficult children. These differences in temperament are fairly stable and probably have a genetic basis.

Early Emotional Development: Attachment



Do mothers and infants forge lasting emotional bonds in the first few hours after birth? Do early emotional bonds affect later development? These are just two of the questions investigated by psychologists interested in attachment. **Attachment refers to the close, emotional bonds of affection that develop between infants and their caregivers.** Researchers have shown a keen interest in how infant-mother attachments are formed early in life. Children eventually may form attachments to many people, including their fathers, grandparents, and others (Cassidy, 1999). However, a child’s first important attachment usually occurs with his or her mother because in most cultures she is the principal caregiver, especially in the early years of life (Lamb et al., 1999).

Contrary to popular belief, infants’ attachment to their mothers is *not* instantaneous. Initially, babies show relatively little in the way of a special preference for their mothers. At 2–3 months of age, infants may smile and laugh more when they interact with their mother, but they generally can be handed over to strangers such as babysitters with little difficulty. This situation gradually changes, and by about 6–8 months, infants begin to show a pronounced preference for their mother’s company and often protest when separated from her (Lamb, Ketterlinus, & Fracasso, 1992). This is the first manifestation of **separation anxiety—emotional distress seen in many infants when they are separated from people with whom they have formed an attachment.** Separation anxiety, which may occur with fathers and other familiar caregivers as well as with mothers, typically peaks at around 14–18 months and then begins to decline.

Theories of Attachment

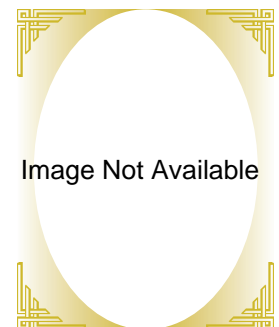


Why do children gradually develop a special attachment to their mothers? This question sounds simple enough, but it has been the subject of a lively theoretical dialogue. Behaviorists have argued that the infant-mother attachment develops because mothers are associated with the powerful, reinforcing event of being fed. Thus, the mother becomes a conditioned reinforcer. This reinforcement theory of attachment came into question as a result of Harry Harlow’s famous studies of attachment in infant rhesus monkeys (Harlow, 1958, 1959).

Harlow removed monkeys from their mothers at birth and raised them in the laboratory with two types

PREVIEW QUESTIONS

- How did Harlow and Bowlby change thinking about attachment?
- What patterns of attachment are seen in infants?
- How is secure attachment related to subsequent development?
- What kinds of cultural variations have been observed in attachment patterns?
- What is the evolutionary significance of attachment patterns?
- What do stage theories have in common?
- How did Erikson explain personality development?
- What are the strengths and weaknesses of Erikson’s theory?



HARRY HARLOW

“The little we know about love does not transcend simple observation, and the little we write about it has been written better by poets and novelists.”



Early Childhood Care and Development

This site's subtitle, *International Resources for Early Childhood Development*, emphasizes the focus of resources provided: the worldwide (not just North American) challenge of caring for children from birth through age 6 and fulfilling the needs of their families.

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Even if fed by a wire surrogate mother, the Harlows' infant monkeys cuddled up with a terry cloth surrogate that provided contact comfort. When threatened by a frightening toy, the monkeys sought security from their terry cloth mothers.

Figure 11.7

Overview of the attachment process. The unfolding of attachment depends on the interaction between a mother (or other caregiver) and an infant. Research by Mary Ainsworth suggested that attachment relations fall into three categories—secure, avoidant, and anxious-ambivalent—which depend in part on how sensitive and responsive caregivers are to their children's needs. The feedback loops shown in the diagram reflect the fact that babies are not passive bystanders in the attachment drama; their reactions to caregivers can affect the caregivers' behavior. Ainsworth's model did not include the fourth attachment pattern (disorganized-disoriented), which was recognized later.

Source: Adapted from Shaver, P. R., & Hazan, C. (1994). Attachment. In A. Weber & J. H. Harvey (Eds.), *Perspectives on close relationships*. Boston: Allyn & Bacon. Copyright © 1994 by Allyn and Bacon. Reprinted by permission.

of artificial "substitute mothers." One type of artificial mother was made of terrycloth and could provide "contact comfort" (see the photo above). The other type of artificial mother was made of wire. Half of the monkeys were fed from a bottle attached to a wire mother and the other half were fed by a cloth mother. The young monkeys' attachment to their substitute mothers was tested by introducing a frightening stimulus, such as a strange toy. If reinforce-

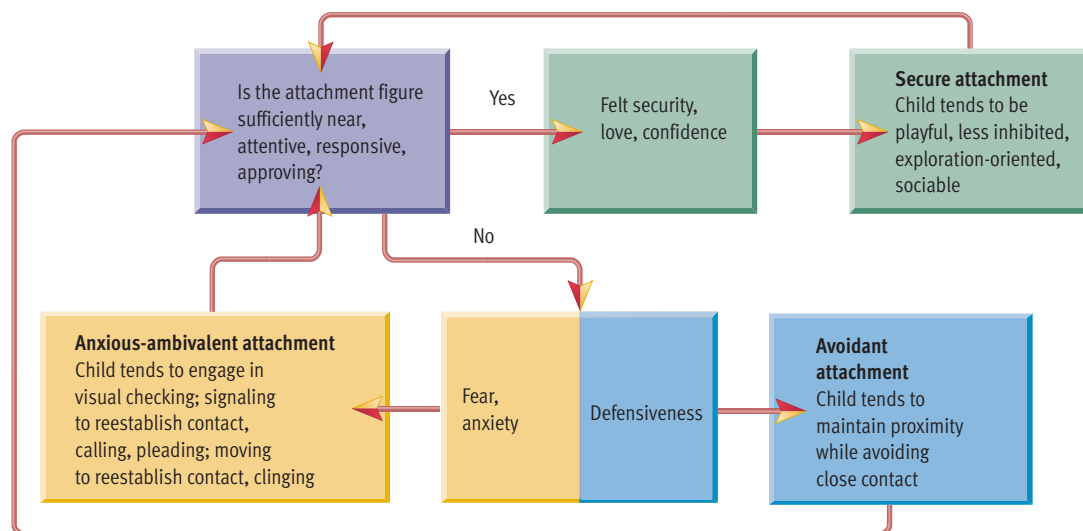
ment through feeding were the key to attachment, the frightened monkeys should have scampered off to the mother that had fed them. This was not the case. The young monkeys scrambled for their cloth mothers, even if they were *not* fed by them.

Harlow's work made a simple reinforcement explanation of attachment unrealistic for animals, let alone for more complex human beings. Attention then turned to an alternative explanation of attachment proposed by John Bowlby (1969, 1973, 1980). Bowlby was impressed by the importance of contact comfort to the Harlows' monkeys and by the apparently unlearned nature of this preference. Influenced by evolutionary theories, Bowlby argued that there must be a biological basis for attachment. According to his view, infants are biologically programmed to emit behavior (smiling, cooing, clinging, and so on) that triggers an affectionate, protective response from adults. Bowlby also asserted that adults are programmed by evolutionary forces to be captivated by this behavior and to respond with warmth, love, and protection. Obviously, these characteristics would be adaptive in terms of promoting children's survival. Bowlby's theory has guided most of the research on attachment over the last several decades, including Mary Ainsworth's influential work on patterns of attachment.

Patterns of Attachment



Research by Mary Ainsworth and her colleagues (Ainsworth, 1979; Ainsworth et al., 1978) demonstrated that infant-mother attachments vary in quality. Ainsworth found that attachments fall into three categories (see **Figure 11.7**). Fortunately, most infants develop a *secure attachment*. These infants use their mother as a secure base from which to venture out



and explore the world. They play comfortably with their mother present, become visibly upset when she leaves, and are quickly calmed by her return. However, some children display a pattern called *anxious-ambivalent attachment* (also called *resistant attachment*). They appear anxious even when their mother is near and protest excessively when she leaves, but they are not particularly comforted when she returns. Children in the third category seek little contact with their mothers and often are not distressed when she leaves, a condition labeled *avoidant attachment*. Years later, other researchers added a fourth category called *disorganized-disoriented attachment* (Main & Solomon, 1986, 1990). These children appear confused about whether they should approach or avoid their mother and are especially insecure (Lyons-Ruth & Jacobvitz, 1999).

Maternal behaviors appear to have considerable influence over the type of attachment that emerges between an infant and mother (Ainsworth et al., 1978). Mothers who are sensitive and responsive to their children's needs are more likely to promote secure attachments than mothers who are relatively insensitive or inconsistent in their responding (Isabella, 1995; van den Boom, 1994). However, infants are not passive bystanders as this process unfolds. They are active participants who influence the process with their crying, smiling, fussing, and babbling. Difficult infants who spit up most of their food, make bathing a major battle, and rarely smile may sometimes slow the process of attachment (Mangelsdorf et al., 1990). Thus, the type of attachment that emerges between an infant and mother may depend on the nature of the infant's temperament as well as the mother's sensitivity (Vaughn & Bost, 1999).

Evidence suggests that the quality of the attachment relationship can have important consequences for children's subsequent development. Based on their attachment experiences, children develop *internal working models* of the dynamics of close relationships that influence their future interactions with a wide range of people (Bretherton & Munholland, 1999). Infants with a relatively secure attachment *tend* to become resilient, competent toddlers with high self-esteem (Goldsmith & Harman, 1994; Thompson, 1999). In their preschool years, they display more persistence, curiosity, self-reliance, and leadership and have better peer relations (Weinfield et al., 1999), while experiencing fewer negative emotions and more positive emotions (Kochanska, 2001). Studies have also found a relationship between secure attachment and more advanced cognitive development during childhood and adolescence (Jacobsen, Edelstein, & Hofmann, 1994), as well as healthier inti-

mate relations during adulthood (Feeney, 1999; Kirkpatrick, 1999). However, it is worth noting that all the relevant data on attachment effects are correlational (experimenters cannot manipulate caregiver-infant attachments), so we cannot assume that secure attachment *causes* all these favorable outcomes. Secure attachment could co-vary with other factors that contribute to high self-esteem, self-reliance, and so forth.

The repercussions of attachment patterns in infancy appear to even reach into adulthood. In Chapter 16 we'll discuss thought-provoking evidence that infant attachment patterns set the tone for people's romantic relationships in adulthood, not to mention their gender roles, religious beliefs, and patterns of self-disclosure (Feeney, 1999; Kirkpatrick, 1999; Shaver & Hazan, 1993, 1994; Shaver & Mikulincer, 2005).

Culture and Attachment



Separation anxiety emerges in children at about 6–8 months and peaks at about 14–18 months in cultures around the world (Grossmann & Grossmann, 1990). These findings, which have been replicated in quite a variety of non-Western cultures, suggest that attachment is a universal feature of human development. However, studies have found some modest cultural variations in the proportion of infants who fall into the three attachment categories described by Ainsworth. Working mostly with white, middle-class subjects in the United States, researchers have found that 65% of infants display a secure attachment, 20% an avoidant attachment, and 15% an anxious-ambivalent attachment (the fourth attachment pattern mentioned earlier is not included here because it has only been tracked in a small minority of studies to date) (van IJzendoorn & Sagi, 1999). Interestingly, studies in Japan and Germany have yielded somewhat different estimates of the prevalence of various types of attachment, as shown in **Figure 11.8** on the next page. That said, the differences are small and secure attachment appears to be the predominant type of attachment around the world.

Evolutionary Perspectives on Attachment

Attachment theory has had an evolutionary slant from its very beginning, long before evolutionary theory became influential in psychology. John Bowlby (1969, 1973, 1980), who originated the concept of attachment, analyzed attachment in terms of its *survival value* for infants. In contrast, contemporary evolutionary theorists emphasize how attachment contributes to parents' and children's *reproductive fitness* (Belsky, Steinberg, & Draper, 1991; Chisholm, 1996; Simpson, 1999). For example, contemporary theorists



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MARY SALTER AINSWORTH

"Where familial security is lacking, the individual is handicapped by the lack of what might be called a secure base from which to work."



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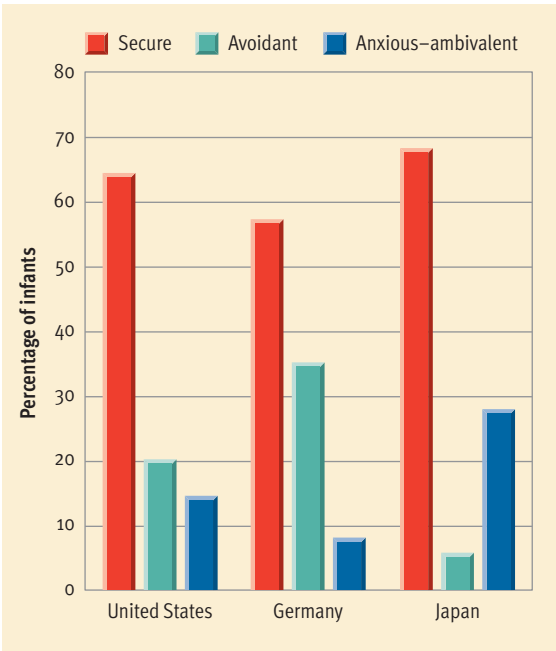
JOHN BOWLBY

"The only relevant criterion by which to consider the natural adaptedness of any particular part of present-day man's behavioural equipment is the degree to which and the way in which it might contribute to population survival in man's primeval environment."

Figure 11.8

Cultural variations in attachment patterns.

This graph shows the distribution of the three original attachment patterns found in specific studies in Germany, Japan, and the United States. As you can see, secure attachment is the most common pattern in all three societies, as it is around the world. However, there are some modest cultural differences in the prevalence of each pattern of attachment, which are probably attributable to cultural variations in childrearing practices. (Data from van IJzendoorn & Kroonenberg, 1988)



point out that if parents expect to pass their genes on to future generations, they need to raise their offspring to reproductive age and help them develop the social maturity required for successful mating. Parent-child attachments make crucial contributions to these outcomes by fostering social and emotional development in children (Kobak, 1999).

Contemporary theorists also have some interesting hypotheses about the evolutionary significance of the specific patterns of attachment seen in children. Jay Belsky (1999) asserts that *the nature of children's early attachment experiences depends on the character of their environments and that these experiences chart the course of children's social development in ways that are adaptive for their environmental circumstances*. According to Belsky, over the course of evolutionary history, if our ancient ancestors had the time and energy to be sensitive and responsive to infants' needs, the local environment was probably relatively safe

and rich in resources. Sensitive care presumably promoted secure attachments and conveyed to infants that the world is safe, others can be trusted, and relationships are enduring. When securely attached children reached adulthood, this mindset supposedly fostered a reproductive strategy that emphasized *quality* in mating relationships, resulting in relatively few sexual partners, more stable, durable romantic bonds, and more parental investment in offspring. In contrast, Belsky theorizes that, historically, when parents were insensitive and unresponsive to infants' needs, the local environment was probably relatively unsafe and resources depleted. Unresponsive care presumably promoted insecure attachments and conveyed to infants that the world is harsh, others cannot be trusted, and relationships are fleeting. When children with insecure attachments reached adulthood, this mindset supposedly fostered an opportunistic reproductive strategy that emphasized *quantity* in mating relationships, resulting in relatively more sexual partners, less stable romantic bonds, and less parental investment in offspring (consult Figure 11.9).

Belsky's (1999) key point is that each reproductive strategy was adaptive for the environment in which it tended to occur. In other words, individuals' reproductive potential was probably maximized by being sexually opportunistic in harsh, depleted environments, where long-term survival was precarious, and by emphasizing enduring relationships and high parental investment in benign, abundant environments, where long-term survival appeared more promising.

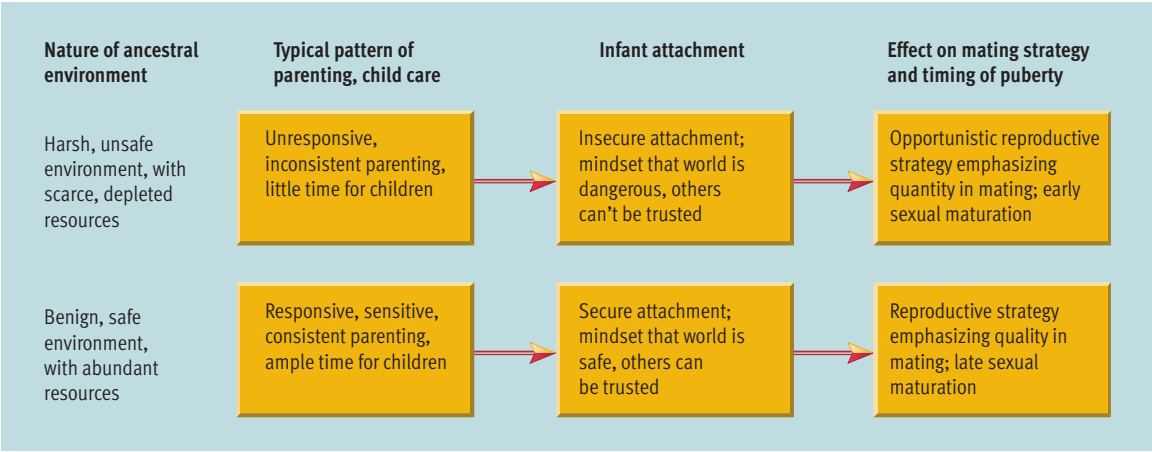
Becoming Unique: Personality Development



How do individuals develop their unique constellations of personality traits over time? Many theories have addressed this question. The first major theory of personality development was constructed by Sig-

Figure 11.9

Belsky's analysis relating attachment to sexual maturation. Based on his evolutionary analysis of the possible significance of infants' attachment patterns, Belsky hypothesized that insecure attachments might accelerate sexual maturation, as outlined here. (Belsky, 1999; Belsky, Steinberg, & Draper, 1991)



mund Freud back around 1900. As we'll discuss in Chapter 12, he claimed that the basic foundation of an individual's personality is firmly laid down by age 5. Half a century later, Erik Erikson (1963) proposed a sweeping revision of Freud's theory that has proven influential. Like Freud, Erikson concluded that events in early childhood leave a permanent stamp on adult personality. However, unlike Freud, Erikson theorized that personality continues to evolve over the entire life span.

Building on Freud's earlier work, Erikson devised a stage theory of personality development. As you'll see in reading this chapter, many theories describe development in terms of stages. **A stage is a developmental period during which characteristic patterns of behavior are exhibited and certain capacities become established.** Stage theories assume that (1) individuals must progress through specified stages in a particular order because each stage builds on the previous stage, (2) progress through these stages is strongly related to age, and (3) development is marked by major discontinuities that usher in dramatic transitions in behavior (see Figure 11.10).

Erikson's Stage Theory



Erikson partitioned the life span into eight stages, each of which brings a *psychosocial crisis* involving transitions in important social relationships. According to Erikson, personality is shaped by how individuals deal with these psychosocial crises. Each crisis involves a struggle between two opposing tendencies, such as trust versus mistrust or initiative versus guilt, both of which are experienced by the person. Erikson described the stages in terms of these antagonistic tendencies, which represent personality traits that people display in varying degrees over the re-

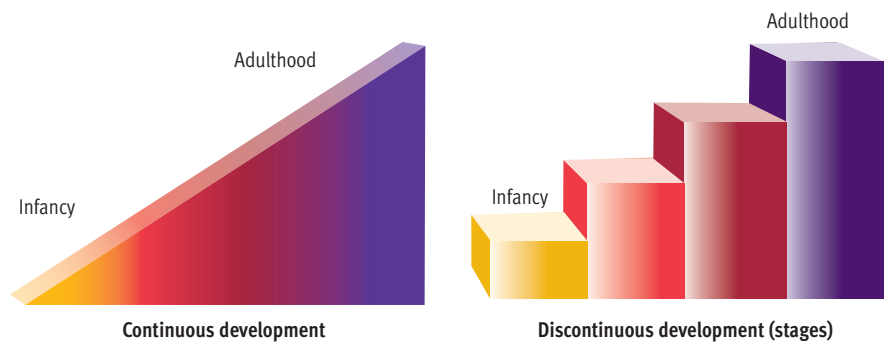


Figure 11.10

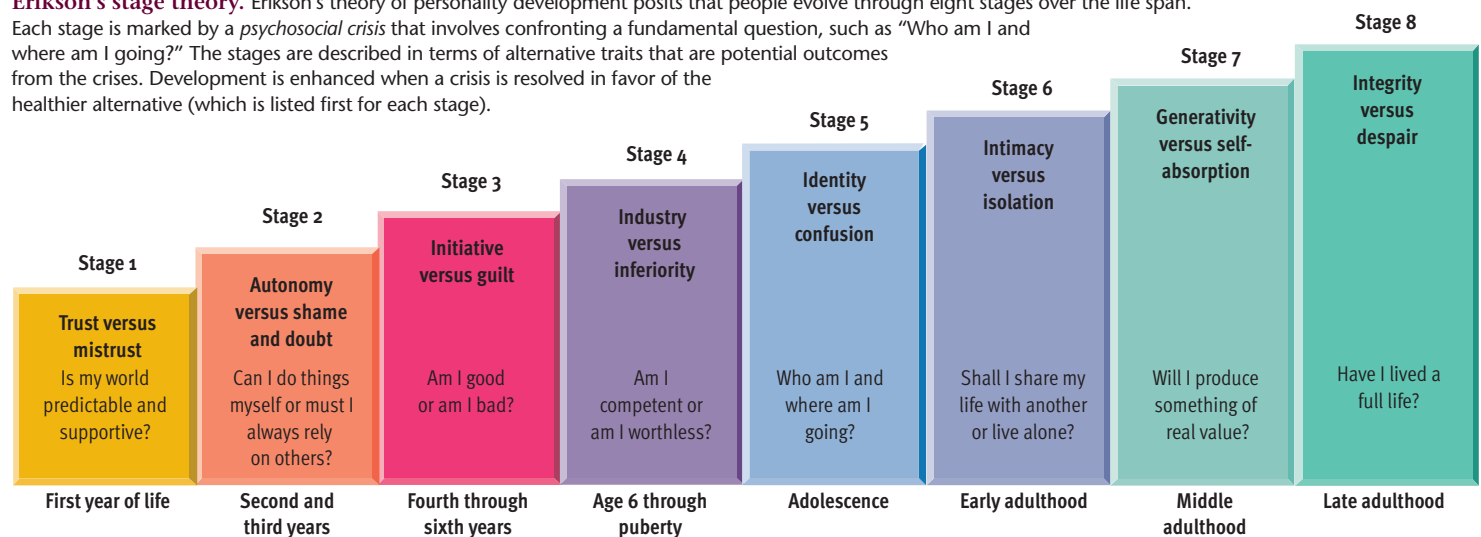
Stage theories of development. Some theories view development as a relatively continuous process, albeit not as smooth and perfectly linear as depicted on the left. In contrast, stage theories assume that development is marked by major discontinuities (as shown on the right) that bring fundamental, qualitative changes in capabilities or characteristic behavior.

mainder of their lives. Although the names for Erikson's stages suggest either-or outcomes, he viewed each stage as a tug of war that determined the subsequent *balance* between opposing polarities in personality. All eight stages in Erikson's theory are charted in Figure 11.11. We describe the first four childhood stages here and discuss the remaining stages in the upcoming sections on adolescence and adulthood.

Trust Versus Mistrust. Erikson's first stage encompasses the first year of life, when an infant has to depend completely on adults to take care of its basic needs for such necessities as food, a warm blanket, and changed diapers. If an infant's basic biological needs are adequately met by his or her caregivers and sound attachments are formed, the child should develop an optimistic, trusting attitude toward the world. However, if the infant's basic needs are taken care of poorly, a more distrusting, pessimistic personality may result.

Figure 11.11

Erikson's stage theory. Erikson's theory of personality development posits that people evolve through eight stages over the life span. Each stage is marked by a *psychosocial crisis* that involves confronting a fundamental question, such as "Who am I and where am I going?" The stages are described in terms of alternative traits that are potential outcomes from the crises. Development is enhanced when a crisis is resolved in favor of the healthier alternative (which is listed first for each stage).



According to Erik Erikson, school-age children face the challenge of learning how to function in social situations outside of their family, especially with peers and at school. If they succeed, they will develop a sense of competence; if they fail, they may feel inferior.



© Bill Bachman/PhotoEdit

in this less nurturant social sphere where productivity is highly valued should learn to pursue achievement and to take pride in accomplishment, resulting in a sense of competence. Or, if things don't go well in this broader social domain, they may develop a sense of inferiority.

Evaluating Erikson's Theory

The strength of Erikson's theory is that it accounts for both continuity and transition in personality development. It accounts for transition by showing how new challenges in social relations stimulate personality development throughout life. It accounts for continuity by drawing connections between early childhood experiences and aspects of adult personality. One measure of a theory's value is how much research it generates, and Erikson's theory continues to guide a fair amount of research (Thomas, 2005).

On the negative side of the ledger, Erikson's theory has depended heavily on illustrative case studies, which are open to varied interpretations (Thomas, 2005). Another weakness is that the theory provides an "idealized" description of "typical" developmental patterns. Thus, it's not well suited for explaining the enormous personality differences that exist among people. Inadequate explanation of individual differences is a common problem with stage theories of development. This shortcoming surfaces again in the next section, where we'll examine Jean Piaget's stage theory of cognitive development.

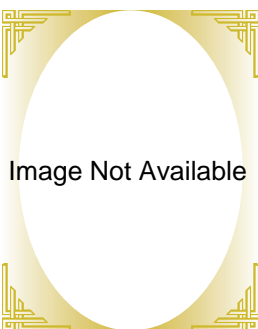
REVIEW OF KEY POINTS

- Infants' attachments to their caregivers develop gradually. Separation anxiety usually appears around 6–8 months of age. Harlow's work with monkeys undermined the reinforcement explanation of attachment. Bowlby proposed an evolutionary explanation that has been very influential.
- Infant-mother attachments fall into four categories: secure, anxious-ambivalent, avoidant, and disorganized-disoriented. Research shows that attachment emerges out of an interplay between infant and mother. A secure attachment fosters self-esteem, persistence, curiosity, and self-reliance, among other desirable traits. Cultural variations in childrearing can affect the patterns of attachment seen in a society.
- Belsky theorizes that children have been programmed by evolution to respond to sensitive or insensitive care with different attachment patterns that eventually cultivate reproductive strategies that would have been adaptive in the environments that have historically fostered sensitive or insensitive care.
- A stage is a developmental period during which characteristic patterns of behavior are exhibited. Stage theories assume that individuals must progress through a series of specified stages in a particular order and that development is marked by major discontinuities.
- Erik Erikson's theory of personality development proposes that individuals evolve through eight stages over the life span. In each stage the person wrestles with two opposing tendencies evoked by that stage's psychosocial crisis.

Autonomy Versus Shame and Doubt. Erikson's second stage unfolds during the second and third years of life, when parents begin toilet training and other efforts to regulate the child's behavior. The child must begin to take some personal responsibility for feeding, dressing, and bathing. If all goes well, he or she acquires a sense of self-sufficiency. But, if parents are never satisfied with the child's efforts and there are constant parent-child conflicts, the child may develop a sense of personal shame and self-doubt.

Initiative Versus Guilt. In Erikson's third stage, lasting roughly from ages 3 to 6, children experiment and take initiatives that may sometimes conflict with their parents' rules. Overcontrolling parents may begin to instill feelings of guilt, and self-esteem may suffer. Parents need to support their children's emerging independence while maintaining appropriate controls. In the ideal situation, children will retain their sense of initiative while learning to respect the rights and privileges of other family members.

Industry Versus Inferiority. In the fourth stage (age 6 through puberty), the challenge of learning to function socially is extended beyond the family to the broader social realm of the neighborhood and school. Children who are able to function effectively



ERIK ERIKSON

"Human personality in principle develops according to steps predetermined in the growing person's readiness to be driven toward, to be aware of, and to interact with a widening social radius."

The Growth of Thought: Cognitive Development



Cognitive development refers to transitions in youngsters' patterns of thinking, including reasoning, remembering, and problem solving. The investigation of cognitive development was dominated in most of the second half of the 20th century by the theory of Jean Piaget (Kessen, 1996). Much of our discussion of cognitive development is devoted to Piaget's theory and the research it generated, although we'll also delve into other approaches.

Overview of Piaget's Stage Theory



Jean Piaget (1929, 1952, 1983) was an interdisciplinary scholar whose own cognitive development was exceptionally rapid. In his early 20s, after he had earned a doctorate in natural science and published a novel, Piaget's interest turned to psychology. He met Theodore Simon, who had collaborated with Alfred Binet in devising the first useful intelligence tests (see Chapter 9). Working in Simon's Paris laboratory, Piaget administered intelligence tests to many children to develop better test norms. In doing this testing, Piaget became intrigued by the reasoning underlying the children's *wrong* answers. He decided that measuring children's intelligence was less interesting than studying how children *use* their intelligence. In 1921 he moved to Geneva, where he spent the rest of his life studying cognitive development. Many of his ideas were based on insights gleaned from careful observations of his own three children during their infancy.

Like Erikson's theory, Piaget's model is a *stage theory* of development. Piaget proposed that youngsters progress through four major stages of cognitive development, which are characterized by fundamentally different thought processes: (1) the *sensorimotor period* (birth to age 2), (2) the *preoperational period* (ages 2 to 7), (3) the *concrete operational period* (ages 7 to 11), and (4) the *formal operational period* (age 11 onward). **Figure 11.12** provides an overview of each of these periods. Piaget regarded his age norms as approximations and acknowledged that transitional ages may vary, but he was convinced that all children progress through the stages of cognitive development in the same order.

Noting that children actively explore the world around them, Piaget asserted that interaction with the environment and maturation gradually alter the way children think. According to Piaget, children progress in their thinking through the complementary processes of assimilation and accommodation. **Assimilation** involves interpreting new experiences

in terms of existing mental structures without changing them. In contrast, **accommodation** involves changing existing mental structures to explain new experiences. Accommodation and assimilation often occur interactively. For instance, a child who has learned to call four-legged pets "puppies" may apply this scheme the first time she encounters a cat (assimilation), but she will eventually discover that puppies and cats are different types of animals and make adjustments to her mental schemes (accommodation). With the companion processes of assimilation and accommodation in mind, let's turn now to the four stages in Piaget's theory.

Sensorimotor Period. One of Piaget's foremost contributions was to greatly enhance our understanding of mental development in the earliest months of life. The first stage in his theory is the *sensorimotor period*, which lasts from birth to about age 2. Piaget called this stage *sensorimotor* because infants are developing the ability to coordinate their sensory input with their motor actions. Their development is marked by increasingly sophisticated *circular reactions*, in which they discover pleasureable responses (like making a toy squeal by squeezing it) and then perform them over and over.

The major development during the sensorimotor stage is the gradual appearance of symbolic thought. At the beginning of this stage, a child's behavior is dominated by innate reflexes. But by the end of the stage, the child can use mental symbols to represent objects (for example, a mental image of a favorite toy). The key to this transition is the acquisition of the concept of object permanence.

Object permanence develops when a child recognizes that objects continue to exist even when they are no longer visible. Although you surely take

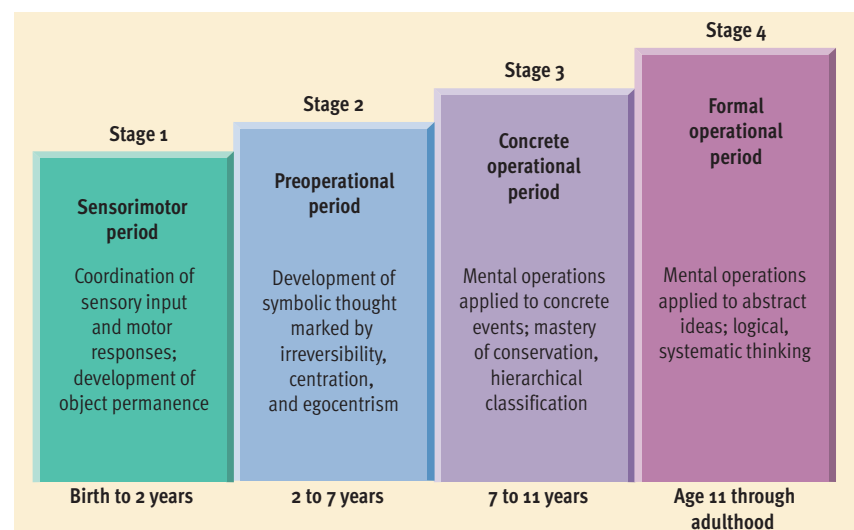
PREVIEW QUESTIONS

- What are Piaget's four major stages of cognitive development?
- What are the chief developments in each stage?
- What are the strengths and weaknesses of Piaget's theory?
- How does Vygotsky's theory of cognitive development compare to Piaget's theory?
- Why do some theorists believe that infants have innate cognitive abilities?
- What are Kohlberg's stages of moral development?
- What are the strengths and weaknesses of Kohlberg's theory?

Figure 11.12

Piaget's stage theory.

Piaget's theory of cognitive development identifies four stages marked by fundamentally different modes of thinking through which youngsters evolve. The approximate age norms and some key characteristics of thought at each stage are summarized here.





JEAN PIAGET

"It is virtually impossible to draw a clear line between innate and acquired behavior patterns."

the permanence of objects for granted, infants aren't aware of this permanence at first. If you show a 4-month-old an eye-catching toy and then cover the toy with a pillow, the child will not attempt to search for the toy. Piaget inferred from this observation that the child does not understand that the toy continues to exist under the pillow. The notion of object permanence does not dawn on children overnight. The first signs of this insight usually appear between 4 and 8 months of age, when children will often pursue an object that is *partially* covered in their presence. Progress is gradual, and Piaget believed that children typically don't master the concept of object permanence until they're about 18 months old.

Preoperational Period. During the *preoperational period*, which extends roughly from age 2 to age 7, children gradually improve in their use of mental images. Although progress in symbolic thought continues, Piaget emphasized the *shortcomings* in preoperational thought.

Consider a simple problem that Piaget presented to youngsters. He would take two identical beakers and fill each with the same amount of water. After a child had agreed that the two beakers contained the same amount of water, he would pour the water from one of the beakers into a much taller and thinner beaker (see **Figure 11.13**). He would then ask the child whether the two differently shaped beakers still contained the same amount of water. Confronted with a problem like this, children in the preoperational period generally said no. They typically focused on the higher water line in the taller beaker and insisted that there was more water in the slender beaker. They had not yet mastered the principle of conservation. **Conservation is Piaget's term for the awareness that physical quantities remain constant in spite of changes in their shape or appearance.**

Why are preoperational children unable to solve conservation problems? According to Piaget, their inability to understand conservation is caused by some basic flaws in preoperational thinking. These flaws include centration, irreversibility, and egocentrism.

Centration is the tendency to focus on just one feature of a problem, neglecting other important aspects. When working on the conservation problem with water, preoperational children tend to concentrate on the height of the water while ignoring the width. They have difficulty focusing on several aspects of a problem at once.

Irreversibility is the inability to envision reversing an action. Preoperational children can't mentally "undo" something. For instance, in grappling with the conservation of water, they don't think about what would happen if the water were poured back from the tall beaker into the original beaker.

Egocentrism in thinking is characterized by a limited ability to share another person's viewpoint. Indeed, Piaget felt that preoperational children fail to appreciate that there are points of view other than their own. For instance, if you ask a preoperational girl whether her sister has a sister, she'll probably say no if they are the only two girls in the family. She's unable to view sisterhood from her sister's perspective.

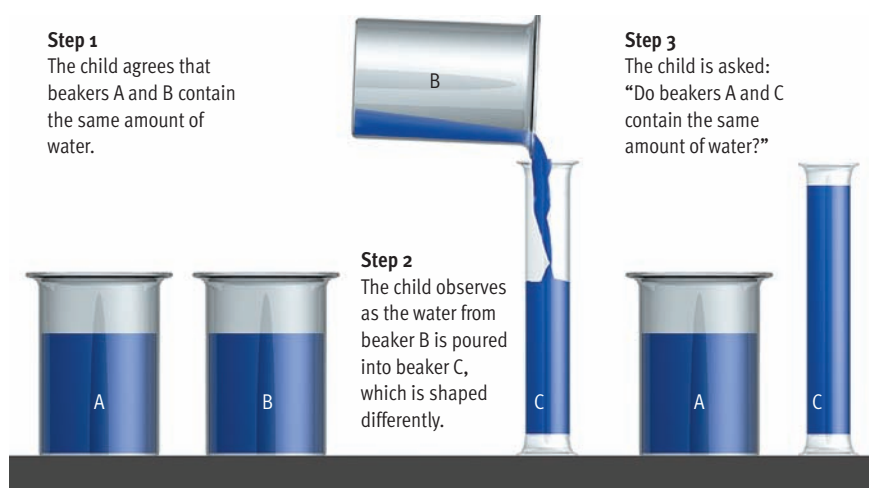
A notable feature of egocentrism is **animism—the belief that all things are living**, just like oneself. Thus, youngsters attribute lifelike, human qualities to inanimate objects, asking questions such as, "When does the ocean stop to rest?" or "Why does the wind get so mad?"

As you can see, Piaget emphasized the weaknesses apparent in preoperational thought. Indeed, that is why he called this stage *preoperational*. The ability to perform *operations*—internal transformations, manipulations, and reorganizations of mental structures—emerges in the next stage.

Concrete Operational Period. The development of mental operations marks the beginning of the *concrete operational period*, which usually lasts from about age 7 to age 11. Piaget called this stage *concrete* operations because children can perform operations only on images of tangible objects and actual events.

Among the operations that children master during this stage are reversibility and decentration. **Reversibility** permits a child to mentally undo an action. **Decentration** allows the child to focus on more than one feature of a problem simultaneously. The new-found ability to coordinate several aspects of a problem helps the child appreciate that there are several ways to look at things. This ability in turn leads to a *decline in egocentrism* and *gradual mastery of conser-*

Figure 11.13
Piaget's conservation task. After watching the transformation shown, a preoperational child will usually answer that the taller beaker contains more water. In contrast, the child in the concrete operational period tends to respond correctly, recognizing that the amount of water in beaker C remains the same as the amount in beaker A.











Typical tasks used to measure conservation		Typical age of mastery
	Conservation of number Two equivalent rows of objects are shown to the child, who agrees that they have the same number of objects.	6–7
	One row is lengthened, and the child is asked whether one row has more objects.	
	Conservation of mass The child acknowledges that two clay balls have equal amounts of clay.	7–8
	The experimenter changes the shape of one of the balls and asks the child whether they still contain equal amounts of clay.	
	Conservation of length The child agrees that two sticks aligned with each other are the same length.	7–8
	After moving one stick to the left or right, the experimenter asks the child whether the sticks are of equal length.	
	Conservation of area Two identical sheets of cardboard have wooden blocks placed on them in identical positions; the child confirms that the same amount of space is left on each piece of cardboard.	8–9
	The experimenter scatters the blocks on one piece of cardboard and again asks the child whether the two pieces have the same amount of unoccupied space.	

Figure 11.14
The gradual mastery of conservation. Children master conservation during the concrete operational period, but their mastery is gradual. As outlined here, children usually master the conservation of number at age 6 or 7, but they may not understand the conservation of area until age 8 or 9.

vation as it applies to liquid, mass, number, volume, area, and length (see **Figure 11.14**).

As children master concrete operations, they develop a variety of new problem-solving capacities. Let's examine another problem studied by Piaget. Give a preoperational child seven carnations and three daisies. Tell the child the names for the two types of flowers and ask the child to sort them into carnations and daisies. That should be no problem. Now ask the child whether there are more carnations or more daisies. Most children will correctly respond that there are more carnations. Now ask the child whether there are more carnations or more flowers. At this point, most preoperational children will stumble and respond incorrectly that there are more carnations than flowers. Generally, preoperational children can't handle *hierarchical classification* problems that require them to focus simultaneously on two levels of classification. However, the child who has advanced to the concrete operational stage is not as limited by centration and can work successfully with hierarchical classification problems.

Formal Operational Period. The final stage in Piaget's theory is the *formal operational period*, which typically begins around 11 years of age. In this stage, children begin to apply their operations to *abstract* concepts in addition to concrete objects. Indeed, during this stage, youngsters come to *enjoy* the heady contemplation of abstract concepts. Many adolescents spend hours mulling over hypothetical possibilities related to abstractions such as justice, love, and free will.

According to Piaget, youngsters graduate to relatively adult modes of thinking in the formal operations stage. He did *not* mean to suggest that no further cognitive development occurs once children reach this stage. However, he believed that after children achieve formal operations, further developments in thinking are changes in *degree* rather than fundamental changes in the *nature* of thinking.

Adolescents in the formal operational period become more *systematic* in their problem-solving efforts. Children in earlier developmental stages tend to attack problems quickly, with a trial-and-error approach.



Recognizing Piaget's Stages

Check your understanding of Piaget's theory by indicating the stage of cognitive development illustrated by each of the following examples. For each scenario, fill in the letter for the appropriate stage in the space on the left. The answers are in Appendix A.

- | | |
|--------------------------|--------------------------------|
| a. Sensorimotor period | c. Concrete operational period |
| b. Preoperational period | d. Formal operational period |

- _____ 1. Upon seeing a glass lying on its side, Sammy says, "Look, the glass is tired. It's taking a nap."
- _____ 2. Maria is told that a farmer has nine cows and six horses. The teacher asks, "Does the farmer have more cows or more animals?" Maria answers, "More animals."
- _____ 3. Alice is playing in the living room with a small red ball. The ball rolls under the sofa. She stares for a moment at the place where the ball vanished and then turns her attention to a toy truck sitting in front of her.

In contrast, children who have achieved formal operations are more likely to think things through. They envision possible courses of action and try to use logic to reason out the likely consequences of each possible solution before they act. Thus, thought processes in the formal operational period can be characterized as abstract, systematic, logical, and reflective.

Evaluating Piaget's Theory

Jean Piaget made a landmark contribution to psychology's understanding of children in general and their cognitive development in particular (Beilin, 1992). He founded the field of cognitive development and fostered a new view of children that saw them as active agents constructing their own worlds (Fischer & Hencke, 1996). Above all else, he sought answers to new questions. As he acknowledged in a 1970 interview, "It's just that no adult ever had the idea of asking children about conservation. It was so obvious that if you change the shape of an object, the quantity will be conserved. Why ask a child? The novelty lay in asking the question" (Hall, 1987, p. 56). Piaget's theory guided an enormous volume of productive research that continues through today (Brainerd, 1996; Feldman, 2003). This research has supported many of Piaget's central propositions (Flavell, 1996). In such a far-reaching theory, however, there are bound to be some weak spots. Here are some of the criticisms of Piaget's theory:

1. In many areas, Piaget appears to have underestimated young children's cognitive development

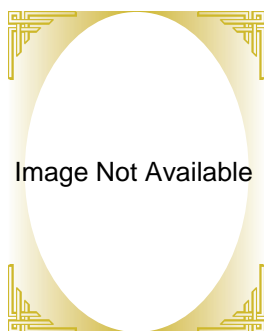
(Lutz & Sternberg, 1999). For example, researchers have found evidence that children begin to develop object permanence much earlier than Piaget thought, perhaps as early as 3 to 4 months of age (Baillargeon, 1987, 1994). Others have marshaled evidence that preoperational children exhibit less egocentrism and animism than Piaget believed (Newcombe & Huttenlocher, 1992).

2. Piaget's model suffers from problems that plague most stage theories. Like Erikson, Piaget had little to say about individual differences in development (Siegler, 1994). Also, people often simultaneously display patterns of thinking that are characteristic of several stages. This "mixing" of stages and the fact that the transitions between stages are gradual rather than abrupt call into question the value of organizing development in terms of stages (Courage & Howe, 2002; Bjorklund, 2005).

3. Piaget believed that his theory described universal processes that should lead children everywhere to progress through uniform stages of thinking at roughly the same ages. Subsequent research has shown that the *sequence* of stages is largely invariant, but the *timetable* that children follow in passing through these stages varies considerably across cultures (Dasen, 1994; Rogoff, 1990). Thus, Piaget underestimated the influence of cultural factors on cognitive development.

Vygotsky's Sociocultural Theory

In recent decades, as the limitations and weaknesses of Piaget's ideas have become more apparent, some developmental researchers have looked elsewhere for theoretical guidance. Ironically, the theory that has recently inspired the greatest interest—Lev Vygotsky's *sociocultural theory*—dates back to around the same time that Piaget began formulating his theory (1920s–1930s). Vygotsky was a prominent Russian psychologist whose research ended prematurely in 1934 when he died of tuberculosis at the age of 37. Western scientists had little exposure to his ideas until the 1960s, and it was only in 1986 that a complete version of his principal book, *Thought and Language* (Vygotsky, 1934), was published in English. Working in a perilous political climate in the post-revolution Soviet Union, Vygotsky had to devise a theory that would not be incompatible with the Marxist social philosophy that ruled communist thinking (Thomas, 2005). Given the constraints placed on his theorizing, one might expect that 70 years later his ideas would not resonate with contemporary psychologists in capitalist societies, but the reality is just the opposite, as his theory has become very influential (Feldman, 2003).



LEV VYGOTSKY

"In the process of development the child not only masters the items of cultural experience but the habits and forms of cultural behaviour, the cultural methods of reasoning."

Vygotsky's and Piaget's perspectives on cognitive development have much in common, but they also differ in several important respects (DeVries, 2000; Matusov & Hayes, 2000; Rowe & Wertsch, 2002). First, in Piaget's theory, cognitive development is primarily fueled by individual children's active exploration of the world around them. The child is viewed as the agent of change. In contrast, Vygotsky places enormous emphasis on how children's cognitive development is fueled by social interactions with parents, teachers, and older children who can provide invaluable guidance. Second, Piaget viewed cognitive development as a universal process that should unfold in largely the same way across widely disparate cultures. Vygotsky, on the other hand, asserted that culture exerts great influence over how cognitive growth unfolds. For example, the cognitive skills acquired in literate cultures that rely on schools for training will differ from those skills acquired in tribal societies with no formal schooling. Third, Piaget viewed children's gradual mastery of language as just another aspect of cognitive development, whereas Vygotsky argued that language acquisition plays a crucial, central role in fostering cognitive development.

According to Vygotsky, children acquire most of their culture's cognitive skills and problem-solving strategies through collaborative dialogues with more experienced members of their society. He saw cognitive development as more like an *apprenticeship* than a journey of individual discovery. His emphasis on the social origins of cognitive development is apparent in his theoretical concepts, such as the *zone of proximal development* and *scaffolding*. **The zone of proximal development (ZPD) is the gap between what a learner can accomplish alone and what he or she can achieve with guidance from more skilled partners.** For example, a young child learning to run a personal computer, working solo, will be stymied in many ways and may quickly reach a point at which progress is stalled. But the same child may progress much further with a judicious hint here or there from an experienced computer user. The ZPD for a task is the area in which new cognitive growth is likely and the area that should be the focus of instructional efforts. These efforts are more likely to be helpful when an instructor practices scaffolding. **Scaffolding occurs when the assistance provided to a child is adjusted as learning progresses.** Typically, less and less help is provided as a child's competence on a task increases.

Vygotsky's emphasis on the primacy of language is reflected in his discussion of *private speech*. Preschool children talk aloud to themselves a lot as they go about their activities. Piaget viewed this speech as ego-

centric and insignificant. Vygotsky argued that children use this private speech to plan their strategies, regulate their actions, and accomplish their goals. As children grow older, this private speech is internalized and becomes the normal verbal dialogue that people have with themselves as they go about their business. Thus, language increasingly serves as the *foundation* for youngsters' cognitive processes.

Vygotsky's sociocultural theory is guiding a great deal of contemporary research on cognitive development (Feldman, 2003). This research has provided empirical support for many of Vygotsky's ideas (Rogoff, 1998; Winsler, 2003). Like Piaget's theory, Vygotsky's perspective promises to enrich our understanding of how children's thinking develops and matures.

Are Some Cognitive Abilities Innate?

The frequent finding that Piaget underestimated infants' cognitive abilities has led to a rash of research suggesting that infants have a surprising grasp of many complex concepts. The new findings have been made possible by some innovative research methods that permit investigators to draw inferences about the abilities of very young children. Many studies have made use of the *habituation-dishabituation paradigm*. **Habituation is a gradual reduction in the strength of a response when a stimulus event is presented repeatedly.** If you show infants the same event over and over (such as an object dropping onto a platform), they habituate to it—their heart and respiration rates decline and they spend less time looking at the stimulus. **Dishabituation occurs if a new stimulus elicits an increase in the strength of an habituated response.** Patterns of dishabituation can give researchers insights into what types of events infants can tell apart, which events surprise or interest them, and which events violate their expectations.

Working with the habituation-dishabituation paradigm and similar methods, researchers have discovered that infants understand basic properties of objects and some of the rules that govern them (Baillargeon, 2002, 2004). At 3 to 4 months of age, infants understand that objects are distinct entities with boundaries, that objects move in continuous paths, that one solid object cannot pass through another, that an object cannot pass through an opening that is smaller than the object, and that objects on slopes roll down rather than up (Kim & Spelke, 1992; Spelke & Newport, 1998). Other research has shown that infants' ability to categorize objects is much more advanced than previously appreciated. At 9 to 12 months of age, infants can recognize whether common objects be-

Web Link 11.3



Theories of Development Maintained by the Psychology Department at George Mason University, this site is an excellent resource, providing links to many other sites that focus on influential theories of human development. Starting here, a visitor can learn a great deal about the ideas of Erik Erikson, Jean Piaget, Lev Vygotsky, and Lawrence Kohlberg.

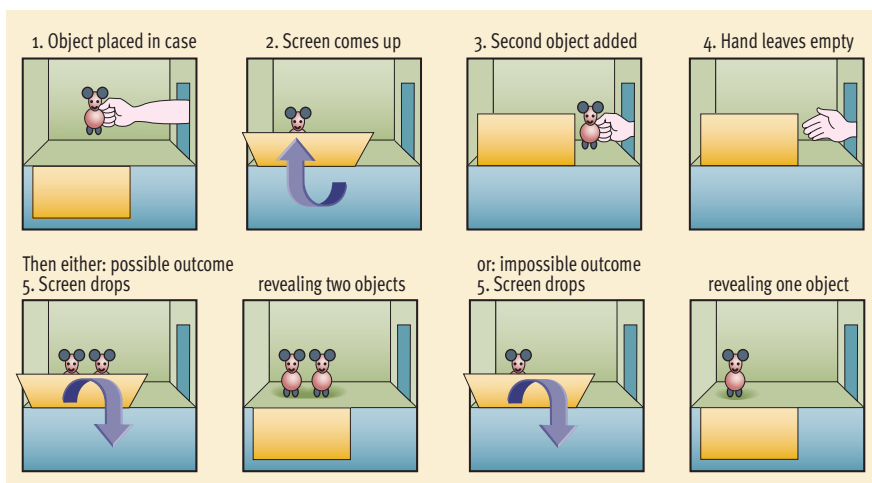


Figure 11.15

The procedure used to test infants' understanding of number. To see if 5-month-old infants have some appreciation of addition and subtraction, Wynn (1992, 1996) showed them sequences of events like those depicted here. If children express surprise (primarily assessed by time spent looking) when the screen drops and they see only one object, this result suggests that they understand that $1 + 1 = 2$. Wynn and others have found that infants seem to have some primitive grasp of simple addition and subtraction.

Source: Adapted from Wynn, K. (1992). Addition and subtraction by human infants. *Nature*, 358, 749–750. Copyright © 1992 Macmillan Magazines, Ltd. Reprinted with permission.

long to sensible categories, such as foods, animals, and vehicles (Quinn & Eimas, 1996, 1998).

In this line of research, perhaps the most stunning discovery has been the finding that *infants seem to be able to add and subtract small numbers* (Bremner, 2001). Karen Wynn (1992, 1996) has conducted some groundbreaking studies of infants' numerical abilities. She demonstrated that if 5-month-old infants are shown a sequence of events in which one object is added to another behind a screen, they expect to see two objects when the screen is removed (see **Figure 11.15**). And they exhibit surprise—in the form of longer looking—when their expectation is violated. This finding suggested that the infants understood that $1 + 1 = 2$. Similar manipulations in subsequent studies suggested that infants also understand that $2 - 1 = 1$, that $2 + 1 = 3$, and that $3 - 1 = 2$ (Hauser & Carey, 1998; Wynn, 1998). Thus, Wynn concluded that infants have a primitive “number sense.” However, skeptics raised some questions about the interpretation of these surprising findings, which brings us to our Featured Study for this chapter.

FEATURED Study

Source: McCrink, K., & Wynn, K. (2004). Large-number addition and subtraction by 9-month-old infants. *Psychological Science*, 15, 776–81.



KAREN WYNN

“Human infants are able to represent and reason about number. . . . humans possess a mental ‘number mechanism,’ designed through natural selection.”

Can Infants Do Arithmetic?

Critics of Wynn's previous research argued that alternative explanations could account for her findings. Specifically, they suggested that infants' surprise in response to incorrect numerical outcomes could reflect the operation of a simple object-tracking system rather than a capacity to work with numbers (Simon, 1997; Trick & Pylyshyn, 1994). According to this view, infants attempt to keep track of objects in their view; they look longer at incorrect outcomes because these outcomes produce a mismatch between the “object files” they stored in memory and the objects presented visually. In other words, their surprise does not mean that they are doing arithmetic. In the present study, McCrink and Wynn set out to conduct an experiment that might rule out this potentially plausible explanation for earlier findings. They note that research on infants' object tracking capabilities indicates that they are only able to track a maximum of four objects simultaneously. So, the object tracking explanation is plausible when problems involve four or fewer elements, as in previous research, but it would not be a viable alternative explanation if earlier findings could be replicated with larger numbers. Thus, the present study tested the hypothesis that infants would look longer at wrong outcomes for the arithmetic operations of $5 + 5$ and $10 - 5$.

Method

Participants. The final sample consisted of twenty-six 9-month-old infants (13 males and 13 females) whose

parents responded to recruitment efforts in the southeastern Connecticut area. Some additional infants were tested but had to be excluded because they were too fussy or uncooperative to complete the experiment. Half of the subjects were presented with an addition problem ($5 + 5$) and the other half were presented with a subtraction problem ($10 - 5$).

Procedure. The infants sat in a carseat in front of a computer monitor with a parent present, but the parent was facing away from the computer. The numerical scenarios were presented on the computer screen. A small curtain was lowered to block the infant's view of the computer at the end of each trial and raised to begin the next trial. A hidden observer monitored how long the infants looked when the final outcomes in the numerical sequences were revealed.

Materials. In the addition scenario, five rectangles were dropped into view and then moved to the right side of the screen where they were covered by a panel that rose up from the bottom. Then five more rectangles dropped into view and migrated behind the panel. Finally, the panel moved downward to reveal either 10 rectangles (the correct outcome) or only 5 rectangles (the incorrect outcome). In the subtraction scenario, 10 rectangles dropped into view and moved behind the panel. Then 5 rectangles moved out from behind the panel and migrated off the screen. Finally, the panel moved downward to reveal either 10 rectangles (the incorrect outcome) or 5 rectangles (the correct outcome).

Results

The infants who saw the addition operation looked longer at the wrong outcome (mean = 10.28 seconds) than right outcome (mean = 7.35 seconds). Likewise, the subjects who viewed the subtraction sequence looked at the wrong outcome longer than the right outcome, although the difference was not as large as in the addition scenario (see **Figure 11.16**).

Discussion

The results suggest that 9-month-old infants have some understanding that $5 + 5 = 10$ and that $10 - 5 = 5$. Given the larger size of these numbers (in comparison to previous research), these results cannot be attributed to the operation of infants' object tracking system. Hence, the authors conclude that the infants "were performing numerical computations." They also note that their findings support the idea that the human brain may have an innate ability to work with numbers.

Comment

This study was featured primarily because the results border on amazing. Prior to Wynn's breakthrough research in the 1990s, few scientists would have given any credence to the hypothesis that infants could understand mathematical operations that would make a kin-

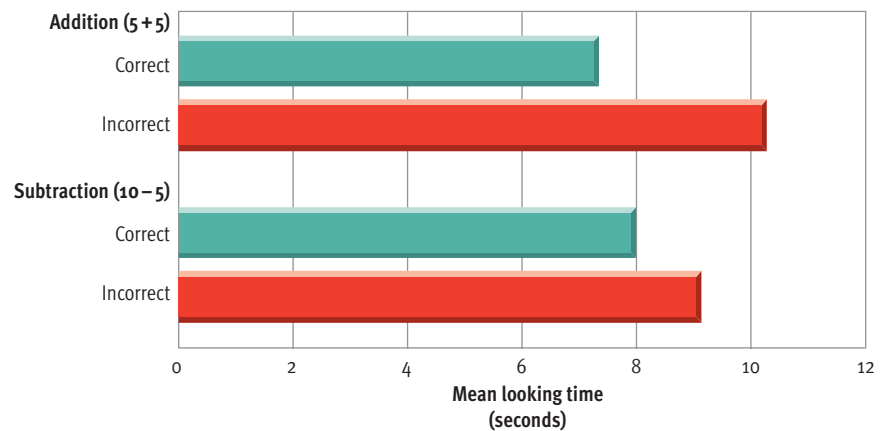


Figure 11.16

Mean looking time for correct and incorrect numerical operations. As predicted, 9-month-old infants shown correct and incorrect numerical operations looked longer at incorrect outcomes, suggesting that they were surprised by the wrong outcomes. (Data from McCrink & Wynn, 2004)

dergartner proud. The study also illustrates the typical ebb and flow of scientific progress, which often involves someone reporting an interesting finding, only to have its meaning challenged by a skeptic who suggests an alternative explanation, which leads to further research that pits the competing explanations against each other.

Again and again in recent years, research has shown that infants appear to understand surprisingly complex concepts that they have had virtually no opportunity to learn about. These findings have led some theorists to conclude that certain basic cognitive abilities are biologically built into humans' neural architecture. The theorists who have reached this conclusion tend to fall into two camps: nativists and evolutionary theorists. The *nativists* simply assert that humans are prewired to readily understand certain concepts without making any assumptions about *why* humans are prewired in these ways (Spelke, 1994; Spelke & Newport, 1998). Their principal interest is to sort out the complex matter of what is prewired and what isn't.

Evolutionary theorists agree with the nativists that humans are prewired for certain cognitive abilities, but they are keenly interested in *why*. As you might expect, they maintain that this wiring is a product of natural selection, and they strive to understand its adaptive significance (Hauser & Carey, 1998; Wynn, 1998). For example, evolutionary theorists are interested in how basic addition-subtraction abilities may have enhanced our hominid ancestors' success in hunting, foraging, and social bargaining. The evolutionary theorists also argue that the findings on infants' surprising abilities support their view that *the*

human mind is modular—that it is made up of domain-specific modules that have been crafted by natural selection to solve specific adaptive problems, such as recognizing faces, discriminating simple speech sounds, and understanding basic properties of objects (Gelman & Williams, 1998; Leslie, 1994).

The Development of Moral Reasoning



In Europe, a woman was near death from cancer. One drug might save her, a form of radium that a druggist in the same town had recently discovered. The druggist was charging \$2,000, ten times what the drug cost him to make. The sick woman's husband, Heinz, went to everyone he knew to borrow the money, but he could only get together about half of what it cost. He told the druggist that his wife was dying and asked him to sell it cheaper or let him pay later. But the druggist said, "No." The husband got desperate and broke into the man's store to steal the drug for his wife. Should the husband have done that? Why? (Kohlberg, 1969, p. 379)

What's your answer to Heinz's dilemma? Would you have answered the same way three years ago? In the fifth grade? Can you guess what you might have said at age 6? By presenting similar dilemmas to sub-

Web Link 11.4



National Parent Information Network (NPIN)

Parents are faced with all sorts of questions about development; the NPIN site describes many guides to online and other resources for answering those questions.



LAWRENCE KOHLBERG

"Children are almost as likely to reject moral reasoning beneath their level as to fail to assimilate reasoning too far above their level."

jects and studying their responses, Lawrence Kohlberg (1976, 1984; Colby & Kohlberg, 1987) devised a model of how moral reasoning develops. What is morality? That's a complicated question that philosophers have debated for centuries. For our purposes, it will suffice to say that *morality* involves the ability to discern right from wrong and to behave accordingly.

Kohlberg's Stage Theory



Kohlberg's model is the most influential of a number of competing theories that attempt to explain how youngsters develop a sense of right and wrong. His work was derived from much earlier work by Jean Piaget (1932), who theorized that moral development is determined by cognitive development. By this he meant that the way individuals think out moral issues depends on their level of cognitive development. This assumption provided the springboard for Kohlberg's research.

Kohlberg's theory focuses on moral *reasoning* rather than overt *behavior*. This point is best illustrated by describing Kohlberg's method of investigation. He presented his subjects with thorny moral questions such as Heinz's dilemma. He then asked them what the actor in the dilemma should do, and more important, why. It was the *why* that interested Kohlberg. He examined the nature and progression of subjects' moral reasoning.

The result of this work is the stage theory of moral reasoning outlined in **Figure 11.17**. Kohlberg found that individuals progress through a series of three levels of moral development, each of which can be broken into two sublevels, yielding a total of six stages. Each stage represents a different approach to thinking about right and wrong.

Younger children at the *preconventional level* think in terms of external authority. Acts are wrong because they are punished or right because they lead to positive consequences. Older children who have reached

the *conventional level* of moral reasoning see rules as necessary for maintaining social order. They therefore accept these rules as their own. They "internalize" these rules not to avoid punishment but to be virtuous and win approval from others. Moral thinking at this stage is relatively inflexible. Rules are viewed as absolute guidelines that should be enforced rigidly.

During adolescence, some youngsters move on to the *postconventional level*, which involves working out a personal code of ethics. Acceptance of rules is less rigid, and moral thinking shows some flexibility. Subjects at the postconventional level allow for the possibility that someone might not comply with some of society's rules if they conflict with personal ethics. For example, subjects at this level might applaud a newspaper reporter who goes to jail rather than reveal a source of information who was promised anonymity.

Evaluating Kohlberg's Theory

How has Kohlberg's theory fared in research? The central ideas have received reasonable support. Progress in moral reasoning is indeed closely tied to cognitive development (Walker, 1988). Studies also show that youngsters generally do progress through Kohlberg's stages of moral reasoning in the order that he proposed (Walker & Taylor, 1991). Furthermore, relations between age and level of moral reasoning are in the predicted directions (Rest, 1986; Walker, 1989). Representative age trends are shown in **Figure 11.18**. As children get older, stage 1 and stage 2 reasoning declines, while stage 3 and stage 4 reasoning increases. However, there is great variation in the age at which people reach specific stages. Finally, evidence suggests that moral *reasoning* is predictive of moral *behavior*, although the association is modest (Bruggerman & Hart, 1996). That is, youngsters who are at higher stages of moral reasoning are somewhat more likely to be altruistic, conscientious, and honest than youngsters at lower stages (Fabes et al., 1999; Taylor

Figure 11.17

Kohlberg's stage theory. Kohlberg's model posits three levels of moral reasoning, each of which can be divided into two stages. This chart summarizes some of the key facets in how individuals think about right and wrong at each stage.

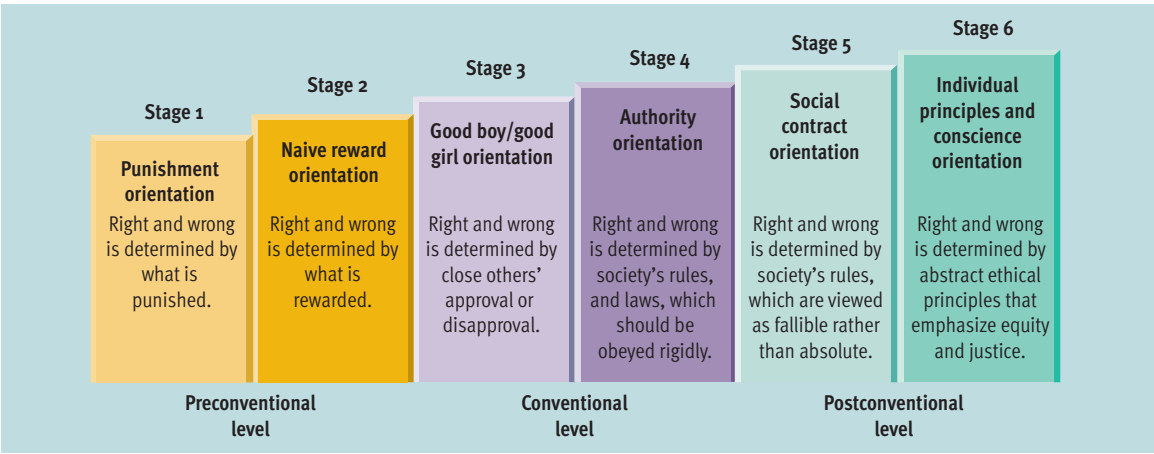


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& Walker, 1997). Although these findings support the utility of Kohlberg's model, like all influential theorists, he has his critics. They have raised the following issues:

1. It's not unusual to find that a person shows signs of several adjacent levels of moral reasoning at a particular point in development (Walker & Taylor, 1991). As we noted in the critiques of Erikson and Piaget, this mixing of stages is a problem for virtually all stage theories.

2. Researchers have focused too heavily on how people reason about the specific dilemmas devised by Kohlberg. As Wark and Krebs (1996) put it, "It is somewhat disconcerting to consider how much we have learned about people's judgments about Heinz

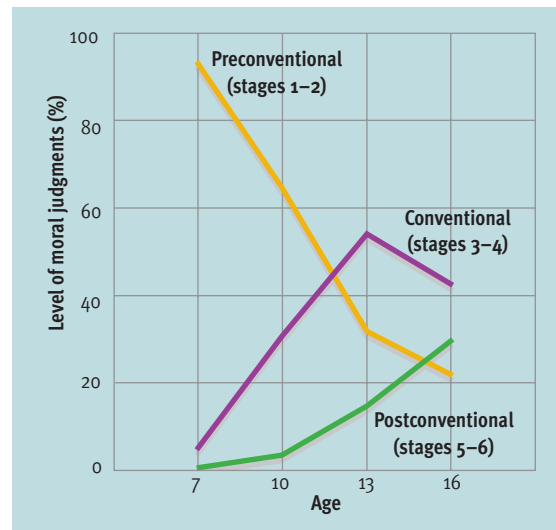


Figure 11.18
Age and moral reasoning. The percentages of different types of moral judgments made by subjects at various ages are graphed here (based on Kohlberg, 1963, 1969). As predicted, preconventional reasoning declines as children mature, conventional reasoning increases during middle childhood, and postconventional reasoning begins to emerge during adolescence. But at each age, children display a mixture of various levels of moral reasoning.

concept check 11.3



Analyzing Moral Reasoning

Check your understanding of Kohlberg's theory of moral development by analyzing hypothetical responses to the following moral dilemma.

A midwest biologist has conducted numerous studies demonstrating that simple organisms such as worms and paramecia can learn through conditioning. It occurs to her that perhaps she could condition fertilized human ova, to provide a dramatic demonstration that abortions destroy adaptable, living human organisms. This possibility appeals to her, as she is ardently opposed to abortion. However, there is no way to conduct the necessary research on human ova without sacrificing the lives of potential human beings. She desperately wants to conduct the research, but obviously, the sacrifice of human ova is fundamentally incompatible with her belief in the sanctity of human life. What should she do? Why? [Submitted by a student (age 13) to Professor Barbara Banas at Monroe Community College]

In the spaces on the left of each numbered response, indicate the level of moral reasoning shown, choosing from the following: (a) preconventional level, (b) conventional level, or (c) postconventional level. The answers are in Appendix A.

- _____ 1. She should do the research. Although it's wrong to kill, there's a greater good that can be realized through the research.
- _____ 2. She shouldn't do the research because people will think that she's a hypocrite and condemn her.
- _____ 3. She should do the research because she may become rich and famous as a result.

and his dilemma, and how little we have learned about real-life moral judgment” (pp. 220–221).

3. Sizable cultural disparities have been found in people’s progress through Kohlberg’s stages (Miller, 2001). Values vary from one culture to another and evidence is mounting that Kohlberg’s dilemmas may not be valid indicators of moral development in some cultures (Nucci, 2002).

➤ REVIEW OF KEY POINTS

- According to Piaget’s theory of cognitive development, the key advance during the sensorimotor period is the child’s gradual recognition of the permanence of objects. The pre-operational period is marked by certain deficiencies in thinking—notably, centration, irreversibility, and egocentrism.
- During the concrete operations period, children develop the ability to perform operations on mental representations, making them capable of conservation and hierarchical classification. The stage of formal operations ushers in more abstract, systematic, and logical thought.
- Piaget may have underestimated some aspects of children’s cognitive development, and his theory, like other stage theories, does not explain individual differences very well. Nonetheless, his work has greatly improved psychology’s understanding of cognitive development.
- Vygotsky’s sociocultural theory maintains that children’s cognitive development is fueled by social interactions with parents and others. Vygotsky argued that language is central to cognitive development and that culture exerts great influence over how cognitive growth unfolds.
- Recent research has shown that infants appear to understand surprisingly complex concepts that they have had virtually no opportunity to learn about. For example, the Featured Study showed that infants can add and subtract small numbers. Findings such as these have led some theorists to conclude that basic cognitive abilities are biologically built into humans’ neural architecture.
- According to Kohlberg, moral reasoning progresses through six stages that are related to age and determined by cognitive development. Age-related progress in moral reasoning has been found in research, although a great deal of overlap occurs between adjacent stages.

➤ The Transition of Adolescence

PREVIEW QUESTIONS

- When do children reach pubescence and puberty?
- What changes do these landmarks bring?
- What have neuroscientists learned about the adolescent brain?
- Does the empirical evidence support the notion that adolescence is a time of great turmoil?
- What is the chief challenge of adolescence, according to Erikson?
- What are Marcia’s four identity statuses?

Adolescence is a transitional period between childhood and adulthood. Its age boundaries are not exact, but in our society adolescence begins at around age 13 and ends at about age 22. Although most contemporary societies have at least a brief period of adolescence, it has *not* been universal historically or across cultures (Larson & Wilson, 2004; Schlegel & Barry, 1991). In some societies, young people used to move directly from childhood to adulthood. A protracted period of adolescence emerged in conjunction with industrialization. In modern societies, rapid technological progress made lengthy education, and therefore prolonged economic dependence, the norm. Thus, in our own culture high school and college students often have a “marginal” status. They are capable of reproduction and so are physiologically mature. Yet they have not achieved the emotional and economic independence from their parents that are the hallmarks of adulthood. Let’s begin our discussion of adolescent development with its most visible aspect: the physical changes that transform the body of a child into that of an adult.

Physiological and Neural Changes

Recall for a moment your junior high school days. Didn’t it seem that your body grew so fast about this time that your clothes just couldn’t “keep up”? This phase of rapid growth in height and weight is called the *adolescent growth spurt*. Brought on by hormonal

changes, it typically starts at about 10 years of age in girls and about two years later in boys (Archibald, Graber, & Brooks-Dunn, 2003). Scientists are not sure about what triggers the hormonal changes that underlie the adolescent growth spurt, but recent evidence suggests that rising levels of *leptin*, the recently discovered hormone that reflects the body’s fat cell storage (see Chapter 10), may play a role (Spear, 2000).

The term **pubescence** is used to describe the two-year span preceding puberty during which the changes leading to physical and sexual maturity take place. In addition to growing taller and heavier during pubescence, children begin to develop the physical features that characterize adults of their respective sexes. These features are termed **secondary sex characteristics**—physical features that distinguish one sex from the other but that are not essential for reproduction. For example, males go through a voice change, develop facial hair, and experience greater skeletal and muscle growth in the upper torso, leading to broader shoulders (see Figure 11.19). Females experience breast growth and a widening of the pelvic bones plus increased fat deposits in this area, resulting in wider hips (Susman & Rogol, 2004).

Note, however, that the capacity to reproduce is not attained in pubescence. This comes later. **Puberty** is the stage during which sexual functions reach maturity, which marks the beginning of adolescence. It is during puberty that the **primary sex characteristics**—the structures necessary for reproduction—develop fully. In the male these include the

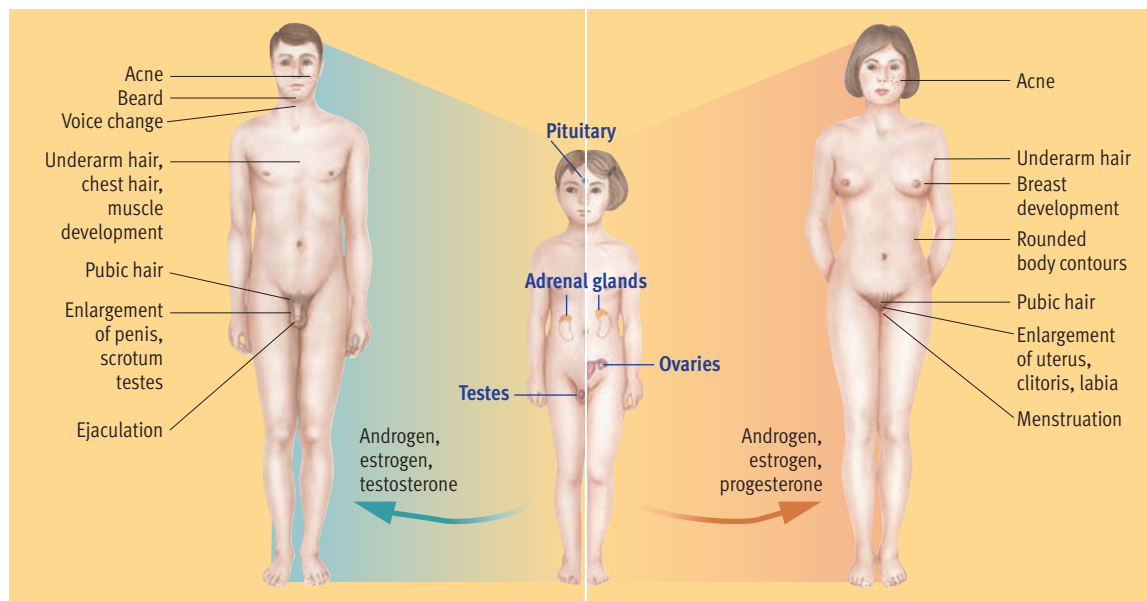


Figure 11.19
Physical development at puberty. Hormonal changes during puberty lead not only to a growth spurt but also to the development of secondary sex characteristics. The pituitary gland sends signals to the adrenal glands and gonads (ovaries and testes), which secrete hormones responsible for various physical changes that differentiate males and females.

testes, penis, and related internal structures. In the female they include the ovaries, vagina, uterus, and other internal structures.

In females, the onset of puberty is typically signaled by **menarche—the first occurrence of menstruation**, which reflects the culmination of a series of hormonal changes (Dorn et al., 1999). American girls typically reach menarche at ages 12–13, with further sexual maturation continuing until approximately age 16 (Susman, Dorn, & Schiefelbein, 2003). American boys typically experience **spermarche—the first occurrence of ejaculation**, at ages 13–14, with further sexual maturation continuing until approximately 18 (Archibald et al., 2003). Interestingly, *generational* changes have occurred in the timing of puberty for females. Today's adolescent girls begin puberty at a younger age, and complete it more rapidly, than their counterparts in earlier generations (Anderson, Dallal, & Must, 2003; Fredriks et al., 2000). The factors underlying this trend and the reasons it has only been seen in females have scientists perplexed (Archibald et al., 2003), as the most obvious potential causes—improvements in nutrition and medical care—should apply equally to males and females.

The timing of puberty varies from one adolescent to the next over a range of about 5 years (10–15 for girls, 11–16 for boys). Generally, *girls who mature early and boys who mature late seem to experience more subjective distress and emotional difficulty with the transition to adolescence* (Susman et al., 2003). However, in both males and females, early maturation is associated with greater use of alcohol and drugs, more high-risk behavior, and more trouble with the law (Steinberg & Morris, 2001). Among females, early maturation is also correlated with earlier experience of intercourse,

more unwanted pregnancies, a greater risk for eating problems, and a variety of psychological disorders (Archibald et al., 2003). Thus, we might speculate that early maturation often thrusts both sexes (but especially females) toward the adult world too soon.

Recent years have brought significant advances in the study of adolescents' neural development. The size of the human brain does not increase significantly after age 5 (Durstun et al., 2001). Given this fact, it was widely assumed until recently that the brain did not undergo much development after middle childhood. However, the increased availability of MRI scans, which can provide exquisitely detailed images of the brain, has permitted neuroscientists to conduct entirely new investigations of whether there are age-related changes in brain structure. These studies have uncovered some interesting developmental trends during adolescence. For example, the volume of white matter in the brain grows throughout adolescence (Schmithorst et al., 2002). This means that *neurons are becoming more myelinated* (see Chapter 3), which presumably leads to enhanced conductivity and connec-



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The timing of sexual maturation can have important implications for adolescents. Youngsters who mature unusually early or unusually late often feel uneasy about this transition.

Web Link 11.5



Adolescence Directory OnLine
Browsers visiting this site hosted by the University of Indiana will find guides to resources about adolescence that cover many of the health, mental health, safety, personal, and parenting issues important to this phase of development.

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tivity in the brain. In contrast, gray matter decreases in volume (Sowell et al., 2002). This finding is thought to reflect the process of *synaptic pruning*—the elimination of less-active synapses—which plays a key role in the formation of neural networks (see Chapter 3).

Perhaps the most interesting discovery about the adolescent brain has been that increased myelination and synaptic pruning are most pronounced in the *prefrontal cortex* (Keating, 2004). Thus, *the prefrontal cortex appears to be the last area of the brain to fully mature*, and this maturation is not complete until late adolescence or early adulthood (see **Figure 11.20**). Much has been made of this finding, because the prefrontal cortex has been characterized as an “executive control center” that is crucial to high-level cognitive functions, such as planning, organization, emotional regulation, and response inhibition (Nelson et al., 2002). Theorists have suggested that immaturity of the prefrontal cortex may explain why risky behavior (such as reckless driving, experimentation with drugs, dangerous stunts, unprotected sex, and so forth) peaks during adolescence (Compas, 2004; Dahl, 2003). This conclusion is speculative, but it has become clear that the brain continues to mature during the adolescent years.

Time of Turmoil?

Back around the beginning of the 20th century, G. Stanley Hall (1904), one of psychology’s great pi-

oneers (see Chapter 1), proposed that the adolescent years are characterized by convulsive instability and disturbing inner turmoil. Hall attributed this turmoil to adolescents’ erratic physical changes and resultant confusion about self-image. Over the decades, several theorists have agreed with Hall’s characterization of adolescence as a stormy period.

Statistics on *adolescent suicide* would seem to support the idea that adolescence is a time marked by turmoil, but the figures can be interpreted in various ways. On the one hand, suicide rates among adolescents have risen alarmingly in recent decades. On the other hand, even with this steep increase, suicide rates for adolescents are a little lower than those for older age groups (see **Figure 11.21**). Actually, the suicide crisis among teenagers involves *attempted* suicide more than *completed* suicide. It is difficult to compile accurate data on suicide attempts (which are often covered up), but experts estimate that when all age groups are lumped together, suicide attempts outnumber actual suicidal deaths by a ratio of at least 8 to 1 and perhaps as high as 25 to 1. However, this ratio of attempted to completed suicides is much higher for adolescents and is estimated to range anywhere from 100:1 to 200:1 (Maris, Berman, & Silverman, 2000). Thus, attempted suicide is a major problem during adolescence. About 2% of adolescent males and about 5% of adolescent females attempt suicide each year in the United States (Blum & Rinehart, 2000). Although adolescent girls *attempt* suicide more often than adolescent boys, completed suicide rates are almost six times higher for boys (Serocynski, Jacquez, & Cole, 2003).

In recent years, the highly publicized problem of *adolescent violence* has led many people to conclude that adolescence is indeed a time of turmoil. The tragic shootings at Columbine High School and similar incidents at other schools have created the impression that disaffected teenagers are running amok and that schools are perilous combat zones. As we saw with adolescent suicide, the data on adolescent

Figure 11.20

The prefrontal cortex.

Recent research suggests that neural development continues throughout adolescence. Moreover, the chief site for much of this development is the prefrontal cortex, which appears to be the last area of the brain to mature fully. This discovery may have fascinating implications for understanding the adolescent brain, as the prefrontal cortex appears to play a key role in emotional regulation and self-control.



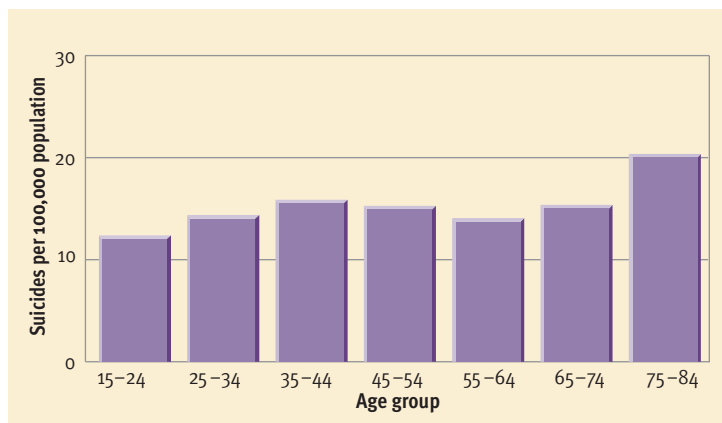


Figure 11.21

Suicide rates by age. Although suicide rates for adolescents have increased dramatically in recent decades, the suicide rates for this age group remain lower than suicide rates for older age groups. (Source: Centers for Disease Control and Prevention)

violence can be viewed in different ways. Arrest rates for violent crimes (assault, rape, robbery, and murder) *do* climb through the adolescent years until age 18 and then gradually decline (see **Figure 11.22**). And youngsters under the age of 18 accounted for 27% of the arrests for serious crimes in the United States in 1999 (Federal Bureau of Investigation, 1999). So, there is a distressing association between adolescence and the prevalence of violent crime.

That said, the vast majority of this violence occurs in settings outside of school. The perception that school shootings are common and rapidly increasing is not accurate. The incidence of school violence has been stable since the late 1980s, and violent deaths at school remain infrequent (Mulvey & Cauffman, 2001). Less than 1% of homicides and suicides among school-aged children occur at school, and most youngsters are much safer in their schools than they are on the way to or from their schools. Parents and school authorities grossly overestimate the likelihood of shootings at school because of all the media coverage these tragic events have (understandably) garnered. Despite a public outcry for efforts to identify adolescents who are likely to lash out with violence at school, the offenders do not have any unique characteristics that would permit reliable prediction of these rare outbursts of violence (Steinberg, 2000). That's not to say that nothing can be done in the way of psychological interventions. Programs that strive to reduce student alienation and foster healthy, supportive school environments appear to have some value in reducing school violence (Franke, 2000; Howard, Flora, & Griffin, 1999). But programs designed to single out perpetrators in advance who have not made any overt threats are doomed to failure (Mulvey & Cauffman, 2001).

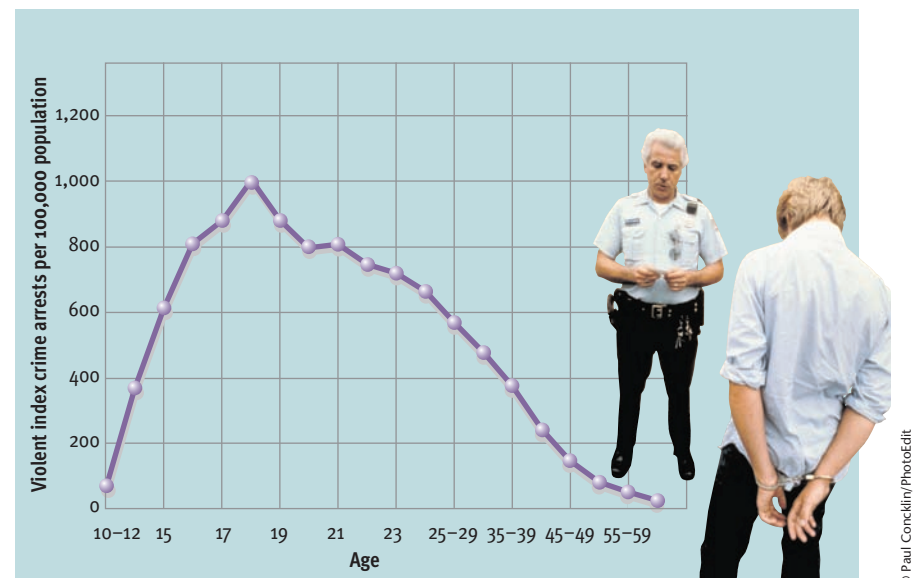
Returning to our original question, does the weight of evidence support the idea that adolescence is usually a period of turmoil and turbulence? Overall, the consensus of the experts seems to be that adolescence is *not* an exceptionally difficult period (Petersen et al.,

1993; Steinberg & Levine, 1997). However, in a recent reanalysis of the evidence, Jeffrey Arnett (1999) has argued convincingly that “not all adolescents experience storm and stress, but storm and stress is more likely during adolescence than at other ages” (p. 317). Arnett supports his intermediate position by summarizing research on adolescents’ moods, risky behaviors, and conflicts with their parents. Research shows that adolescents do experience more volatile and more negative emotions than their parents or younger children do (Larson & Richards, 1994). Studies also show that various types of risky behavior, such as substance abuse, careless sexual practices, and dangerous driving peak during late adolescence (Arnett, 1992, 1995). Finally, adolescence *does* bring an increase in parent-child conflicts (Laursen, Coy, & Collins, 1998). Arnett is quick to emphasize that turmoil in adolescence is far from universal, but he maintains that, on the average, adolescence is somewhat more stressful than other developmental periods.

Although turbulence and turmoil are not *universal* features of adolescence, challenging adaptations

Figure 11.22

Age and violent crime. FBI statistics for the United States show a substantial relationship between age and the likelihood of being arrested for a violent crime. As you can see, the prevalence of violent criminal activity definitely peaks in adolescence and then declines throughout adulthood. (Data based on FBI *Uniform Crime Reports for the United States*, 1999)





Adolescent Health and Mental Health
This site on issues related to adolescence is edited by Michael Fenichel, a prominent psychologist interested in using the Internet to distribute quality professional information to the public.

do have to be made during this period. In particular, most adolescents struggle to some extent in their effort to achieve a sound sense of identity.

The Search for Identity

Erik Erikson was especially interested in personality development during adolescence, which is the fifth of the eight major life stages he described. The psychosocial crisis during this stage pits *identity* against *confusion*. According to Erikson (1968), the premier challenge of adolescence is the struggle to form a clear sense of identity. This struggle involves working out a stable concept of oneself as a unique individual and embracing an ideology or system of values that provides a sense of direction. In Erikson’s view, adolescents grapple with questions such as “Who am I, and where am I going in life?”

Erikson recognized that the process of identity formation begins before adolescence and often extends beyond it, as his own life illustrates (Coles, 1970; Roazen, 1976). Erikson’s mother, who was Jewish, was abandoned by his Danish father before Erik’s birth in 1902 in Germany. Within a few years, his mother married a Jewish doctor and the two of them raised Erik in the Jewish faith as Erik Homburger. Erik was viewed as a Jew by his schoolmates, but he was viewed as a gentile at his temple because of his decidedly Scandinavian appearance. Thus, Erikson struggled with identity confusion early in life.

During adolescence Erikson began to resist family pressures to study medicine. Instead, he wandered about Europe until he was 25, trying to “find himself” as an artist. His interest in psychoanalysis was sparked by an introduction to Sigmund Freud’s youngest daughter, Anna, a pioneer of child psychoanalysis. After his psychoanalytic training, he moved to the United States. When he became a naturalized citizen in 1939, he changed his surname from Homburger to Erikson. Clearly, Erikson was struggling with the ques-

tion of “Who am I?” well into adulthood. Small wonder, then, that he focused a great deal of attention on identity formation.

Although the struggle for a sense of identity is a lifelong process (Waterman & Archer, 1990), it does tend to be especially intense during adolescence. Adolescents deal with identity formation in a variety of ways. According to James Marcia (1966, 1980, 1994), the presence or absence of a sense of commitment (to life goals and values) and a sense of crisis (active questioning and exploration) can combine to produce four different *identity statuses* (see **Figure 11.23**). These are not stages that people pass through, but orientations that may occur at a particular time. In order of increasing maturity, Marcia’s four identity statuses are as follows (Meeus, 1996).

- *Identity diffusion* is a state of rudderless apathy. Some people simply refuse to confront the challenge of charting a life course and committing to an ideology. Although this stance allows them to evade the crisis of identity, the lack of direction can become problematic, as people in this status exhibit more social and psychological problems than others (Adams, Gullotta, & Montemayor, 1992).
- *Identity foreclosure* is a premature commitment to visions, values, and roles—typically those prescribed by one’s parents. This path allows a person to circumvent much of the struggle for an identity. However, foreclosure is associated with attachment-related anxiety, conformity, and not being very open to new experiences (Kroger, 2003).
- An *identity moratorium* involves delaying commitment for a while to experiment with alternative ideologies and careers. Such experimentation can be valuable. Unfortunately, some people remain indefinitely in what should be a temporary phase. Identity moratorium is associated with self-doubt and confusion (Flum, 1994).
- *Identity achievement* involves arriving at a sense of self and direction after some consideration of alternative possibilities. Commitments have the strength of some conviction, although they’re not absolutely irrevocable. Identity achievement is associated with higher self-esteem, conscientiousness, security, achievement motivation, and capacity for intimacy (Kroger, 2003).

Age trends in identity status are depicted in **Figure 11.24**. Consistent with Marcia’s theory, identity moratorium and achievement increase with age while identity diffusion and foreclosure decline (Meuus et al., 1999). Although the age trends seen in **Figure 11.24** make sense, they mask the extent to which a sizable majority of adolescents shift back and forth

Figure 11.23
Marcia’s four identity statuses. According to Marcia (1980), the occurrence of identity crisis and exploration and the development of personal commitments can combine into four possible identity statuses, as shown in this diagram. The progressively darker shades of blue signify progressively more mature identity statuses.

Source: Adapted from Marcia, J. E. (1980). Identity in adolescence. In J. Adelson (Ed.), *Handbook of adolescent psychology* (pp. 159–210). New York: John Wiley. Copyright © 1980 by John Wiley. Adapted by permission.

		Crisis	
		Present	Absent
Commitment	Present	Identity achievement (successful achievement of a sense of identity)	Identity foreclosure (unquestioning adoption of parental or societal values)
	Absent	Identity moratorium (active struggling for a sense of identity)	Identity diffusion (absence of struggle for identity, with no obvious concern about it)

among the four identity statuses (Berzonsky & Adams, 1999). Moreover, people tend to reach identity achievement at later ages than originally envisioned by Marcia. By late adolescence, only a small minority of individuals have reached identity achievement, so the struggle for a sense of identity routinely extends into young adulthood.

➤ REVIEW OF KEY POINTS

- The growth spurt at puberty is a prominent event involving the development of reproductive maturity and secondary sex characteristics. Early sexual maturation is associated with a variety of problems, especially among females. The prefrontal cortex appears to be the last area of the brain to mature fully.
- Adolescent suicide rates have climbed dramatically in recent decades, and attempted suicides have increased even more. Although school shootings remain rare, there is an association between adolescence and the prevalence of violent crime. Most theorists do not view adolescence as a time of turmoil, but Arnett argues that adolescence is slightly more stressful than other periods of life.
- According to Erikson, the key challenge of adolescence is to make some progress toward a sense of identity. Marcia identified four patterns of identity formation: foreclosure, moratorium, identity diffusion, and identity achievement.

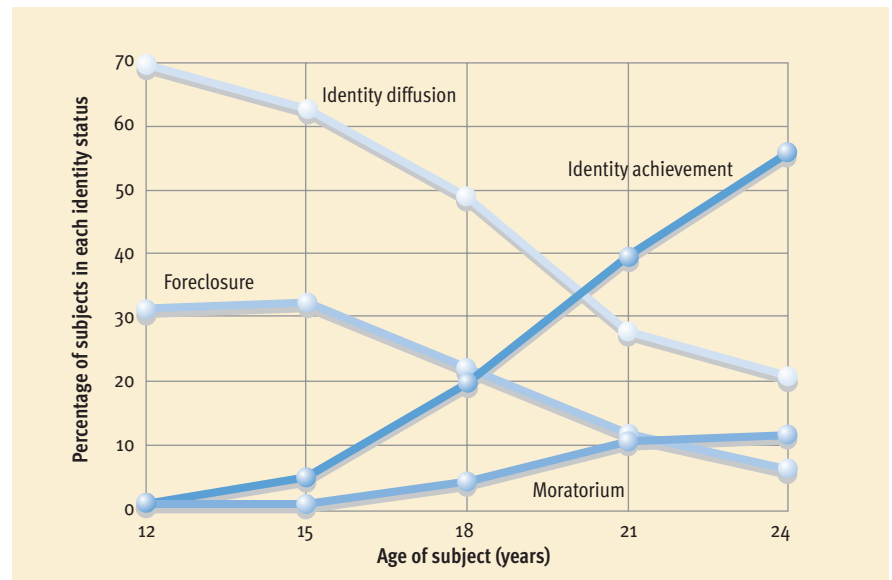


Figure 11.24

Age and identity status. These data from Meilman (1979) summarize the relationship between age and Marcia's (1980) identity statuses. The less mature statuses (diffusion and foreclosure) become less common as people move into young adulthood, and the more mature statuses (moratorium and identity achievement) become more common. As you can see, at age 18, relatively few people have reached identity achievement.

Source: Adapted from Meilman, P. W. (1979). Cross-sectional age changes in ego identity status during adolescence. *Developmental Psychology*, 15, 230–231. Copyright © 1979 by the American Psychological Association. Reprinted by permission of the author.

➤ The Expanse of Adulthood

The concept of development was once associated almost exclusively with childhood and adolescence, but today development is more commonly seen as a life-long journey. The life-span approach to development assumes that important changes occur throughout the life cycle. Recent years have also brought increasing recognition that the historical context people live in can have profound impact on their developmental trajectories. As Stewart and Ostrove (1998) put it, "It makes sense that generations raised with different expectations and in different historical circumstances may age differently" (p. 1185). Events such as the Great Depression, the Vietnam war, the women's movement, the AIDS epidemic, the emergence of television, and the rise of the Internet can leave a lasting mark on the people exposed to them. Complicating the picture further, developmental patterns are becoming increasingly diverse. The boundaries between young, middle, and late adulthood are becoming blurred as more and more people have children later than one is "supposed" to, retire earlier than one is "supposed" to and so forth. In the upcoming pages we will look at some of the major developmen-

tal transitions in adult life, but you should bear in mind that in adulthood (even more so than childhood or adolescence) there are many divergent pathways and timetables.

Personality Development



In recent years, research on adult personality development has been dominated by one key question: How stable is personality over the life span? We'll look at this issue, the question of the midlife crisis, and Erikson's view of adulthood in our discussion of personality development in the adult years.

The Question of Stability

At midlife, Jerry Rubin went from being an outraged, radical political activist to being a subdued, conventional Wall Street businessman. His transformation illustrates that major personality changes sometimes occur during adulthood. But how common are such changes? Is a grouchy 20-year-old going to be a grouchy 40-year-old and a grouchy 65-year-

PREVIEW QUESTIONS

- How stable is personality over the life span?
- How did Erikson describe adult development?
- How does marital satisfaction tend to evolve over the life span?
- How difficult are the transitions to parenthood and the empty nest?
- What kinds of physical changes occur in middle and late adulthood?
- What is dementia, and what is its chief cause in old age?
- How well do intelligence and memory hold up in middle and late adulthood?

old? Or can the grouchy young adult become a mellow senior citizen?

After tracking subjects through adulthood, many researchers have been impressed by the amount of change observed. Roger Gould (1975) studied two samples of men and women and concluded that “the evolution of a personality continues through the fifth decade of life.” After studying development between the ages of 20 and 42, Whitbourne and her colleagues (1992) reported “consistent patterns of personality change.” In a long-running study that has followed participants from their 20s through their 70s, Helson, Jones, and Kwan (2002) found “evidence that personality changes in general ways over time.”

In contrast, many other researchers have been struck by the stability and durability they have found in personality. The general conclusion that emerged from several longitudinal studies using objective assessments of personality traits was that personality tends to be quite stable over periods of 20 to 40 years (Caspi & Herbener, 1990; Costa & McCrae, 1994, 1997). A review of 150 relevant studies, involving almost 50,000 participants, concluded that personality in early adulthood is a good predictor of personality in late adulthood and that the stability of personality increases with age up to about age 50 (Roberts & DelVecchio, 2000). Moreover, correlations computed between personality measures administered many years apart often yield figures in the .70s, which are regarded as remarkably high (McCrae & Costa, 2003).

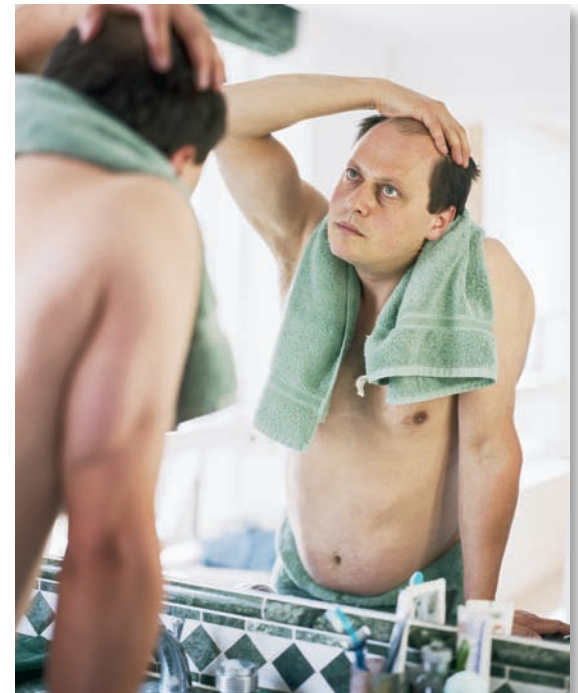
Clearly, researchers assessing the stability of personality in adulthood have reached very different conclusions. How can these contradictory conclusions be reconciled? It appears that *both* conclusions are accurate, they just reflect different ways of looking at the data (Bertrand & Lachman, 2003). Recall from Chapter 9 that psychological test scores are *relative* measures—they show how one scores *relative to other people*. Raw scores are converted into *percentile scores* that indicate the precise degree to which one is above or below average on a particular trait. The data indicate that these percentile scores tend to be remarkably stable over lengthy spans of time—people’s relative standing doesn’t tend to change much. However, if we examine participants’ raw scores, we can see some meaningful developmental trends. For example, adults’ average scores on extraversion, neuroticism, and openness to experience tend to decline moderately with increasing age, while measures of agreeableness and conscientiousness tend to increase (Bertrand & Lachman, 2003; Caspi, Roberts, & Shiner, 2005). In sum, it appears that personality in adulthood is characterized by *both* stability and change.

The Question of the Midlife Crisis

Debate has been spirited about whether most people go through a *midlife crisis*—a **difficult, turbulent period of doubts and reappraisal of one’s life**. The two most influential studies of adult development in the 1970s (Gould, 1978; Levinson et al., 1978) both concluded that a midlife crisis is a normal transition experienced around the age of 40 by a majority of people. However, numerous subsequent studies have failed to detect an increase in emotional turbulence at midlife (Eisler & Ragsdale, 1992; Rosenberg, Rosenberg, & Farrell, 1999).

How can we explain this discrepancy? Levinson and Gould both studied samples that were less than ideal. Levinson’s was unusually small, and Gould’s was not very representative. Moreover, both researchers depended primarily on interview and case study methods to gather their data. As we noted in Chapter 2, when knitting together impressionistic case studies, it is easy for investigators to see what they expect to see. Given that the midlife crisis has long been part of developmental folklore, Levinson and Gould may have been prone to interpret their case study data in this light (McCrae & Costa, 1984). In any case, investigators relying on more objective measures of emotional stability have found signs of midlife crises in only a small minority of subjects (Chiriboga, 1989; McCrae & Costa, 1990). Moreover, the subjec-

Do most adults go through a midlife crisis in their 40s? The research on this question is contradictory, but overall, the evidence suggests that only a minority of people in their 40s struggle with a midlife crisis.



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Web Link 11.7



Adult Development and Aging (APA Division 20) Psychological researchers interested in adulthood and aging form a distinct division with the American Psychological Association, Division 20. The division’s homepage contains a wide range of educational, instructional, and clinical resources and references for this area of concern.

tive crises reported by participants appear throughout the span of adulthood (not just around age 40) and are mostly triggered by events that are not particularly age-related, such as a divorce or job loss (Lachman, 2004). Thus, the fabled midlife crisis is not “normal” and is not even all that common.

Erikson's View of Adulthood



Insofar as personality changes during the adult years, Erik Erikson's (1963) theory offers some clues about the nature of changes people can expect. In his eight-stage model of development over the life span, Erikson divided adulthood into three stages (see again **Figure 11.11**).

Intimacy Versus Isolation. In early adulthood, the key concern is whether one can develop the capacity to share intimacy with others. Successful resolution of the challenges in this stage should promote empathy and openness, rather than shrewdness and manipulateness.

Generativity Versus Self-Absorption. In middle adulthood, the key challenge is to acquire a genuine concern for the welfare of future generations, which results in providing unselfish guidance to younger people and concern with one's legacy. Self-absorption is characterized by self-indulgent concerns with meeting one's own needs and desires.

Integrity Versus Despair. During the retirement years, the challenge is to avoid the tendency to dwell on the mistakes of the past and on one's imminent death. People need to find meaning in their lives, rather than wallow in bitterness and resentment.

Empirical research on the adult stages in Erikson's theory has been sparse, but generally supportive of the theory. For example, research by Susan Whitbourne and her colleagues (1992) suggests that personality development proceeds in an orderly sequence of stages and that favorable resolutions of psychosocial crises in earlier stages lead to more favorable outcomes in later stages. And *generativity* has proven to be a measurable trait that increases in middle age (Stewart, Ostrove, & Helson, 2001) and is related to better adjustment and higher life satisfaction (Ackerman, Zuroff, & Moskowitz, 2000; Grossbaum & Bates, 2002), as envisioned by Erikson.

Transitions in Family Life

Many of the important transitions in adulthood involve changes in family responsibilities and relation-

ships. Predictable patterns of development can be seen in families, just as they can in individuals (Carter & McGoldrick, 1988, 1999). **The family life cycle is a sequence of stages that families tend to progress through.** However, in contemporary American society, shifting social trends are altering the traditional family life cycle. In the eyes of most people, the typical American family consists of a husband and wife who have never been married to anyone else, rearing two or more children, with the man serving as the principal breadwinner and the woman filling the homemaker role (McGraw & Walker, 2004). This configuration was never as dominant as widely assumed, and today it is estimated that only a small minority of American families match this idealized image (Coontz, 2000). The increasing prevalence of people remaining single, cohabitating, getting divorced, being single parents, having stepfamilies, voluntarily remaining childless, or having children out of wedlock, and of wives and mothers working has made the traditional nuclear family a deceptive mirage that does not reflect the diversity of family life in America.

Diversity aside, everyone emerges from families, and most people go on to form their own families. However, the transitional period during which young adults are “between families” until they form a new family is being prolonged by more and more individuals. The percentage of young adults who are postponing marriage until their late twenties or early thirties has risen dramatically (Teachman, Polonko, & Scanzoni, 1999; see **Figure 11.25**). This trend is probably the result of a number of factors. Chief among them are the availability of new career options for women, increased educational requirements in the world of work, and increased emphasis on personal

Figure 11.25
Median age at first marriage. The median age at which people in the United States marry for the first time has been creeping up for both males and females since the mid-1960s. This trend indicates that more people are postponing marriage. (Data from the U.S. Bureau of the Census)

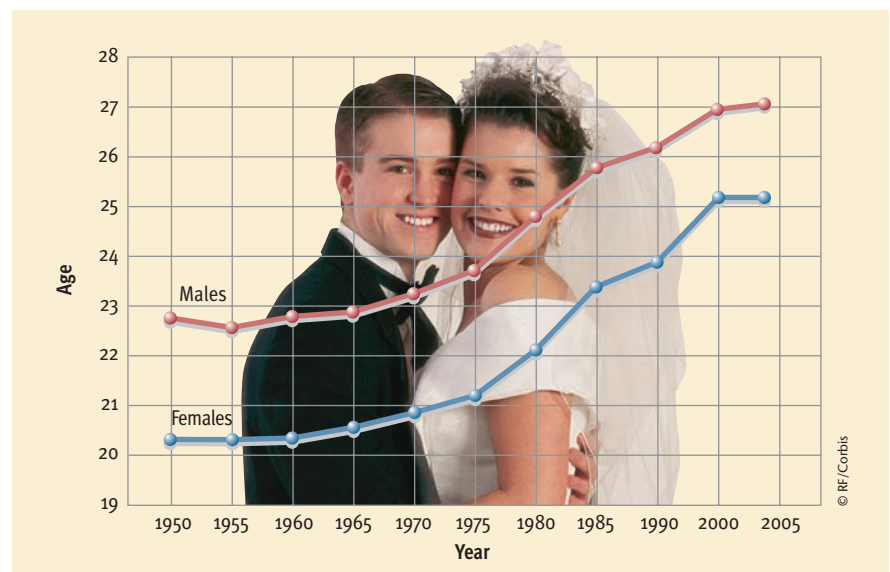


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autonomy. Remaining single is a much more acceptable option today than it was a few decades ago (DeFrain & Olson, 1999). Nonetheless, over 90% of adults eventually marry.

Adjusting to Marriage

The newly married couple usually settle into their roles as husband and wife gradually. Difficulties with this transition are more likely when spouses come into a marriage with different expectations about marital roles (Lye & Biblarz, 1993). Unfortunately, substantial differences in role expectations seem particularly likely in this era of transition in gender roles (Brewster & Padavic, 2000).

Women may be especially vulnerable to ambivalence about shifting marital roles. More and more women are aspiring to demanding careers, yet research shows that husbands' careers continue to take priority over their wives' vocational ambitions (Haas, 1999). Moreover, many husbands maintain traditional role expectations about housework, child care, and decision making. Men's contribution to housework has increased noticeably since the 1960s, as you can see in **Figure 11.26**. However, studies indicate that wives are still doing the bulk of the household chores in

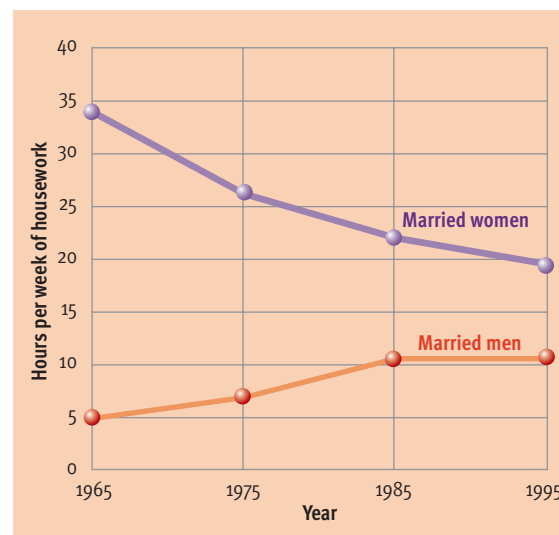
America, even when they work outside the home (Bianchi et al., 2000). Although married women perform about two-thirds of all housework, only about one-third of wives characterize their division of labor as unfair, because most women don't expect a 50-50 split (Coltrane, 2001). Research shows that women who have nontraditional attitudes about gender roles are more likely to perceive their share of housework as unfair than women with traditional attitudes (Coltrane, 2001). As you might expect, wives who perceive their housework burden to be unfair tend to report lower levels of marital satisfaction (Haas, 1999).

The prechildren phase of the family life cycle used to be rather short for most newly married couples. Traditionally, couples just *assumed* that they would proceed to have children. In recent decades, however, ambivalence about the prospect of having children has clearly increased (T. W. Smith, 1999), and the percentage of childless couples has doubled since 1960 (Bulcroft & Teachman, 2004). Hence, more and more couples are finding themselves struggling to decide *whether* to have children. Interestingly, intentions about having children are not as stable over time as one might expect. In one study that followed adult participants over a span of six years, about one-quarter of the respondents changed their plans (Heaton, Jacobson, & Holland, 1999). These subjects were almost evenly split between those who planned to remain childless but subsequently decided they wanted to have children and those who intended to have children but subsequently expressed a preference for remaining child-free.

Adjusting to Parenthood

Although an increasing number of people are choosing to remain childless, the vast majority of married couples continue to have children. Most parents are happy with their decision to have children, but the arrival of the first child represents a major transition, and the disruption of routines can be emotionally draining (Bost et al., 2002; Carter, 1999). The transition to parenthood tends to have more impact on mothers than fathers (Nomaguchi & Milkie, 2003).

Figure 11.26
Housework trends since the 1960s. As these data show, the housework gap between husbands and wives has narrowed since the 1960s. Married men have more than doubled their housework, but it is the large reduction in wives' housework that has really shrunk the housework gap. (Data from Bianchi et al., 2000)



New mothers, already physically exhausted by the birth process, are particularly prone to postpartum distress, and about 10% experience depression (Formicelli, 2001). The transition is more difficult when a wife's expectations regarding how much the father will be involved in child care are not met (Fox, Bruce, & Combs-Orme, 2000). A review of decades of research on parenthood and marital satisfaction, found that (1) parents exhibit lower marital satisfaction than comparable nonparents, (2) mothers of infants report the steepest decline in marital satisfaction, and (3) the more children couples have, the lower their marital satisfaction tends to be (Twenge, Campbell, & Foster, 2003).

Crisis during the transition to first parenthood is far from universal, however (Cox et al., 1999). Couples who have high levels of affection and commitment prior to the first child's birth are likely to maintain a stable level of satisfaction after the birth (Shapiro, Gottman, & Carrère, 2000). The key to making this transition less stressful may be to have *realistic expectations* about parental responsibilities (Belsky & Kelly, 1994). Studies find that stress is greatest in new parents who have overestimated the benefits and underestimated the costs of their new role. Interestingly, the nature of parenthood appears to be undergoing a cultural transition. Parents in more recent age cohorts tend to be more involved with and accessible to their children than previous generations (Parke, 2004).

As children grow up, parental influence over them tends to decline, and the early years of parenting—that once seemed so difficult—are often recalled with fondness. When youngsters reach adolescence and seek to establish their own identities, gradual realignments occur in parent-child relationships. On the one hand, parent-adolescent relations generally are not as bitter or contentious as widely assumed (Laursen, Coy, & Collins, 1998). On the other hand, adolescents do spend less time in family activities (Larson et al., 1996), and their closeness to their parents declines while conflicts become more frequent (Grotevant, 1997). The conflicts tend to involve everyday matters (chores and appearance) more than substantive issues (sex and drugs) (Barber, 1994). When conflicts occur, they seem to have more adverse effects on the parents than the children (Steinberg & Steinberg, 1994). Ironically, although research has shown that adolescence is not as turbulent or difficult for youngsters as once believed, their parents *are* stressed out (Steinberg, 2001).

Adjusting to the Empty Nest

When parents get all their children launched into the adult world, they find themselves faced with an “empty nest.” This period was formerly thought to

be a difficult transition for many parents, especially mothers who were familiar only with the maternal role. In recent decades, however, more women have experience with other roles outside the home. Hence, recent evidence suggests that most parents adjust effectively to the empty nest transition and are more likely to have problems if their children *return* to the once-empty nest (Blacker, 1999; Dennerstein, Dudley, & Guthrie, 2002).

Aging and Physical Changes

People obviously experience many physical changes as they progress through adulthood. In both sexes, hair tends to thin out and become gray, and many males confront receding hairlines and baldness. To the dismay of many, the proportion of body fat tends to increase with age, while the amount of muscle tissue decreases. Overall, weight tends to increase in most adults through the mid-50s, when a gradual decline may begin. These changes have little functional significance, but in our youth-oriented society, they often have an impact on self-concept, leading many people to view themselves as unattractive (Whitbourne, 1999).

In the sensory domain, the key developmental changes occur in vision and hearing. The proportion of people with 20/20 visual acuity declines with age. Farsightedness, difficulty adapting to darkness, and poor recovery from glare are common among older people (Fozard, 1990). Sensitivity to color and contrast also decline (Fozard & Gordon-Salant, 2001). Hearing sensitivity begins declining gradually in early adulthood but usually isn't noticeable until after age 50. Hearing loss tends to be greater in men than in women and for high-frequency sounds more than low-frequency sounds (Yost, 2000). These sensory losses could be problematic, but in modern society they can usually be compensated for with eyeglasses, contacts, and hearing aids.

Age-related changes also occur in hormonal functioning during adulthood. Among women, these changes lead to *menopause*. This ending of menstrual periods, accompanied by a loss of fertility, typically occurs at around age 50 (Avis, 1999). Most women experience at least some unpleasant symptoms (such as hot flashes, headaches, night sweats, mood changes), but the amount of discomfort varies considerably. Not long ago, menopause was thought to be almost universally accompanied by severe emotional strain. However, it is now clear that most women experience relatively modest psychological distress (George, 2002; Walter, 2000). Although people sometimes talk about “male menopause,” men don't really go through an equivalent experience. Starting

Web Link 11.8



USDHHS: Administration on Aging
The U.S. Department of Health and Human Services provides a content-rich site devoted to all aspects of aging; it includes one of the best available guides to online information about older Americans.

in middle age, testosterone levels *do* decline substantially (Morley, 2001), but these decreases are gradual and are not associated with a constellation of symptoms comparable to what women experience (Jacobs, 2001).

The amount of brain tissue and brain weight decline gradually after age 60 (Vinters, 2001). These trends appear to reflect both a decrease in the number of active neurons in some areas of the brain and shrinkage of still-active neurons, with neuron loss perhaps being less important than once believed (Albert & Killiany, 2001). Although this gradual loss of brain tissue sounds alarming, it is a normal part of the aging process. Its functional significance is the subject of some debate, but it doesn't appear to be a key factor in any of the age-related dementias. **A dementia is an abnormal condition marked by multiple cognitive deficits that include memory impairment.** Dementia can be caused by quite a variety of diseases, such as Alzheimer's disease, Parkinson's disease, Huntington's disease, and AIDS, to name just a few (Caine & Lyness, 2000). Because many of these diseases are more prevalent in older adults, dementia is seen in about 15%–20% of people over age 75 (Wise, Gray, & Seltzer, 1999). However, it is important to emphasize that dementia and "senility" are not part of the normal aging process. As Cavanaugh (1993) notes, "The term *senility* has no valid medical or psychological meaning, and its continued use simply perpetuates the myth that drastic mental decline is a product of normal aging" (p. 85).

Alzheimer's disease accounts for roughly two-thirds of all cases of dementia (Cummings & Cole, 2002). The estimated prevalence of Alzheimer's disease is 1% for ages 65–74, 7% for ages 75–84, and 25% for those 85 or older (Brookmeyer & Kawas, 1998; Hy & Keller, 2000). Alzheimer's disease is accompanied by major structural deterioration in the brain. Alzheimer's patients exhibit profound and widespread loss of neurons and brain tissue and the accumulation of characteristic neural abnormalities known as neuritic plaques and neurofibrillary tangles (Vinters, 2001). In the early stages of the disease, this damage is largely centered in the hippocampal region, which is known to play a crucial role in many facets of memory, but as the disease advances it spreads throughout much of the brain (Bourgeois, Seaman, & Servis, 2003).

Alzheimer's disease is a vicious affliction that can strike during middle age but usually emerges after age 65. The beginnings of Alzheimer's disease are so subtle they are often recognized only after the disease has progressed for a year or two. The hallmark early symptom is the forgetting of newly learned information after surprisingly brief periods of time (Albert &

Killiany, 2001). The course of the disease is one of progressive deterioration, typically over a period of eight to ten years, ending in death (Rabins, Lyketsos, & Steele, 1999). In the beginning, victims simply lose the thread of conversations or forget to follow through on tasks they have started. Gradually, much more obvious problems begin to emerge, including difficulties in speaking, comprehending, and performing complicated tasks, as well as depression and sleep disturbance. Job performance deteriorates noticeably as victims forget important appointments and suffer indignities such as getting lost while driving and paying the same bill several times. From this point, profound memory loss develops. For example, patients may fail to recognize familiar people, something particularly devastating to family and friends. Many patients become restless and experience hallucinations, delusions, and paranoid thoughts. Eventually, victims become completely disoriented and are unable to care for themselves. There are some encouraging leads for treatments that might slow the progression of this horrific disease, but a cure does not appear to be on the horizon.

The causes that launch this debilitating neural meltdown are not well understood. Genetic factors clearly contribute, but their exact role remains unclear (Ashford & Mortimer, 2002). Some "protective" factors that reduce vulnerability to Alzheimer's disease have been identified, including regular exercise (Schuit et al., 2001) and frequent participation in stimulating cognitive activities (Wilson & Bennet, 2003). The importance of the latter factor emerged in a widely discussed longitudinal investigation called the Nun Study, which followed a group of elderly Catholic Nuns who agreed to donate their brains upon death. The findings of the Nun Study suggest that a high prevalence of positive emotions and strong engagement in mentally challenging work and recreation reduce one's risk for Alzheimer's disease (Danner, Snowdon, & Friesen, 2001; Snowdon, 2001).

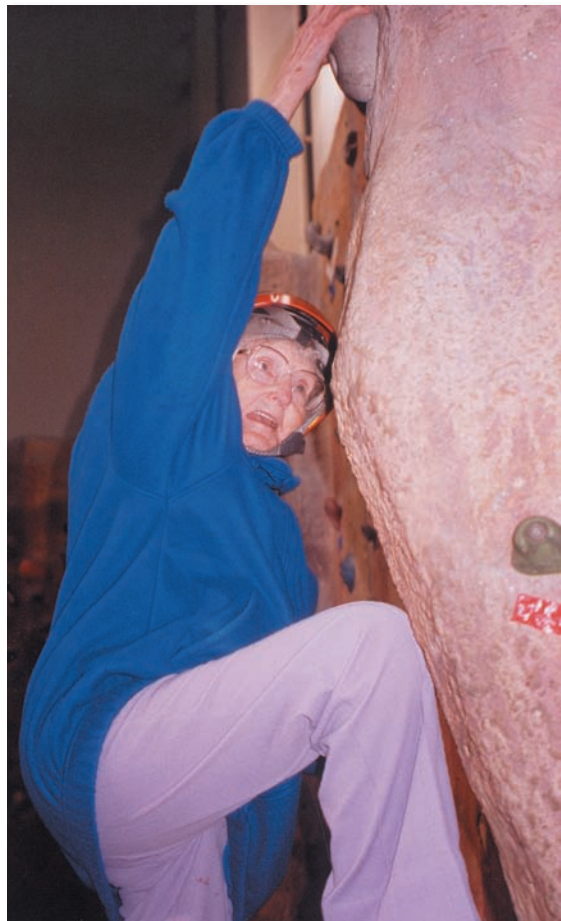
Aging and Cognitive Changes

The evidence indicates that general intelligence is fairly stable throughout most of adulthood, with a small decline in *average* test scores often seen after age 60 (Schaie, 1990, 1994, 1996). However, this seemingly simple assertion masks many complexities and needs to be qualified carefully. Group averages can be deceptive in that mean scores can be dragged down by a small minority of people who show a decline. For example, when Schaie (1990) calculated the percentage of people who maintain stable performance on various abilities (see **Figure 11.27**), he found that

about 80% showed no decline by age 60 and that about two-thirds were still stable through age 81.

What about memory? Numerous studies report decreases in older adults' memory capabilities (Backman et al., 1999). Most researchers maintain that the memory losses associated with normal aging tend to be moderate and are *not* experienced by everyone (Dixon & Cohen, 2003; Shimamura et al., 1995). However, Salthouse (2003, 2004) takes a much more pessimistic view, arguing that age-related decreases in memory are substantial in magnitude, that they begin in early adulthood, and that they affect everyone. One reason for these varied conclusions may be that a variety of different types of memory can be assessed (see Chapter 7 for a review of various systems of memory). The most reliable decrements are usually seen in *episodic memory* and *working memory*, with less consistent losses observed on tasks involving *procedural memory* and *semantic memory* (Backman, Small, & Wahlin, 2001; Dixon & Cohen, 2003).

Contrary to widespread stereotypes, many people remain active and productive in their 70s, 80s, and even beyond. Pictured here is the author's Auntie Mildred, at age 99, having a little fun at a child's birthday party held at a rock-climbing facility. Now 105, Mildred still composes poetry and you can't pull her away from her personal computer.



Courtesy of Wayne Welten

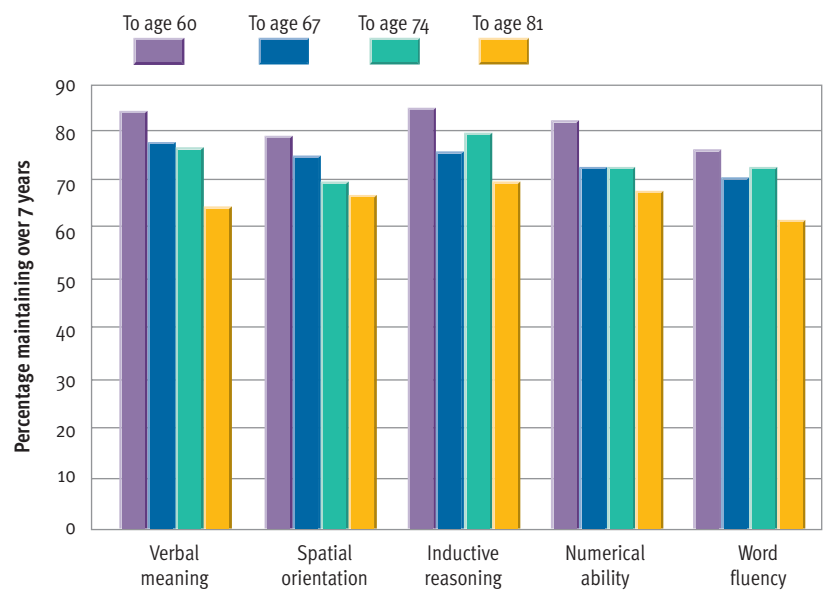


Figure 11.27

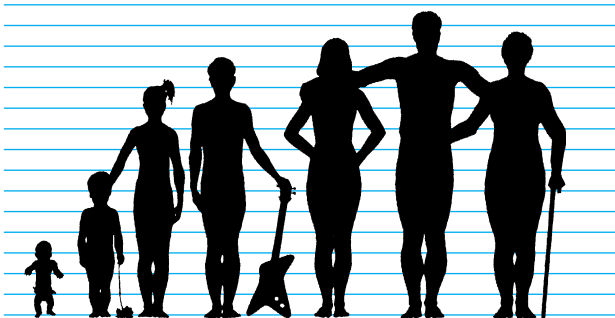
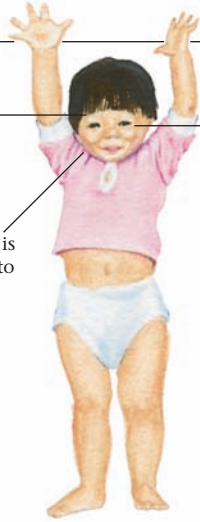

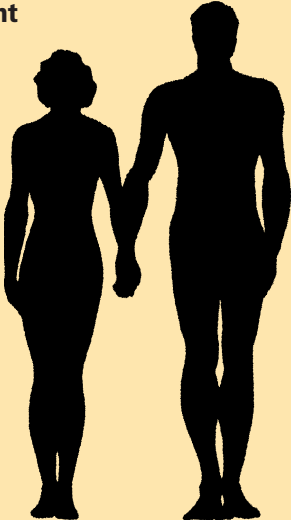

Age and the stability of primary mental abilities. In his longitudinal study of cognitive performance begun in 1956, Schaie (1983, 1993) has repeatedly assessed the five basic mental abilities listed along the bottom of this chart. The data graphed here show the percentage of subjects who maintained stable levels of performance on each ability through various ages up to age 81. As you can see, even through the age of 81, the majority of subjects show no significant decline on most abilities.


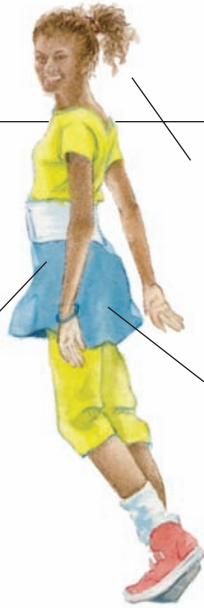


Source: Adapted from Schaie, K. W. (1990). Intellectual development in adulthood. In J. E. Birren and K. W. Schaie (Eds.), *Handbook of the psychology of aging* (pp. 291–309). San Diego: Academic Press. Copyright © 1990 Elsevier Science (USA), reproduced with permission from the publisher.

In the cognitive domain, aging does seem to take its toll on *speed* first. Many studies indicate that speed in learning, solving problems, and processing information tends to decline with age (Salthouse, 1996). The evidence suggests that the erosion of processing speed may be a gradual, lengthy trend beginning in middle adulthood (see **Figure 11.28** on page 458). The general nature of this trend (across differing tasks) suggests that it may be the result of age-related changes in neurological functioning (Salthouse, 2000), although doubts have been raised about this conclusion (Bashore, Ridderinkhof, & van der Molen, 1997). Although mental speed declines with age, problem-solving ability remains largely unimpaired if older people are given adequate time to compensate for their reduced speed.

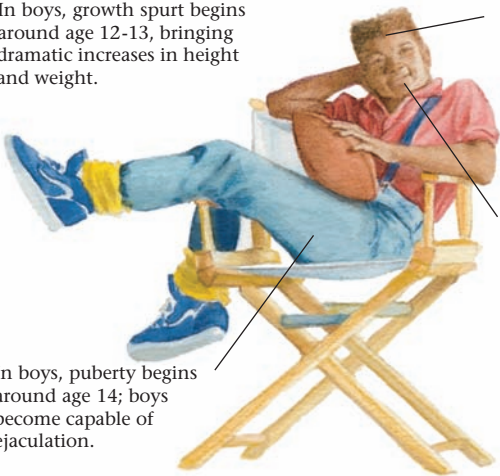


It should be emphasized that many people remain capable of great intellectual accomplishments well into their later years (Simonton, 1990, 1997). This fact was verified in a study of scholarly, scientific, and artistic productivity that examined lifelong patterns of work among 738 men who lived at least through the age of 79. Dennis (1966) found that the 40s decade was the most productive in most professions. However, productivity was remarkably stable through the 60s and even the 70s in many areas.





> Illustrated Overview of Human Development

Stage of development		Infancy (birth–2)	
Physical and sensorimotor development 		<p>Rapid brain growth; 75% of adult brain weight is attained by age 2.</p> <p>Ability to localize sounds is apparent at birth; ability to recognize parent's voice occurs within first week.</p> <p>Rapid improvement occurs in visual acuity; depth perception is clearly present by 6 months, perhaps earlier.</p> <p>Landmarks in motor development: Infants sit without support around 6 months, walk around 12–14 months, run freely around 2 years.</p> 	
Major stage theories	Piaget	Sensorimotor	
	Kohlberg	Premoral	
	Erikson	Trust vs. mistrust	Autonomy vs. shame
	Freud (see Chapter 12)	Oral	Anal
Cognitive development 		<p>Object permanence gradually develops.</p> <p>Infant shows orienting response (pupils dilate, head turns) and attention to new stimulus, habituation (reduced orienting response) to repeated stimulus.</p> <p>Babbling increasingly resembles spoken language.</p> <p>First word is used around age 1; vocabulary spurt begins around 18 months; frequent overextensions (words applied too broadly) occur.</p>	
Social and personality development   <p>Information compiled by Barbara Hansen Lemme, College of DuPage</p>		<p>Temperamental individuality is established by 2–3 months; infants tend to be easy, difficult, or slow to warm up.</p> <p>Attachment to caregiver(s) is usually evident around 6–8 months; secure attachment facilitates exploration.</p> <p>“Stranger anxiety” often appears around 6–8 months; separation anxiety peaks around 14–18 months.</p>	

	Early childhood (2–6)	Middle childhood (6–12)
	<p>Connections among neurons continue to increase in density.</p> <p>Visual acuity reaches 20/20.</p> <p>Bladder and bowel control is established.</p> <p>Hand preference is usually solidified by 3–4 years; coordination improves; children learn to dress themselves.</p> 	<p>In girls, growth spurt begins around age 10–11, bringing dramatic increases in height and weight.</p> <p>Level of pituitary activity and sex hormones increases.</p> <p>In girls, puberty begins around age 12; menstruation starts.</p> <p>Girls' secondary sex characteristics (such as breast development and widening hips) begin to emerge.</p> 
	Preoperational	Concrete operational
	Preconventional	Conventional
	Initiative vs. guilt	Industry vs. inferiority
	Phallic	Latency
	<p>Thought is marked by egocentrism (limited ability to view world from another's perspective).</p> <p>Thought is marked by centration (inability to focus on more than one aspect of a problem at a time) and irreversibility (inability to mentally undo an action).</p> <p>Telegraphic speech (omitting nonessential words) appears at 2–3 years; syntax is well developed by age 5; vocabulary increases dramatically.</p> <p>Short-term memory capacity increases from two items at age 2 to five items around age 6–7; attention span improves.</p>	<p>Conservation (understanding that physical qualities can remain constant in spite of transformations in shape) is gradually mastered.</p> <p>Child develops decentration (ability to focus on more than one feature of a problem at a time) and reversibility (ability to mentally undo an action).</p> <p>Metalinguistic awareness (ability to reflect on use of language) leads to play with language, use of puns, riddles, metaphors.</p> <p>Long-term memory improves with increasing use of encoding strategies of rehearsal and organization.</p>
 <p>© David Young-Wolff/PhotoEdit</p>	<p>Child realizes that gender does not change and begins to learn gender roles and form gender identity; social behavior is influenced by observational learning, resulting in imitation.</p> <p>Child progresses from parallel (side-by-side, noninteractive) play to cooperative play.</p> <p>Social world is extended beyond family; first friendships are formed.</p>	 <p>© Jon Feingersh/Corbis</p> <p>Child experiences great increase in social skills, improved understanding of others' feelings; social world is dominated by same-sex peer relationships.</p> <p>Role-taking skills emerge; fantasy is basis for thoughts about vocations and jobs.</p> <p>Altruism tends to increase, aggression tends to decrease; aggression tends to become verbal rather than physical, hostile more than instrumental.</p>

> Illustrated Overview of Human Development (continued)

Adolescence (12–20)		Young adulthood (20–40)	
<p>In boys, growth spurt begins around age 12–13, bringing dramatic increases in height and weight.</p>  <p>Level of pituitary activity and hormones increases.</p> <p>Boys' secondary sex characteristics (such as voice change and growth of facial hair) begin to emerge.</p> <p>In boys, puberty begins around age 14; boys become capable of ejaculation.</p>		<p>Reaction time and muscular strength peak in early to mid-20s.</p>  <p>External signs of aging begin to show in 30s; skin loses elasticity; hair is thinner, more likely to be gray.</p> <p>Lowered metabolic rate contributes to increased body fat relative to muscle; gain in weight is common.</p> <p>Maximum functioning of all body systems, including senses, attained; slow decline begins in 20s.</p>	
Formal operational			
	Postconventional (if attained)		
Identity vs. confusion		Intimacy vs. isolation	
Genital			
<p>Deductive reasoning improves; problem solving becomes more systematic, with alternative possibilities considered before solution is selected.</p> <p>Thought becomes more abstract and reflective; individual develops ability to mentally manipulate abstract concepts as well as concrete objects.</p> <p>Individual engages in idealistic contemplation of hypotheticals, "what could be."</p> <p>Long-term memory continues to improve as elaboration is added to encoding strategies.</p>		<p>Intellectual abilities and speed of information processing are stable.</p> <p>Greater emphasis is on application, rather than acquisition, of knowledge.</p> <p>There is some evidence of a trend toward dialectical thought (ideas stimulate opposing ideas), leading to more contemplation of contradictions, pros and cons.</p>	
<p>Person experiences increased interactions with opposite-sex peers; dating begins.</p> <p>Attention is devoted to identity formation, questions such as "Who am I?" and "What do I want out of life?"</p> <p>Realistic considerations about abilities and training requirements become more influential in thoughts about vocations and jobs.</p>  <p>© David Young-Wolff/PhotoEdit</p>		<p>Energies are focused on intimate relationships, learning to live with marriage partner, starting a family, managing a home.</p> <p>Trial period is given for occupational choices, followed by stabilization of vocational commitment; emphasis is on self-reliance, becoming one's own person.</p> <p>For many, close relationship develops with mentor (older person who serves as role model, adviser, and teacher).</p> <div style="border: 1px solid black; padding: 20px; text-align: center; width: 200px; margin: 0 auto;">Image Not Available</div>	

	Middle adulthood (40–65)	Late adulthood (65 and older)
	<p>Changes occur in vision: increased farsightedness and difficulty recovering from glare; slower dark adaptation.</p> <p>The amount of brain tissue declines, but significance of this neural loss is unclear.</p> <p>In women, menopause occurs around age 50; in both sexes, sexual activity declines, although capacity for arousal changes only slightly.</p> <p>Sensitivity to high-frequency sounds decreases especially in males after age 55.</p> 	<p>Height decreases slightly because of changes in vertebral column; decline in weight also common.</p> <p>Sensitivity of vision, hearing, and taste noticeably decreases.</p> <p>Chronic diseases, especially heart disease, cancer, and stroke, increase.</p> <p>Rate of aging is highly individualized.</p> 
	Generativity vs. self-absorption	Integrity vs. despair
	<p>There is some evidence for a trend toward improved judgment or “wisdom” based on accumulation of life experiences.</p> <p>Effectiveness of retrieval from long-term memory begins slow decline, usually not noticeable until after age 55.</p> <p>Individual experiences gradual decline in speed of learning, problem solving, and information processing.</p> <p>In spite of decreased speed in cognitive processes, intellectual productivity and problem-solving skills usually remain stable.</p>	<p>Individual experiences gradual decline in cognitive speed and effectiveness of working memory.</p> <p>Intellectual productivity depends on factors such as health and lifestyle; many people in 60s and 70s remain quite productive.</p> <p>Decision making tends to become more cautious.</p> <p>Fluid intelligence often declines, but crystallized intelligence remains stable or increases.</p>
	<p>Midlife transition around age 40 leads to reflection, increased awareness of mortality and passage of time, but usually is not a personal crisis.</p> <p>“Sandwich generation” is caught between needs of aging parents and children reaching adulthood.</p> <p>Career development peaks; there is some tendency to shift energy from career concerns to family concerns.</p> 	 <p>Physical changes associated with aging require adjustments that affect life satisfaction.</p> <p>Marital satisfaction often increases, but eventually death of spouse presents coping challenge.</p> <p>Living arrangements are a significant determinant of satisfaction, as 60%–90% of time is spent at home.</p>

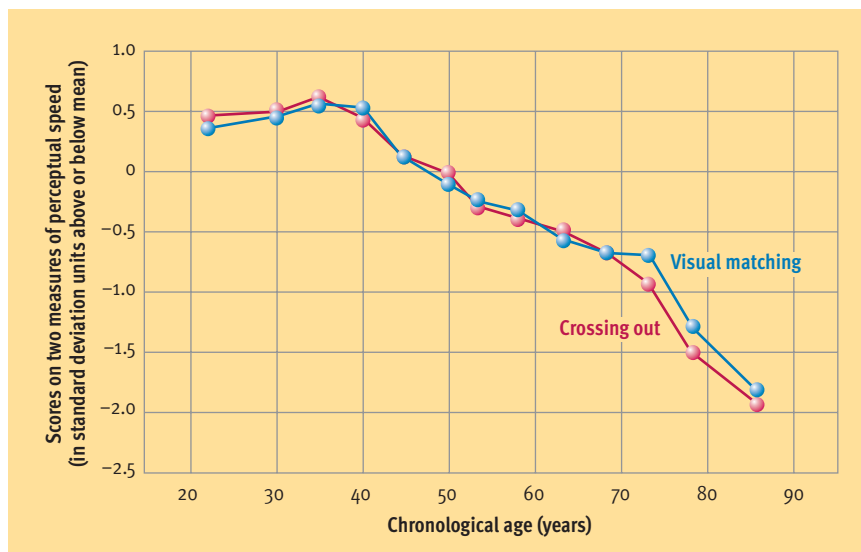


Figure 11.28

Age and mental speed. Many studies have found that mental speed decreases with age. The data shown here, from Salthouse (2000), are based on two perceptual speed tasks. The data points are means for large groups of subjects expressed in terms of how many standard deviations (see Chapter 2) they are above or below the mean for all ages (which is set at 0). Similar age-related declines are seen on many tasks that depend on mental speed.

Source: Adapted from Salthouse, T. A. (2000). Aging and measures of processing speed. *Biological Psychology*, 54, 35-54. Reproduced by permission of Elsevier Science.

➤ REVIEW OF KEY POINTS

- During adulthood, personality is marked by both stability and change. Doubts have surfaced about whether a mid-life crisis is a normal developmental transition. Adults who move successfully through the three stages of adulthood posited by Erikson should develop intimacy, generativity, and integrity.
- Many landmarks in adult development involve transitions in family relationships. Difficulty adjusting to marriage is more likely when spouses have different role expectations. The transition to parenthood can be very stressful. Parent-adolescent relations are not as contentious as widely assumed. For most parents, the empty nest transition no longer appears to be as difficult as it once was.
- During adulthood, age-related physical transitions include changes in appearance, sensory losses (especially in vision and hearing), and hormonal changes. Menopause is not as problematic as widely suggested. Drastic mental decline is not a part of the normal aging process. However, 15%–20% of adults over age 75 suffer from some form of dementia.
- In the cognitive domain, general intelligence is fairly stable, with a small decline in average test scores seen after the age of 60. Many studies have found decreases in older adults' memory capabilities, especially in episodic and working memory. Mental speed declines in late adulthood. Nonetheless, many people remain productive well into old age.

➤ Reflecting on the Chapter's Themes

Theoretical Diversity



Sociohistorical Context



Multifactorial Causation



Cultural Heritage



Heredity and Environment



Many of our seven integrative themes surfaced to some degree in our coverage of human development. We saw theoretical diversity in the discussions of attachment, cognitive development, and personality development. We saw that psychology evolves in a sociohistorical context, investigating complex, real-world issues. We encountered multifactorial causation of behavior in the development of temperament and attachment, among other things. We saw cultural invariance and cultural diversity in our examination of attachment, motor development, cognitive development, and moral development.

But above all else, we saw how heredity and environment jointly mold behavior. We've encountered the dual influence of heredity and environment before, but this theme is rich in complexity, and each chapter draws out different aspects and implications. Our discussion of development amplified the point that genetics and experience work *interactively* to shape behavior. In the language of science, an interaction means that the effects of one variable depend on the effects of another. In other words, heredity and environment do not operate independently.

Children with "difficult" temperaments will elicit different reactions from different parents, depending on the parents' personalities and expectations. Likewise, a particular pair of parents will affect children in different ways, depending on the inborn characteristics of the children. An interplay, or feedback loop, exists between biological and environmental factors. For instance, a temperamentally difficult child may elicit negative reactions from parents, which serve to make the child more difficult, which evokes more negative reactions. If this child develops into an ornery 11-year-old, which do we blame—genetics or experience? Clearly, this outcome is due to the reciprocal effects of both.

All aspects of development are shaped jointly by heredity and experience. We often estimate their relative weight or influence, as if we could cleanly divide behavior into genetic and environmental components. Although we can't really carve up behavior that neatly, such comparisons can be of great theoretical interest, as you'll see in our upcoming Personal Application, which discusses the nature and origins of gender differences in behavior.

PERSONAL Application

Understanding Gender Differences

Answer the following “true” or “false.”

- ___ 1 Females are more socially oriented than males.
- ___ 2 Males outperform females on most spatial tasks.
- ___ 3 Females are more irrational than males.
- ___ 4 Males are less sensitive to nonverbal cues than females.
- ___ 5 Females are more emotional than males.

Are there genuine behavioral differences between the sexes similar to those mentioned above? If so, why do these differences exist? How do they develop? These are the complex and controversial questions that we’ll explore in this Personal Application.

Before proceeding further, we need to clarify how some key terms are used, as terminology in this area of research has been evolving and remains a source of confusion. **Sex refers to the biologically based categories of female and male.** In contrast, **gender refers to culturally constructed distinctions between femininity and masculinity.** Individuals are born female or male. However, they become feminine or masculine through complex developmental processes that take years to unfold.

The statements at the beginning of this Application reflect popular gender stereotypes in our society. **Gender stereotypes are widely held beliefs about females’ and males’ abilities, personality traits, and social behavior.** Table 11.1 lists some characteristics that are part of the masculine and feminine stereotypes in North American society. The table shows something you may have already noticed on your own: The male stereotype is much more flattering, suggesting that men have virtually cornered the market on competence and rationality. After all, everyone knows that females are more dependent, emotional, irrational, submis-

sive, and talkative than males. Right? Or is that not the case? Let’s look at the research.

How Do the Sexes Differ in Behavior?

Gender differences are actual disparities between the sexes in typical behavior or average ability. Mountains of research, literally thousands of studies, exist on gender differences. What does this research show? Are the stereotypes of males and females accurate? Well, the findings are a mixed bag. The research indicates that genuine behavioral

differences *do* exist between the sexes and that people’s stereotypes are not entirely inaccurate (Eagly, 1995; Halpern, 2000). But the differences are fewer in number, smaller in size, and far more complex than stereotypes suggest. As you’ll see, only two of the differences mentioned in our opening true-false questions (the even-numbered items) have been largely supported by the research.

Cognitive Abilities

In the cognitive domain, it appears that there are three genuine—albeit rather small—gender differences. First, on the average, females tend to exhibit slightly better *verbal skills* than males (Halpern, 2000). In particular, females seem stronger on tasks that require rapid access to semantic information in long-term memory and tasks that require the production or comprehension of complex prose (Halpern, 1997, 2004). Second, starting during high school, males show a slight advantage on tests of *mathematical ability*. When all students are compared, males’ advantage is quite small (Hyde, Fennema, & Lamon, 1990). However, at the high end of the ability distribution, the gender gap is larger, as far more males than females are found to have exceptional math skills (Stumpf & Stanley, 1996). Third, starting in the grade-school years, males tend to score higher than females on most measures of *visual-spatial ability* (Voyer, Voyer, & Bryden, 1995). The size of these gender differences varies depending on the exact nature of the spatial task. Males appear to be strongest on tasks that require mental rotations or tracking the movement of objects through three-dimensional space (Halpern, 2004).

Social Behavior

In regard to social behavior, research findings support the existence of some additional gender differences. First, studies indicate that males tend to be much more *physically*

Table 11.1 Elements of Traditional Gender Stereotypes

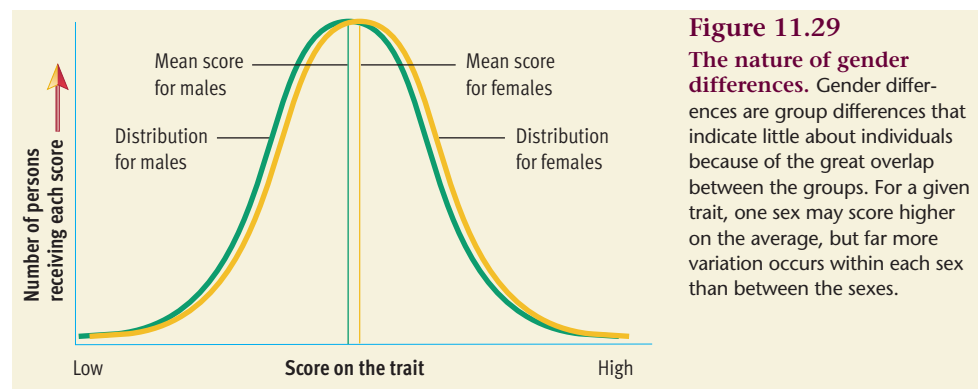
Masculine	Feminine
Active	Aware of other’s feelings
Adventurous	Considerate
Aggressive	Creative
Ambitious	Cries easily
Competitive	Devotes self to others
Dominant	Emotional
Independent	Enjoys art and music
Leadership qualities	Excitable in a crisis
Likes math and science	Expresses tender feelings
Makes decisions easily	Feelings hurt
Mechanical aptitude	Gentle
Not easily influenced	Home oriented
Outspoken	Kind
Persistent	Likes children
Self-confident	Neat
Skilled in business	Needs approval
Stands up under pressure	Tactful
Takes a stand	Understanding

Source: Adapted from Ruble, T. L. (1983). Sex stereotypes: Issues of change in the 70s. *Sex Roles*, 9, 397–402. Copyright © 1983 Plenum Publishing Group. Adapted with kind permission of Springer Science and Business Media.

aggressive than females (Archer, 2005). This disparity shows up early in childhood. Its continuation into adulthood is supported by the fact that men account for a grossly disproportionate number of the violent crimes in our society (Halpern, 2000). The findings on *verbal aggression* are more complex, as females appear to exhibit more relational aggression (snide remarks and so forth) (Archer, 2005). Second, there are gender differences in *nonverbal communication*. The evidence indicates that females are more sensitive than males to subtle nonverbal cues (Hall, Carter, & Horgan, 2000; McClure, 2000). Third, males are more sexually active than females in a variety of ways, and they have more permissive attitudes about casual, premarital, and extramarital sex (Baumeister et al., 2001b; see Chapter 10).

Some Qualifications

Although research has identified some genuine gender differences in behavior, bear in mind that these are group differences that indicate nothing about individuals. Essentially, research results compare the “average man” with the “average woman.” However, you are—and every individual is—unique. The average female and male are ultimately figments of our imagination. Furthermore, the genuine group differences noted are relatively small. **Figure 11.29** shows how scores on a trait, perhaps verbal ability, might be distributed for men and women. Although



the group averages are detectably different, you can see the great variability within each group (sex) and the huge overlap between the two group distributions.

Biological Origins of Gender Differences

What accounts for the development of various gender differences? To what degree are they the product of learning or of biology? This question is yet another manifestation of the nature versus nurture issue. Investigations of the biological origins of gender differences have centered on the evolutionary bases of behavior, hormones, and brain organization.

Evolutionary Explanations

Evolutionary analyses usually begin by arguing that gender differences in behavior are

largely the same across divergent cultures because cultural invariance suggests that biological factors are at work (Kenrick & Trost, 1993). Although research has turned up some fascinating exceptions, the better-documented gender differences in cognitive abilities, aggression, and sexual behavior *are* found in virtually all cultures (Beller & Gafni, 1996; Halpern, 1997). Evolutionary psychologists go on to argue that these universal gender differences reflect different natural selection pressures operating on males and females over the course of human history (Archer, 1996; Buss & Kenrick, 1998). For example, as we discussed in Chapter 10, males supposedly are more sexually active and permissive because they invest less than females in the process of procreation and can maximize their reproductive success by seeking many sexual partners (Buss, 1996; Schmitt, 2005). The gender gap in aggression is also explained in terms of reproductive fitness.

Image Not Available

Because females are more selective about mating than males, males have to engage in more competition for sexual partners than females do. Greater aggressiveness is thought to be adaptive for males in this competition for sexual access because it should foster social dominance over other males and facilitate the acquisition of the material resources emphasized by females when they evaluate potential partners (Campbell, 2005; Cummins, 2005). Evolutionary theorists assert that gender differences in spatial ability reflect the division of labor in ancestral hunting-and-gathering societies in which males typically handled the hunting and females the gathering. Males' superiority on most spatial tasks has been attributed to the adaptive demands of hunting (Silverman & Choi, 2005; see Chapter 1).

Evolutionary analyses of gender differences are interesting, but controversial. On the one hand, it seems eminently plausible that evolutionary forces could have led to some divergence between males and females in typical behavior. On the other hand, evolutionary hypotheses are highly speculative and difficult to test empirically (Eagly & Wood, 1999; Halpern, 2000). The crucial problem for some critics is that evolutionary analyses are so "flexible," they can be used to explain almost anything. For example, if the situation regarding spatial ability were reversed—if females scored higher than males—evolutionary theorists might attribute females' superiority to the adaptive demands of gathering food, weaving baskets, and making clothes—and it would be difficult to prove otherwise (Cornell, 1997).

The Role of Hormones

Hormones play a key role in sexual differentiation during prenatal development. The high level of androgens (the principal class of male hormones) in males and the low level of androgens in females lead to the differentiation of male and female genital organs. The critical role of prenatal hormones becomes apparent when something interferes with normal prenatal hormonal secretions. About a half-dozen endocrine disorders can cause overproduction or underproduction of specific gonadal hormones during

prenatal development. Scientists have also studied children born to mothers who were given an androgenlike drug to prevent miscarriage. The general trend in this research is that females exposed prenatally to abnormally high levels of androgens exhibit more male-typical behavior than other females do and that males exposed prenatally to abnormally low levels of androgens exhibit more female-typical behavior than other males (Collaer & Hines, 1995; Golombok & Hines, 2002).

These findings suggest that prenatal hormones contribute to the shaping of gender differences in humans. But there are some problems with this evidence (Basow, 1992; Fausto-Sterling, 1992). First, the evidence is much stronger for females than for males. Second, it's always dangerous to draw conclusions about the general population based on small samples of people who have abnormal conditions. Looking at the evidence as a whole, it does seem likely that hormones contribute to gender differences in behavior. However, a great deal remains to be learned.

Differences in Brain Organization

Interpretive problems have also cropped up in efforts to link gender differences to specialization of the cerebral hemispheres in the brain (see **Figure 11.30**). As you may recall from Chapter 3, in most people the left hemisphere is more actively involved in verbal processing, whereas the right hemisphere is more active in visual-spatial processing (Sperry, 1982; Springer & Deutsch, 1998). After these findings surfaced, theorists began to wonder whether this division of labor in the brain might be related to gender differences in verbal and spatial skills. Consequently, they began looking for sex-related disparities in brain organization.

Some thought-provoking findings *have* been reported. For instance, some studies have found that *males tend to exhibit more cerebral specialization than females* (Hellige, 1993b; Voyer, 1996). In other words, males tend to depend more heavily than females do on the left hemisphere in verbal processing and more heavily on the right hemisphere in spatial processing. Differences between males and females have also been found in

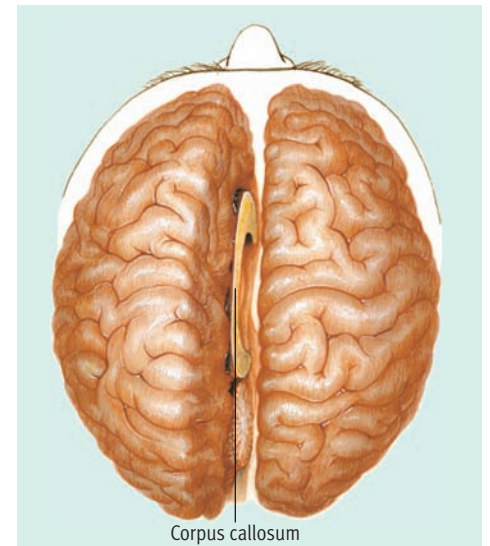


Figure 11.30
The cerebral hemispheres and the corpus callosum. In this drawing the cerebral hemispheres have been "pulled apart" to reveal the corpus callosum, the band of fibers that connects the right and left halves of the brain. Research has shown that the right and left hemispheres are specialized to handle different types of cognitive tasks (see Chapter 3), leading some theorists to speculate that patterns of hemispheric specialization might contribute to gender differences in verbal and spatial abilities.

the size of the corpus callosum, the band of fibers that connects the two hemispheres of the brain. Some studies suggest that *females tend to have a larger corpus callosum* (Bigler et al., 1997), which might allow for better interhemispheric transfer of information, which, in turn, might underlie the less lateralized organization of females' brains (Innocenti, 1994). Thus, some theorists have concluded that differences between the sexes in brain organization are responsible for gender differences in verbal and spatial ability (Geschwind & Galaburda, 1987; Kimura & Hampson, 1993).

This idea is intriguing, but psychologists have a long way to go before they can explain gender differences in terms of right brain/left brain specialization. Studies have not been consistent in finding that males have more specialized brain organization than females (Halpern, 1992; Kinsbourne, 1980), and the finding of a larger corpus callosum in females has proven controversial (Bleier, 1988; Byne & Parsons, 1993). Moreover, even if these

findings were replicated consistently, no one is really sure just how they would account for the observed gender differences in cognitive abilities.

In summary, researchers have made some intriguing progress in their efforts to document the biological roots of gender differences in behavior. However, the idea that “anatomy is destiny” has proven difficult to demonstrate. Many theorists remain convinced that gender differences are largely shaped by experience. Let’s examine their evidence.

Environmental Origins of Gender Differences

Socialization is the acquisition of the norms and behaviors expected of people in a particular society. In all cultures, the socialization process includes efforts to train children about gender roles.

Gender roles are expectations about what is appropriate behavior for each sex. Although gender roles are in a period of transition in modern Western society, there are still many disparities in how males and females are brought up. Investigators have identified three key processes involved in the development of gender roles: operant conditioning, observational learning, and self-socialization. First we’ll examine these processes. Then we’ll look at the principal sources of gender-role socialization: families, schools, and the media.

Operant Conditioning

In part, gender roles are shaped by the power of reward and punishment—the key processes in *operant conditioning* (see Chapter 6). Parents, teachers, peers, and others often reinforce (usually with tacit approval) “gender-appropriate” behavior and respond negatively to “gender-inappropriate” behavior (Bussey & Bandura, 1999; Fagot, Leinbach, & O’Boyle, 1992). If you’re a man, you might recall getting hurt as a young boy and being told that “big boys don’t cry.” If you succeeded in inhibiting your crying, you may have earned an approving smile or even something tangible like an ice cream cone.

The reinforcement probably strengthened your tendency to “act like a man” and suppress emotional displays. If you’re a woman, chances are your crying wasn’t discouraged as gender-inappropriate. Studies suggest that fathers encourage and reward gender-appropriate behavior in their youngsters more than mothers do and that boys experience more pressure to behave in gender-appropriate ways than girls do (Levy, Taylor, & Gelman, 1995).

Observational Learning

Observational learning (see Chapter 6) by children can lead to the imitation of adults’ gender-appropriate behavior. Children imitate both males and females, but most children tend to imitate same-sex role models more than opposite-sex role models (Bussey & Bandura, 1984; Frey & Ruble, 1992). Thus, imitation often leads young girls to play with dolls, dollhouses, and toy stoves. Young boys are more likely to tinker with toy trucks, miniature gas stations, or tool kits.

Self-Socialization

Children themselves are active agents in their own gender-role socialization. Several *cognitive theories* of gender-role development emphasize self-socialization (Bem, 1985; Cross & Markus, 1993; Martin & Ruble, 2004). Self-socialization entails three steps. First, children learn to classify themselves as male or female and to recognize their sex as a permanent quality (around ages 5 to 7). Second, this self-categorization motivates them to value those characteristics and behaviors associated with their sex. Third, they strive to bring their behavior in line with what is considered gender-appropriate in their culture. In other words, children get involved in their own socialization, working diligently to discover the rules that are supposed to govern their behavior.

Sources of Gender-Role Socialization

There are three main sources of influence in gender-role socialization: families, schools, and the media. Of course, we are now in an era of transition in gender roles, so the gen-



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Boys are under more pressure than girls to behave in gender-appropriate ways. Little boys who show an interest in dolls are likely to be chastised by both parents and peers.

eralizations that follow may say more about how you were socialized than about how children will be socialized in the future.

Families. A great deal of gender-role socialization takes place in the home (McHale, Crouter, & Whiteman, 2003). Fathers engage in more “rough-housing” play with their sons than with their daughters, even in infancy (McBride-Chang & Jacklin, 1993). As children grow, boys and girls are encouraged to play with different types of toys (Wood, Desmarais, & Gugula, 2002). Generally, boys have less leeway to play with “feminine” toys than girls do with “masculine” toys. When children are old enough to help with household chores, the assignments tend to depend on sex (Cunningham, 2001). For example, girls wash dishes and boys mow the lawn. And parents are more likely to explain scientific concepts to boys than to girls (Crowley et al., 2001).

Schools. Schools and teachers clearly contribute to the socialization of gender roles.

The books that children use in learning to read can influence their ideas about what is suitable behavior for males and females (Diekmann & Murnen, 2004). Traditionally, males have been more likely to be portrayed as clever, heroic, and adventurous in these books, while females have been more likely to be shown doing domestic chores. Pre-school and grade-school teachers frequently reward sex-appropriate behavior in their pupils (Fagot et al., 1985; Ruble & Martin, 1998). Interestingly, teachers tend to pay greater attention to males, helping them, praising them, and scolding them more than females (Sadker & Sadker, 1994). As youngsters progress through the school system, they are often channeled in career directions considered appropriate for their sex (Read, 1991).

Media. Television is another source of gender-role socialization (Luecke-Aleksa et al., 1995). Although some improvement has been made in recent years, television shows have traditionally depicted men and

women in highly stereotypic ways (Galambos, 2004; Signorielli, 2001). Women are often portrayed as submissive, passive, and emotional. Men are more likely to be portrayed as independent, assertive, and competent. Even commercials contribute to the socialization of gender roles (Furnham & Mak, 1999; Signorielli, McLeod, & Healy, 1994). Women are routinely shown worrying about trivial matters such as the whiteness of their laundry or the shine of their dishes.

Conclusion

As you can see, the findings on gender and behavior are complex and confusing. Nonetheless, the evidence does permit one very general conclusion—a conclusion that you have seen before and will see again. Taken as a whole, the research in this area suggests that biological factors and environmental factors both contribute to gender differences in behavior—as they do to all other aspects of development.

➤ REVIEW OF KEY POINTS

- Sex refers to the biological reality of being male or female, whereas gender refers to distinctions between being masculine or feminine. Gender differences in behavior are fewer in number and smaller in magnitude than gender stereotypes suggest.
- In the cognitive domain, research reviews suggest that there are genuine gender differences in verbal ability, mathematical ability, and spatial ability. In regard to social behavior, differences have been found in aggression, nonverbal communication, and sexual behavior.
- Evolutionary theorists maintain that gender differences transcend culture because males and females have confronted different adaptive demands over the course of human history. Extensive evidence suggests that prenatal hormones contribute to human gender differences, but the research is marred by interpretive problems. Research linking gender differences to cerebral specialization is intriguing, but much remains to be learned.
- A vast research literature shows that gender differences are shaped by socialization processes. Operant conditioning, observational learning, and self-socialization contribute to the development of gender differences. Families, schools, and the media are among the main sources of gender-role socialization.

CRITICAL THINKING Application

Are Fathers Essential to Children's Well-Being?

Are fathers essential for children to experience normal, healthy development? This question is currently the subject of heated debate. In recent years, a number of social scientists have mounted a thought-provoking argument that father absence is the chief factor underlying a host of modern social ills. For example, David Blankenhorn (1995) argues that "fatherlessness is the most harmful demographic trend of this generation. It is the leading cause of declining child well-being in our society" (p. 1). Expressing a similar view, David Popenoe (1996) maintains that "today's fatherlessness has led to social turmoil-damaged children, unhappy children, aimless children, children who strike back with pathological behavior and violence" (p.192).

The Basic Argument

What is the evidence for the proposition that fathers are essential to healthy development? Over the last 40 years, the propor-

tion of children growing up without a father in the home has more than doubled. During the same time, we have seen dramatic increases in teenage pregnancy, juvenile delinquency, violent crime, drug abuse, eating disorders, teen suicide, and family dysfunction. Moreover, mountains of studies have demonstrated an association between father absence and an elevated risk for these problems. Summarizing this evidence, Popenoe (1996) asserts that "fatherless children have a risk factor two to three times that of fathered children for a wide range of negative outcomes, including dropping out of high school, giving birth as a teenager, and becoming a juvenile delinquent" (p. 192), which leads him to infer that "fathers have a unique and irreplaceable role to play in child development" (p. 197). Working from this premise, Popenoe concludes, "If present trends continue, our society could be on the verge of committing social suicide" (p. 192). Echoing this dire conclusion, Blankenhorn (1995) comments that "to tolerate the trend

of fatherlessness is to accept the inevitability of continued societal recession" (p. 222).

You might be thinking, "What's all the fuss about?" Surely, proclaiming the importance of fatherhood ought to be no more controversial than advocacy for motherhood or apple pie. But the assertion that a father is essential to a child's well-being has some interesting sociopolitical implications. It suggests that heterosexual marriage is the only appropriate context in which to raise children and that other family configurations are fundamentally deficient. Based on this line of reasoning, some people have argued for new laws that would make it more difficult to obtain a divorce and other policies and programs that would favor traditional families over families headed by single mothers, cohabiting parents, and gay and lesbian parents (Silverstein & Auerbach, 1999). Thus, the question about the importance of fathers is creating a great deal of controversy, because it is really a question about alternatives to traditional family structure.

Evaluating the Argument

In light of the far-reaching implications of the view that fathers are essential to normal development, it makes sense to subject this view to critical scrutiny. How could you use critical thinking skills to evaluate this argument? At least three previously discussed ideas seem germane.

First, it is important to recognize that the position that fathers are essential for healthy development rests on a foundation of correlational evidence, and as we have seen repeatedly, *correlation is no assurance of causation*. Yes, there has been an increase in fatherlessness that has been paralleled by increases in teenage pregnancy, drug abuse, eating disorders, and other disturbing social problems. But think of all the other changes that have occurred in American culture over the last 40 years, such as the decline of or-



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Are fathers crucial to children's well-being? This seemingly simple question has sparked heated debate.

ganized religion, the growth of mass media, dramatic shifts in sexual mores, and so forth. Increased fatherlessness has co-varied with a host of other cultural trends. Hence, it is highly speculative to infer that father absence is the chief cause of most modern social maladies.

Second, it always pays to think about whether there are specific, *alternative explanations* for findings that you might have doubts about. What other factors might account for the association between father absence and children's maladjustment? Think for a moment: What is the most frequent cause of father absence? Obviously, it is divorce. Divorces tend to be highly stressful events that disrupt children's entire lives. Although the evidence suggests that a majority of children seem to survive divorce without lasting, detrimental effects, it is clear that divorce elevates youngsters' risk for a wide range of negative developmental outcomes (Amato, 2001, 2003; Hetherington, 1999, 2003). Given that father absence and divorce are inextricably intertwined, it is possible that the negative effects of divorce account for much of the association between father absence and social problems.

Are there any other alternative explanations for the correlation between fatherlessness and social maladies? Yes, critics point out that the prevalence of father absence covaries with socioeconomic status. Father absence is much more common in low-income families (Anderson, Kohler, & Letiecq, 2002). Thus, the effects of father absence are entangled to some extent with the many powerful, malignant effects of poverty, which might account for much of the correlation between fatherlessness and negative outcomes (McLoyd, 1998).

A third possible strategy in thinking critically about the effects of father absence would be to look for some of the *fallacies in reasoning* introduced in Chapter 10 (irrelevant reasons, circular reasoning, slippery slope, weak analogies, and false dichotomy). A couple of the quotes from Popenoe and Blankenhorn were chosen to give you an opportunity to detect two of these fallacies in a new context. Take a look at the quotes once again and see whether you can spot the fallacies.

Popenoe's assertion that "if present trends continue, our society could be on the verge of social suicide" is an example of *slippery slope argumentation*, which involves predictions that if one allows X to happen, things will spin out of control and catastrophic events will follow. "Social suicide" is a little vague, but it sounds as if Popenoe is predicting that father absence will lead to the destruction of modern American culture. The other fallacy that you might have spotted was the *false dichotomy* apparent in Blankenhorn's assertion that "to tolerate the trend of fatherlessness is to accept the inevitability of continued societal recession." A false dichotomy creates an either-or choice between the position one wants to advocate (in this case, new social policies to reduce father absence) and some obviously horrible outcome that any sensible person would want to avoid (social decay), while ignoring other possible outcomes that might lie between these extremes.

In summary, we can find a number of flaws and weaknesses in the argument that fathers are *essential* to normal development. However, our critical evaluation of this argument *does not mean that fathers are unimportant*. Many types of evidence suggest that fathers generally make significant contributions to their children's development (Anderson et al., 2002; Phares, 1996; Rohner & Veneziano, 2001). We could argue with merit that fathers typically provide a substantial advantage for children that fatherless children do not have. But there is a cru-

cial distinction between arguing that fathers *promote* normal, healthy development and arguing that fathers are *necessary* for normal, healthy development. If fathers are *necessary*, children who grow up without them could not achieve the same level of well-being as those who have fathers, yet it is clear that a great many children from single-parent homes turn out just fine.

Fathers surely are important, and it seems likely that father absence *contributes* to a variety of social maladies. So, why do Blankenhorn (1995) and Popenoe (1996) argue for the much stronger conclusion—that fathers are *essential*? They appear to prefer the stronger conclusion because it raises much more serious questions about the viability of nontraditional family forms. Thus, they seem to want to advance a *political agenda* that champions traditional family values. They are certainly entitled to do so, but when research findings are used to advance a political agenda—whether conservative or liberal—a special caution alert should go off in your head. When a political agenda is at stake, it pays to scrutinize arguments with extra care, because research findings are more likely to be presented in a slanted fashion. The field of psychology deals with a host of complex questions that have profound implications for a wide range of social issues. The skills and habits of critical thinking can help you find your way through the maze of reasons and evidence that hold up the many sides of these complicated issues.

Table 11.2 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding the limitations of correlational evidence	The critical thinker understands that a correlation between two variables does not demonstrate that there is a causal link between the variables.
Looking for alternative explanations for findings and events	In evaluating explanations, the critical thinker explores whether there are other explanations that could also account for the findings or events under scrutiny.
Recognizing and avoiding common fallacies, such as irrelevant reasons, circular reasoning, slippery slope reasoning, weak analogies, and false dichotomies	The critical thinker is vigilant about conclusions based on unrelated premises, conclusions that are rewordings of premises, unwarranted predictions that things will spin out of control, superficial analogies, and contrived dichotomies.

CHAPTER 11 *Recap*

Key Ideas

Progress Before Birth: Prenatal Development

Prenatal development proceeds through the germinal, embryonic, and fetal stages as the zygote is differentiated into a human organism. During this period, development may be affected by maternal malnutrition, maternal drug use, and some maternal illnesses.

The Wondrous Years of Childhood

Motor development follows cephalocaudal and proximodistal trends. Early motor development depends on both maturation and learning. Developmental norms for motor skills and other types of development only reflect typical performance.

Temperamental differences among children are apparent during the first few months of life. These differences are fairly stable and may have far-reaching effects. Harlow's work with monkeys undermined the reinforcement explanation of attachment. Bowlby proposed an evolutionary explanation that has been very influential.

Research shows that attachment emerges out of an interplay between infant and mother. Infant-mother attachments fall into four categories: secure, anxious-ambivalent, avoidant, and disorganized-disoriented. Attachment patterns may have lasting effects on individuals. Modest cultural variations in the prevalence of various patterns of attachment are seen, but secure attachment predominates in all cultures.

Belsky theorizes that children have been programmed by evolution to respond to sensitive or insensitive care with different attachment patterns, which eventually cultivate reproductive strategies that would have been adaptive in the environments that have historically fostered sensitive or insensitive care.

Erik Erikson's theory of personality development proposes that individuals evolve through eight stages over the life span. In each stage the person wrestles with changes (crises) in social relationships.

According to Piaget's theory of cognitive development, the key advance during the sensorimotor period is the child's gradual recognition of the permanence of objects. The preoperational period is marked by certain deficiencies in thinking—notably, centration, irreversibility, and egocentrism. During the concrete operational period, children develop the ability to perform operations on mental representations, making them capable of conservation and hierarchical classification. The stage of formal operations ushers in more abstract, systematic, and logical thought.

Vygotsky's sociocultural theory maintains that cognitive development is fueled by social interactions with parents and others. Vygotsky argued that language is central to cognitive development and that culture exerts great influence over how cognitive growth unfolds.

Recent research has shown that infants appear to understand surprisingly complex concepts, including numerical operations, that they have had virtually no opportunity to learn about, leading some theorists to conclude that basic cognitive abilities are innate.

According to Kohlberg, moral reasoning progresses through three levels that are related to age and determined by cognitive development. Age-related progress in moral reasoning has been found in research, although a great deal of overlap occurs between adjacent stages.

The Transition of Adolescence

The growth spurt at puberty is a prominent event involving the development of reproductive maturity and secondary sex characteristics. Neural development continues through adolescence and the prefrontal cortex appears to be the last area of the brain to fully mature.

Recent decades have brought a surge in attempted suicide by adolescents and there is an association between adolescence and the prevalence of violent crime. Nonetheless, the evidence suggests that adolescence is only slightly more stressful than other periods of life. According to Erikson, the key challenge of adolescence is to make some progress toward a sense of identity. Marcia identified four patterns of identity formation.

The Expanse of Adulthood

During adulthood, personality is marked by both stability and change. Doubts have surfaced about whether a midlife crisis is a normal developmental transition. Many landmarks in adult development involve transi-

tions in family relationships, including adjusting to marriage, parenthood, and the empty nest.

During adulthood, age-related physical transitions include changes in appearance, sensory losses, and hormonal changes. Drastic mental decline is not a part of the normal aging process. However, 15%–20% of adults over age 75 suffer from some form of dementia. In late adulthood, mental speed declines and working memory suffers, but many people remain productive well into old age.

Putting It in Perspective

Many of our seven integrative themes stood out in this chapter. But above all else, our discussion of development showed how heredity and environment interactively shape behavior.

PERSONAL APPLICATION • Understanding Gender Differences

Gender differences in behavior are fewer in number and smaller in magnitude than gender stereotypes suggest. Research reviews suggest that there are genuine (albeit small) gender differences in verbal ability, mathematical ability, spatial ability, aggression, nonverbal communication, and sexual behavior.

Evolutionary theorists believe that gender differences reflect the influence of natural selection. Some research does link gender differences in humans to prenatal hormones and brain organization, but the research is marred by interpretive problems. Operant conditioning, observational learning, and self-socialization contribute to the development of gender differences.

CRITICAL THINKING APPLICATION • Are Fathers Essential to Children's Well-Being?

Some social scientists have argued that father absence is the chief cause of a host of social problems and that fathers are essential for normal, healthy development. Critics have argued that there are alternative explanations for the association between father absence and negative developmental outcomes.

Key Terms

Accommodation (p. 433)
Age of viability (p. 420)
Animism (p. 434)
Assimilation (p. 433)
Attachment (p. 427)
Centration (p. 434)
Cephalocaudal trend (p. 423)
Cognitive development (p. 433)
Conservation (p. 434)
Cross-sectional design (pp. 425–426)
Dementia (p. 452)
Development (p. 418)
Developmental norms (p. 424)
Dishabituation (p. 437)
Egocentrism (p. 434)
Embryonic stage (p. 419)
Family life cycle (p. 449)
Fetal alcohol syndrome (p. 421)
Fetal stage (p. 419)
Gender (p. 459)
Gender differences (p. 459)
Gender roles (p. 462)
Gender stereotypes (p. 459)
Germinal stage (p. 418)
Habituation (p. 437)
Irreversibility (p. 434)
Longitudinal design (p. 425)
Maturation (p. 424)
Menarche (p. 443)
Midlife crisis (p. 448)
Motor development (p. 423)
Object permanence (p. 433)

Placenta (p. 419)
Prenatal period (p. 418)
Primary sex characteristics (p. 442)
Proximodistal trend (p. 424)
Puberty (p. 442)
Pubescence (p. 442)
Scaffolding (p. 437)
Secondary sex characteristics (p. 442)
Separation anxiety (p. 427)
Sex (p. 459)
Socialization (p. 462)
Spermarche (p. 443)
Stage (p. 431)
Temperament (p. 425)
Zone of proximal development (ZPD) (p. 437)
Zygote (p. 418)

Key People

Mary Ainsworth (pp. 428–429)
Jay Belsky (p. 430)
John Bowlby (pp. 428–429)
Erik Erikson (pp. 431–432, 446, 449)
Harry Harlow (pp. 427–428)
Jerome Kagan (pp. 426–427)
Lawrence Kohlberg (pp. 442–443)
Jean Piaget (pp. 433–436)
Alexander Thomas and Stella Chess (p. 426)
Karen Wynn (pp. 438–439)
Lev Vygotsky (pp. 436–437)

CHAPTER 11 Practice Test

- The stage of prenatal development during which the developing organism is most vulnerable to injury is the:
 - zygotic stage.
 - germinal stage.
 - embryonic stage.
 - fetal stage.
- The cephalocaudal trend in the motor development of children can be described simply as a:
 - head-to-foot direction.
 - center-outward direction.
 - foot-to-head direction.
 - body-appendages direction.
- Developmental norms:
 - can be used to make extremely precise predictions about the age at which an individual child will reach various developmental milestones.
 - indicate the maximum age at which a child can reach a particular developmental milestone and still be considered "normal."
 - indicate the average age at which individuals reach various developmental milestones.
 - involve both a and b.
- When the development of the same subjects is studied over a period of time, the study is called a:
 - cross-sectional study.
 - life history study.
 - longitudinal study.
 - sequential study.
- The quality of infant-caregiver attachment depends:
 - on the quality of bonding in the first few hours of life.
 - exclusively on the infant's temperament.
 - on the interaction between the infant's temperament and the caregiver's responsiveness.
 - on how stranger anxiety is handled.
- During the second year of life, toddlers begin to take some personal responsibility for feeding, dressing, and bathing themselves in an attempt to establish what Erikson calls a sense of:
 - superiority.
 - industry.
 - generativity.
 - autonomy.
- Five-year-old David watches as you pour water from a short, wide glass into a tall, narrow one. He says there is now more water than before. This response demonstrates that:
 - David understands the concept of conservation.
 - David does not understand the concept of conservation.
 - David's cognitive development is "behind" for his age.
 - both b and c are the case.
- Which of the following is *not* one of the criticisms of Piaget's theory of cognitive development?
 - Piaget may have underestimated the cognitive skills of children in some areas.
 - Piaget may have underestimated the influence of cultural factors on cognitive development.
 - The theory does not clearly address the issue of individual differences in development.
 - Evidence for the theory is based on children's answers to questions.
- If a child's primary reason for not drawing pictures on the living room wall with crayons is to avoid the punishment that would inevitably follow this behavior, she would be said to be at which level of moral development?
 - conventional
 - postconventional
 - preconventional
 - unconventional
- The portion of the brain that appears to be the last area to mature fully is the:
 - hypothalamus.
 - corpus callosum.
 - prefrontal cortex.
 - occipital lobe.
- Girls who mature _____ and boys who mature _____ seem to experience more subjective distress and emotional difficulties with the transition to adolescence.
 - early; early
 - early; late
 - late; early
 - late; late
- Sixteen-year-old Foster wants to spend a few years experimenting with different lifestyles and careers before he settles on who and what he wants to be. Foster's behavior illustrates the identity status of:
 - identity moratorium.
 - identity foreclosure.
 - identity achievement.
 - identity diffusion.
- Although women perform about _____ of all housework, about _____ of wives characterize their household division of labor as unfair.
 - one-half; one-half
 - two-thirds; three-quarters
 - two-thirds; one-third
 - three-quarters; one-tenth
- Males have been found to differ slightly from females in three well-documented areas of mental abilities. Which of the following is *not* one of these?
 - verbal ability
 - mathematical ability
 - intelligence
 - visual-spatial abilities
- Research suggests that males exhibit _____ than females and that females have a _____ than males.
 - less cerebral specialization; smaller corpus callosum
 - less cerebral specialization; larger corpus callosum
 - more cerebral specialization; smaller corpus callosum
 - more cerebral specialization; larger corpus callosum

1C p. 419
3C p. 424
4C pp. 425-426
5C pp. 428-429
6D pp. 431-432
7B pp. 434-435
8D p. 436
9C p. 440
10C p. 444
11B p. 443
12A p. 446
13C p. 450
14C p. 459
15D p. 461

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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Personality: Theory, Research, and Assessment



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 Personality Traits: Dispositions and Dimensions
 The Five-Factor Model of Personality Traits

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Recap

Practice Test

Watching Steve Irwin on television, you feel like he's about to jump right out of the set and into your living room. Known to millions of viewers around the world as the Crocodile Hunter, the Australian Irwin is famous—some would say notorious—for his frenetic energy, seeming love of danger, and exuberant affection for some of the world's most terrifying creatures. As one writer described it, "Like some crazed cross between Tarzan and a frat pledge, Steve Irwin flings himself on top of a thrashing crocodile. Slick with mud and blood (his), Irwin wrestles the beast into restraints, then declares to the TV camera, 'She's a beauty!'" (Lee, 2000).

You don't need to have seen Steve Irwin in action to appreciate that he has what most people would describe as an unusual *personality*. He routinely seeks out situations that would give many of us nightmares—getting covered with biting green ants, swimming with killer sharks, grabbing venomous snakes by the tail, hurling himself out of a boat at night onto the back of a 12-foot crocodile whose powerful jaws could easily crush his legs. And he does it all with wide-eyed, boisterous enthusiasm. "One bite and I'm a goner," he'll say as he dodges a spitting cobra or a snapping crocodile. "But isn't he a beaut! Crikey!"

Apparently, it isn't all showmanship. By all accounts, Irwin is just as wildly energetic and thrill seeking off camera as he is on television. One less than friendly interviewer described him as "like a boy with attention deficit disorder after a very serious Hershey's binge" (White, 1997). And if Irwin seems unusually demonstrative in his affection for deadly creatures, that, too, seems to be genuine. When he is not filming, he devotes his time to directing Australia's largest private zoo, and he has declared that educating people about conservation is his life's work. Saving a crocodile that is threatened by poachers can bring him to tears (Irwin & Irwin, 2001).

The example of Steve Irwin points to the mystery of personality. While Irwin may be unusual in many respects, all individuals can be described in terms of characteristics that make up their personalities. But what exactly is personality? How does it develop over time? Are we born with a certain personality, or is experience critical in shaping the qualities that make us who we are? Consider that many of Steve Irwin's qualities were evident from a very early age. Irwin himself has said, "I get called an adrenaline junkie every other minute, and I'm just fine with that. You know what though, mate? I'm doing exactly what I've done from when I was a small boy" (Simpson, 2001). His late mother agreed. She once recalled, "He's always been very, very active—on the verge of hyperactive,

really, very much so. If he went missing, you could always look up a tree; there he'd be" (Stainton, 1999). On the other hand, Irwin's life story points to the role of environment in shaping personality. Irwin clearly had an unusual upbringing. His parents were both lovers of wildlife who opened their own zoo, where Steve grew up. When he was 6 years old, his birthday present from his parents was a 12-foot python. If Irwin is genuinely fond of snakes, is it because that trait is "in his blood," or is it because he was exposed to them from very early in life?

Psychologists have approached questions like these from a variety of perspectives. Traditionally, the study of personality has been dominated by "grand theories" that attempt to explain a great many facets of behavior. Our discussion will reflect this emphasis, as we'll devote most of our time to the sweeping theories of Freud, Jung, Skinner, Rogers, and several others. In recent decades, however, the study of personality has shifted toward narrower research programs that examine specific issues related to personality. The last several sections of the chapter will reflect this trend, as we review biological, cultural, and other contemporary empirical approaches to personality. In the Personal Application, we'll discuss how psychological tests are used to measure various aspects of personality. In the Critical Thinking Application, you'll see how hindsight bias can taint people's analyses of personality.



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Steve Irwin, better known as the Crocodile Hunter, clearly manifests a powerful and unusual personality. But everyone has his or her own unique personality, which makes the study of personality a fascinating area of inquiry in psychology.

> The Nature of Personality

PREVIEW QUESTIONS

- What are the essential features of the concept of personality?
- What are personality traits?
- How many personality traits are necessary to describe personality adequately?

Personality is a complex hypothetical construct that has been defined in a variety of ways. Let's take a closer look at the concepts of personality and personality traits.

Defining Personality: Consistency and Distinctiveness

What does it mean to say that someone has an optimistic personality? This assertion indicates that the person has a fairly *consistent tendency* to behave in a cheerful, hopeful, enthusiastic way, looking at the bright side of things, across a wide variety of situations. Although no one is entirely consistent in behavior, this quality of *consistency across situations* lies at the core of the concept of personality.

Distinctiveness is also central to the concept of personality. Personality is used to explain why not everyone acts the same way in similar situations. If you were stuck in an elevator with three people, each might react differently. One might crack jokes to relieve the tension. Another might make ominous predictions that "we'll never get out of here." The third might calmly think about how to escape. These varied reactions to the same situation occur because each person has a different personality. Each person has traits that are seen in other people, but each individual has his or her own distinctive *set* of personality traits.

In summary, the concept of personality is used to explain (1) the stability in a person's behavior over time and across situations (consistency) and (2) the behavioral differences among people reacting to the same situation (distinctiveness). We can combine these ideas into the following definition: **Personality refers to an individual's unique constellation of consistent behavioral traits.** Let's look more closely at the concept of *traits*.

Personality Traits: Dispositions and Dimensions

Everyone makes remarks like "Jan is very *conscientious*." Or you might assert that "Bill is too *timid* to succeed in that job." These descriptive statements refer to personality traits. **A personality trait is a durable disposition to behave in a particular way in a variety of situations.** Adjectives such as *honest, dependable, moody, impulsive, suspicious, anxious, excitable,*

domineering, and *friendly* describe dispositions that represent personality traits.

Most approaches to personality assume that some traits are more basic than others. According to this notion, a small number of fundamental traits determine other, more superficial traits. For example, a person's tendency to be impulsive, restless, irritable, boisterous, and impatient might all be derived from a more basic tendency to be excitable.

A number of psychologists have taken on the challenge of identifying the basic traits that form the core of personality. For example, Raymond Cattell (1950, 1966, 1990) used the statistical procedure of *factor analysis* to reduce a list of 171 personality traits compiled by Gordon Allport (1937) to just 16 basic dimensions of personality. In **factor analysis, correlations among many variables are analyzed to identify closely related clusters of variables.** If the measurements of a number of variables (in this case, personality traits) correlate highly with one another, the assumption is that a single factor is influencing all of them. Factor analysis is used to identify these hidden factors. In factor analyses of personality traits, these hidden factors are viewed as basic, higher-order traits that determine less basic, more specific traits. Based on his factor analytic work, Cattell concluded that an individual's personality can be described completely by measuring just 16 traits. The 16 crucial traits are listed in **Figure 12.19**, which can be found in the Personal Application, where we discuss a personality test that Cattell designed to assess these traits.

The Five-Factor Model of Personality Traits

In recent years, Robert McCrae and Paul Costa (1987, 1997, 1999, 2003) have used factor analysis to arrive at an even simpler, *five-factor model of personality* (see **Figure 12.1**). McCrae and Costa maintain that most personality traits are derived from just five higher-order traits that have come to be known as the "Big Five":

1. **Extraversion.** People who score high in extraversion are characterized as outgoing, sociable, upbeat, friendly, assertive, and gregarious. Referred to as *positive emotionality* in some trait models, extraversion has been studied extensively for many decades (Watson & Clark, 1997).

2. **Neuroticism.** People who score high in neuroticism tend to be anxious, hostile, self-conscious, insecure, and vulnerable. Like extraversion, this trait has

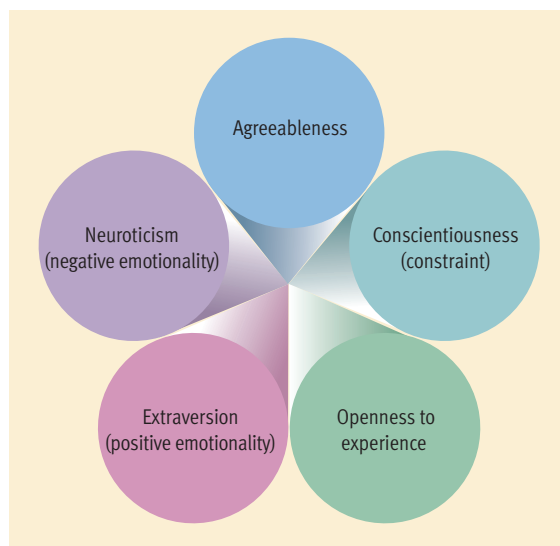


Figure 12.1

The five-factor model of personality. Trait models attempt to analyze personality into its basic dimensions. McCrae and Costa (1985, 1987, 1997) maintain that personality can be described adequately with the five higher-order traits identified here, which are widely referred to as the Big Five.

been the subject of thousands of studies. In some trait models it is called *negative emotionality*. Those who score high in neuroticism tend to overreact more in response to stress than others (Mroczek & Almeida, 2004).

3. *Openness to experience*. Openness is associated with curiosity, flexibility, vivid fantasy, imaginativeness, artistic sensitivity, and unconventional attitudes. McCrae (1996) maintains that its importance has been underestimated. Citing evidence that openness fosters liberalism, he argues that this trait is the key determinant of people's political attitudes and ideology.

4. *Agreeableness*. Those who score high in agreeableness tend to be sympathetic, trusting, cooperative, modest, and straightforward. People who score at the opposite end of this personality dimension are characterized as suspicious, antagonistic, and aggressive. Agreeableness may have its roots in childhood temperament (Graziano & Eisenberg, 1997).

5. *Conscientiousness*. Conscientious people tend to be diligent, disciplined, well organized, punctual, and dependable. Referred to as *constraint* in some trait models, conscientiousness is associated with living longer (Bogg & Roberts, 2004).

Research shows that Big Five traits are predictive of specific aspects of behavior, as one would expect (Paunonen, 2003). For example, extraversion correlates positively with popularity and with dating a greater variety of people. Conscientiousness correlates with greater honesty, earning a higher grade point average in college, higher job performance rat-

ings, and relatively low alcohol consumption. Openness to experience is associated with playing a musical instrument, whereas agreeableness correlates with honesty.

Like Cattell, McCrae and Costa maintain that personality can be described adequately by measuring the basic traits that they've identified. Their bold claim has been supported in many studies by other researchers, and the five-factor model has become the dominant conception of personality structure in contemporary psychology (John & Srivastava, 1999; McCrae, 2005). These five traits have been characterized as the "latitude and longitude" along which personality should be mapped (Ozer & Reise, 1994, p. 361).

However, some theorists have been critical of the model. For example, Dan McAdams (1992) points out that the model is purely descriptive and provides no insight into the causes or development of personality. Jack Block (1995) has questioned the generality of the model. He points out that the higher-order traits that emerge in factor analyses depend to some extent on the exact mix of the much larger set of specific traits that are measured in the first place. Thus, he asserts that the five-factor model is more arbitrary than widely appreciated. Other critics of the five-factor model maintain that more than five traits are necessary to account for most of the variation seen in human personality (Ashton et al., 2004; Benet & Waller, 1995).

The debate about how many dimensions are necessary to describe personality is likely to continue for many years to come. As you'll see throughout the chapter, the study of personality is an area in psychology that has a long history of "dueling theories." We'll divide these diverse personality theories into four broad groups that share certain assumptions, emphases, and interests: (1) psychodynamic perspectives, (2) behavioral perspectives, (3) humanistic perspectives, and (4) biological perspectives. We'll begin our discussion of personality theories by examining the life and work of Sigmund Freud.

➤ REVIEW OF KEY POINTS

- The concept of personality explains the consistency in people's behavior over time and across situations while also explaining their distinctiveness. Factor analysis can be used to identify higher-order traits from which specific traits are derived. There is considerable debate as to how many trait dimensions are necessary to account for the variation in personality.
- The five-factor model has nevertheless become the dominant conception of personality structure. The Big Five personality traits are extraversion, neuroticism, openness to experience, agreeableness, and conscientiousness.

> Psychodynamic Perspectives

PREVIEW QUESTIONS

- How did Freud view the structure of personality?
- Why did Freud think sex and aggression were such important motives?
- How do defense mechanisms work?
- How did Freud explain the development of personality?
- How was Jung's view of the unconscious different from Freud's?
- How did Adler explain inferiority feelings?
- What are the strengths and weaknesses of the psychodynamic approach?

Psychodynamic theories include all the diverse theories descended from the work of Sigmund Freud, which focus on unconscious mental forces. Freud inspired many brilliant scholars who followed in his intellectual footsteps. Some of these followers simply refined and updated Freud's theory. Others veered off in new directions and established independent, albeit related, schools of thought. Today, the psychodynamic umbrella covers a large collection of loosely related theories that we can only sample from in this text. In this chapter, we'll examine the ideas of Sigmund Freud in some detail. Then we'll take a briefer look at the psychodynamic theories of Carl Jung and Alfred Adler.

Freud's Psychoanalytic Theory



Born in 1856, Sigmund Freud grew up in a middle-class Jewish home in Vienna, Austria. He showed an early interest in intellectual pursuits and became an intense, hardworking young man, driven to achieve fame. He experienced his share of inner turmoil and engaged in regular self-analysis for over 40 years. Freud lived in the Victorian era, which was marked by sexual repression. His life was also affected by the first great World War, which devastated Europe, and by the growing anti-Semitism of the times. We'll see that the sexual repression and aggressive hostilities that Freud witnessed left their mark on his view of human nature.

Freud was a physician specializing in neurology when he began his medical practice in Vienna toward the end of the 19th century. Like other neurologists in his era, he often treated people troubled by nervous problems such as irrational fears, obsessions, and anxieties. Eventually he devoted himself to the treatment of mental disorders using an innovative procedure he had developed, called *psychoanalysis*, that required lengthy verbal interactions with patients during which Freud probed deeply into their lives.

Freud's (1901, 1924, 1940) *psychoanalytic theory* grew out of his decades of interactions with his clients in psychoanalysis. Psychoanalytic theory attempts to explain personality, motivation, and psychological disorders by focusing on the influence of early childhood experiences, on unconscious motives and conflicts, and on the methods people use to cope with their sexual and aggressive urges.

Most of Freud's contemporaries were uncomfortable with his theory for at least three reasons. First, in

arguing that people's behavior is governed by unconscious factors of which they are unaware, Freud made the disconcerting suggestion that individuals are not masters of their own minds. Second, in claiming that adult personalities are shaped by childhood experiences and other factors beyond one's control, he suggested that people are not masters of their own destinies. Third, by emphasizing the great importance of how people cope with their sexual urges, he offended those who held the conservative, Victorian values of his time.

Thus, Freud endured a great deal of criticism, condemnation, and outright ridicule, even after his work began to attract more favorable attention. Consider the following recollection from one of Freud's friends: "In those days when one mentioned Freud's name everyone would begin to laugh, as if someone had told a joke. Freud was the queer fellow who wrote a book about dreams . . . He was the man who saw sex in everything. It was considered bad taste to bring up Freud's name in the presence of ladies" (Donn, 1988, p. 57). Let's examine the ideas that generated so much controversy.

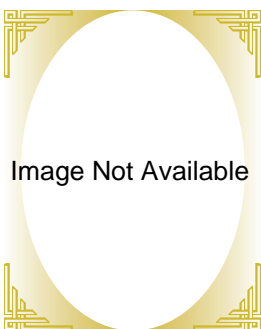
Structure of Personality



Freud divided personality structure into three components: the id, the ego, and the superego (see **Figure 12.2**). He saw a person's behavior as the outcome of interactions among these three components.

The id is the primitive, instinctive component of personality that operates according to the pleasure principle. Freud referred to the id as the reservoir of psychic energy. By this he meant that the id houses the raw biological urges (to eat, sleep, defecate, copulate, and so on) that energize human behavior. The id operates according to the *pleasure principle, which demands immediate gratification of its urges*. The id engages in *primary-process thinking*, which is primitive, illogical, irrational, and fantasy oriented.

The ego is the decision-making component of personality that operates according to the reality principle. The ego mediates between the id, with its forceful desires for immediate satisfaction, and the external social world, with its expectations and norms regarding suitable behavior. The ego considers social realities—society's norms, etiquette, rules, and customs—in deciding how to behave. The ego is guided by the *reality principle, which seeks to delay gratification of the id's urges until appropriate outlets and situations can be found*. In short, to stay out of



SIGMUND FREUD

"No one who, like me, conjures up the most evil of those half-tamed demons that inhabit the human beast, and seeks to wrestle with them, can expect to come through the struggle unscathed."

trouble, the ego often works to tame the unbridled desires of the id.

In the long run, the ego wants to maximize gratification, just as the id does. However, the ego engages in *secondary-process thinking*, which is relatively rational, realistic, and oriented toward problem solving. Thus, the ego strives to avoid negative consequences from society and its representatives (for example, punishment by parents or teachers) by behaving “properly.” It also attempts to achieve long-range goals that sometimes require putting off gratification.

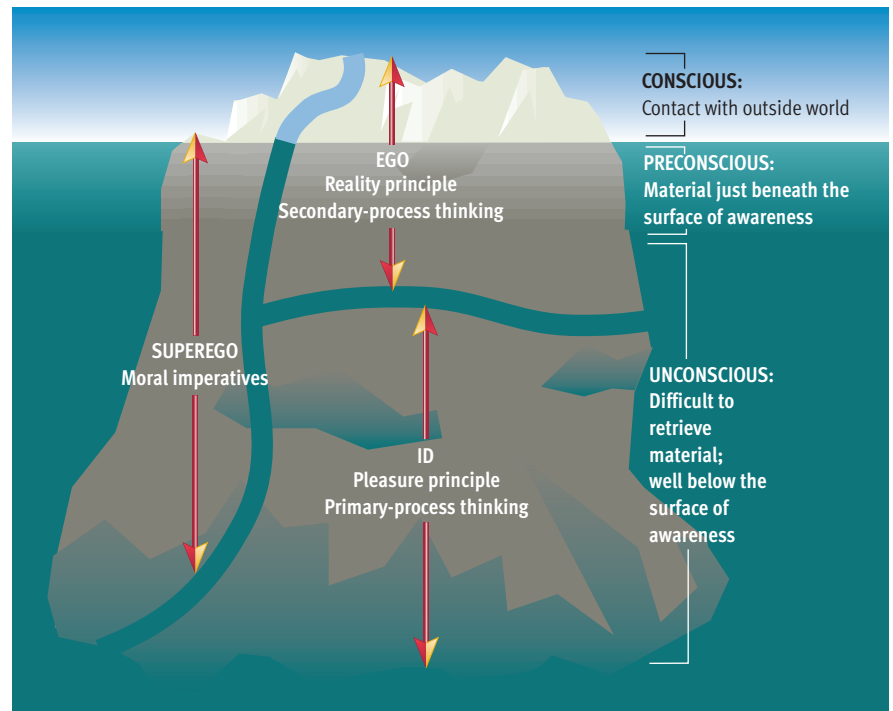
While the ego concerns itself with practical realities, the **superego is the moral component of personality that incorporates social standards about what represents right and wrong**. Throughout their lives, but especially during childhood, people receive training about what constitutes good and bad behavior. Many social norms regarding morality are eventually internalized. The superego emerges out of the ego at around 3 to 5 years of age. In some people, the superego can become irrationally demanding in its striving for moral perfection. Such people are plagued by excessive feelings of guilt. According to Freud, the id, ego, and superego are distributed differently across three levels of awareness, which we’ll describe next.

Levels of Awareness



Perhaps Freud’s most enduring insight was his recognition of how unconscious forces can influence behavior. He inferred the existence of the unconscious from a variety of observations that he made with his patients. For example, he noticed that “slips of the tongue” often revealed a person’s true feelings. He also realized that his patients’ dreams often expressed hidden desires. Most important, through psychoanalysis he often helped patients to discover feelings and conflicts of which they had previously been unaware.

Freud contrasted the unconscious with the conscious and preconscious, creating three levels of awareness. **The conscious consists of whatever one is aware of at a particular point in time.** For example, at this moment your conscious may include the train of thought in this text and a dim awareness in the back of your mind that your eyes are getting tired and you’re beginning to get hungry. **The preconscious contains material just beneath the surface of awareness that can easily be retrieved.** Examples might include your middle name, what you had for supper last night, or an argument you had with a friend yesterday. **The unconscious contains thoughts, memories, and desires that are well below the surface of conscious awareness but that nonetheless exert great influence on behavior.** Examples of material that might be found in your un-



conscious include a forgotten trauma from childhood, hidden feelings of hostility toward a parent, and repressed sexual desires.

Freud’s conception of the mind is often compared to an iceberg that has most of its mass hidden beneath the water’s surface (see Figure 12.2). He believed that the unconscious (the mass below the surface) is much larger than the conscious or preconscious. As you can see in Figure 12.2, he proposed that the ego and superego operate at all three levels of awareness. In contrast, the id is entirely unconscious, expressing its urges at a conscious level through the ego. Of course, the id’s desires for immediate satisfaction often trigger internal conflicts with the ego and superego. These conflicts play a key role in Freud’s theory.

Conflict and the Tyranny of Sex and Aggression



Freud assumed that behavior is the outcome of an ongoing series of internal conflicts. He saw internal battles between the id, ego, and superego as routine. Why? Because the id wants to gratify its urges immediately, but the norms of civilized society frequently dictate otherwise. For example, your id might feel an urge to clobber a co-worker who constantly irritates you. However, society frowns on such behavior, so your ego would try to hold this urge in check. Hence, you would find yourself in conflict. You may be experiencing conflict at this very moment. In Freudian terms, your id may be secretly urging you to abandon reading this chapter so that you can fix a snack and watch some television. Your ego may be

Figure 12.2

Freud’s model of personality structure. Freud theorized that people have three levels of awareness: the conscious, the preconscious, and the unconscious. The enormous size of the unconscious is often dramatized by comparing it to the portion of an iceberg that lies beneath the water’s surface. Freud also divided personality structure into three components—id, ego, and superego—which operate according to different principles and exhibit different modes of thinking. In Freud’s model, the id is entirely unconscious, but the ego and superego operate at all three levels of awareness.



© Peter Aprahamian/Corbis

Freud's psychoanalytic theory was based on decades of clinical work. He treated a great many patients in the consulting room pictured here. The room contains numerous artifacts from other cultures—and the original psychoanalytic couch.

weighing this appealing option against your society-induced need to excel in school.

Freud believed that people's lives are dominated by conflict. He asserted that individuals careen from one conflict to another. The following scenario provides a concrete illustration of how the three components of personality interact to create constant conflicts:

Imagine lurching across your bed to shut off your alarm clock as it rings obnoxiously. It's 7 A.M. and time to get up for your history class. However, your id (operating according to the pleasure principle) urges you to return to the immediate gratification of additional sleep. Your ego (operating according to the reality principle) points out that you really must go to class since you haven't been able to decipher the textbook on your own. Your id (in its typical unrealistic fashion) smugly assures you that you will get the A grade that you need and suggests lying back to dream about how impressed your roommates will be. Just as you're relaxing, your superego jumps into the fray. It tries to make you feel guilty about all the money your parents paid in tuition for the class that you're about to skip. You haven't even gotten out of bed yet, but there's already a pitched battle in your psyche.

Let's say your ego wins the battle. You pull yourself out of bed and head for class. On the way, you pass a donut shop and your id clamors for cinnamon rolls. Your ego reminds you that you're supposed to be on a diet. Your id wins this time. After you've attended your history lecture, your ego reminds you that you need to do some library research for a paper in philosophy. However, your id insists on returning to your apartment to watch some sitcom reruns. As you reenter your apartment, you're overwhelmed by how messy it is. It's your roommates' mess,

and your id suggests that you tell them off. As you're about to lash out, however, your ego convinces you that diplomacy will be more effective. Three sitcoms later you find that you're in a debate with yourself about whether to go to the gym to work out or to the student union to play pool. It's only midafternoon—and already you've been through a series of internal conflicts.

Freud believed that conflicts centering on sexual and aggressive impulses are especially likely to have far-reaching consequences. Why did he emphasize sex and aggression? Two reasons were prominent in his thinking. First, he thought that sex and aggression are subject to more complex and ambiguous social controls than other basic motives. The norms governing sexual and aggressive behavior are subtle, and people often get inconsistent messages about what's appropriate. Thus, Freud believed that these two drives are the source of much confusion. Second, he noted that the sexual and aggressive drives are thwarted more regularly than other basic biological urges. Think about it: If you get hungry or thirsty, you can simply head for a nearby vending machine or a drinking fountain. But if a department store clerk infuriates you, you aren't likely to reach across the counter and slug him or her. Likewise, when you see a person who inspires lustful urges, you don't normally walk up and propose a tryst in a nearby broom closet. There's nothing comparable to vending machines or drinking fountains for the satisfaction of sexual and aggressive urges. Freud ascribed great importance to these needs because social norms dictate that they be routinely frustrated.

Anxiety and Defense Mechanisms



Most internal conflicts are trivial and are quickly resolved one way or the other. Occasionally, however, a conflict will linger for days, months, or even years, creating internal tension. More often than not, such prolonged and troublesome conflicts involve sexual and aggressive impulses that society wants to tame. These conflicts are often played out entirely in the unconscious. Although you may not be aware of these unconscious battles, they can produce *anxiety* that slips to the surface of conscious awareness. The anxiety can be attributed to your ego worrying about (1) the id getting out of control and doing something terrible that leads to severe negative consequences or (2) the superego getting out of control and making you feel guilty about a real or imagined transgression.

The arousal of anxiety is a crucial event in Freud's theory of personality functioning (see **Figure 12.3**). Anxiety is distressing, so people try to rid themselves of this unpleasant emotion any way they can. This ef-

Web Link 12.1



The Victorian Web Psychoanalysis initially developed within a late-19th-century context that is comprehensively portrayed in English Professor George Landow's (Brown University) important [hypertext archive](#).



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fort to ward off anxiety often involves the use of defense mechanisms. **Defense mechanisms are largely unconscious reactions that protect a person from unpleasant emotions such as anxiety and guilt** (see Table 12.1). Typically, they're mental maneuvers that work through self-deception. Consider **rationalization, which is creating false but plausible excuses to justify unacceptable behavior**. For example, after cheating someone in a business transaction, you might reduce your guilt by rationalizing that "everyone does it."

Characterized as "the flagship in the psychoanalytic fleet of defense mechanisms" (Paulhus, Fridhandler, & Hayes, 1997), repression is the most basic and widely used defense mechanism. **Repression is keeping distressing thoughts and feelings buried in the unconscious**. People tend to repress desires that make them feel guilty, conflicts that make them anxious, and memories that are painful. Repression has been called "motivated forgetting." If you forget a dental appointment or the name of someone you don't like, repression may be at work.

Self-deception can also be seen in projection and displacement. **Projection is attributing one's own thoughts, feelings, or motives to another**. Usually, the thoughts one projects onto others are thoughts that would make one feel guilty. For example, if lusting for a co-worker makes you feel guilty, you might attribute any latent sexual tension between the two of you to the *other person's* desire to seduce you. **Displacement is diverting emotional feelings (usually anger) from their original source to a substitute target**. If your boss gives you a hard time at work and you come home and slam the door, kick the dog, and scream at your spouse, you're displacing your anger onto irrelevant targets. Unfortunately, social constraints often force people to hold back their anger, and they end up lashing out at the people they love most.

Other prominent defense mechanisms include reaction formation, regression, and identification. **Reaction formation is behaving in a way that's exactly the opposite of one's true feelings**. Guilt about sexual desires often leads to reaction formation. For example, Freud theorized that many males who ridicule homosexuals are defending against their own latent homosexual impulses. The telltale sign of reaction formation is the exaggerated quality of the opposite behavior. **Regression is a reversion to immature patterns of behavior**. When anxious about their self-worth, some adults respond with childish boasting and bragging (as opposed to subtle efforts to impress others). For example, a fired executive having difficulty finding a new job might start making ridiculous statements about his incomparable talents and achievements. Such bragging is regressive when it's marked by massive exaggerations that virtually anyone can see through. **Identification is bolstering self-esteem by forming an imaginary or real alliance with some person or group**. Youngsters often shore up precarious feelings of self-worth by identifying with rock stars, movie stars, or famous athletes. Adults may

Figure 12.3
Freud's model of personality dynamics. According to Freud, unconscious conflicts between the id, ego, and superego sometimes lead to anxiety. This discomfort may lead to the use of defense mechanisms, which may temporarily relieve anxiety.

Table 12.1 Defense Mechanisms, with Examples

Defense Mechanism	Definition	Example
Repression	Keeping distressing thoughts and feelings buried in the unconscious	A traumatized soldier has no recollection of the details of a close brush with death.
Projection	Attributing one's own thoughts, feelings, or motives to another	A woman who dislikes her boss thinks she likes her boss but feels that the boss doesn't like her.
Displacement	Diverting emotional feelings (usually anger) from their original source to a substitute target	After parental scolding, a young girl takes her anger out on her little brother.
Reaction formation	Behaving in a way that is exactly the opposite of one's true feelings	A parent who unconsciously resents a child spoils the child with outlandish gifts.
Regression	A reversion to immature patterns of behavior	An adult has a temper tantrum when he doesn't get his way.
Rationalization	Creating false but plausible excuses to justify unacceptable behavior	A student watches TV instead of studying, saying that "additional study wouldn't do any good anyway."
Identification	Bolstering self-esteem by forming an imaginary or real alliance with some person or group	An insecure young man joins a fraternity to boost his self-esteem.

Note: See Table 13.2 for additional examples of defense mechanisms.

concept check 12.1

Identifying Defense Mechanisms

Check your understanding of defense mechanisms by identifying specific defenses in the story below. Each example of a defense mechanism is underlined, with a number beneath it. Write in the defense at work in each case in the numbered spaces after the story. The answers are in Appendix A.

My girlfriend recently broke up with me after we had dated seriously for several years. At first, I cried a great deal and locked myself in my room, where I pouted endlessly¹. I was sure that my former girlfriend felt as miserable as I did. I told several friends that she was probably lonely and depressed². Later, I decided that I hated her. I was happy about the breakup and talked about how much I was going to enjoy my newfound freedom³. I went to parties and socialized a great deal and just forgot³ about her. It's funny—at one point I couldn't even remember her phone number!⁴ Then I started pining for her again. But eventually I began to look at the situation more objectively. I realized that she had many faults and that we were bound to break up sooner or later, so I was better off without her⁵.

1. _____
2. _____
3. _____

4. _____
5. _____

join exclusive country clubs or civic organizations as a means of identification.

Recent decades have brought a revival of interest in research on defense mechanisms. For example, a series of studies have identified a *repressive coping style* and shown that “repressors” have an impoverished memory for emotional events and negative feedback and that they habitually avoid unpleasant emotions by distracting themselves with pleasant thoughts and memories (Boden & Baumeister, 1997; Weinberger & Davidson, 1994). In another line of research, Newman, Duff, and Baumeister (1997) have shed new light on the cognitive dynamics of *projection*. They showed that people actively work to suppress thoughts about the possibility that they might have an undesirable trait (say, dishonesty), but this ongoing effort makes thoughts about the unwanted trait highly accessible, so they chronically use this trait concept to explain others’ behavior and end up routinely attributing the trait to others. Another interesting study provided support for the Freudian hypothesis that reaction formation underlies homophobia in males. Adams, Wright, and Lohr (1996) found that when homophobic men are shown an erotic videotape depicting homosexual activity, they exhibit sexual arousal not seen in nonhomophobic subjects.

A great variety of theorists have made extensive additions to Freud’s original list of defenses (Vailant, 1992). We’ll examine some of these additional defense mechanisms in the next chapter, when we discuss the role of defenses in coping with stress. For now, however, let’s turn our attention to Freud’s ideas about the development of personality.

Development: Psychosexual Stages



Freud believed that “the child is father to the man.” In fact, he made the rather startling assertion that the basic foundation of an individual’s personality has been laid down by the tender age of 5. To shed light on these crucial early years, Freud formulated a stage theory of development. He emphasized how young children deal with their immature but powerful sexual urges (he used the term *sexual* in a general way to refer to many urges for physical pleasure). According to Freud, these sexual urges shift in focus as children progress from one stage of development to another. Indeed, the names for the stages (oral, anal, genital, and so on) are based on where children are focusing their erotic energy during that period. Thus, **psychosexual stages are developmental periods with a characteristic sexual focus that leave their mark on adult personality.**

Freud theorized that each psychosexual stage has its own unique developmental challenges or tasks (see **Table 12.2**). The way these challenges are handled supposedly shapes personality. The process of *fixation* plays an important role in this process. **Fixation is a failure to move forward from one stage to another as expected.** Essentially, the child’s development stalls for a while. Fixation can be caused by *excessive gratification* of needs at a particular stage or by *excessive frustration* of those needs. Either way, fixations left over from childhood affect adult personality. Generally, fixation leads to an overemphasis on the psychosexual needs prominent during the fixated stage. Freud described a series of five psychosexual

Web Link 12.2



Sigmund Freud Museum, Vienna, Austria

This online museum, in both English and German versions, offers a detailed chronology of Freud’s life and an explanation of the most important concepts of psychoanalysis. The highlights here, though, are the rich audiovisual resources, including photos, amateur movie clips, and voice recordings of Freud.

Table 12.2 Freud's Stages of Psychosexual Development

Stage	Approximate Ages	Erotic Focus	Key Tasks and Experiences
Oral	0–1	Mouth (sucking, biting)	Weaning (from breast or bottle)
Anal	2–3	Anus (expelling or retaining feces)	Toilet training
Phallic	4–5	Genitals (masturbating)	Identifying with adult role models; coping with Oedipal crisis
Latency	6–12	None (sexually repressed)	Expanding social contacts
Genital	Puberty onward	Genitals (being sexually intimate)	Establishing intimate relationships; contributing to society through working

stages. Let's examine some of the highlights in this sequence.

Oral Stage. This stage encompasses the first year of life. During this period, the main source of erotic stimulation is the mouth (in biting, sucking, chewing, and so on). In Freud's view, the handling of the child's feeding experiences is crucial to subsequent development. He attributed considerable importance to the manner in which the child is weaned from the breast or the bottle. According to Freud, fixation at the oral stage could form the basis for obsessive eating or smoking later in life (among many other things).

Anal Stage. In their second year, children get their erotic pleasure from their bowel movements, through either the expulsion or retention of feces. The crucial event at this time is toilet training, which represents society's first systematic effort to regulate the child's biological urges. Severely punitive toilet training leads to a variety of possible outcomes. For example, excessive punishment might produce a latent feeling of hostility toward the "trainer," usually the mother. This hostility might generalize to women as a class. Another possibility is that heavy reliance on punitive measures could lead to an association between genital concerns and the anxiety that the punishment arouses. This genital anxiety derived from severe toilet training could evolve into anxiety about sexual activities later in life.

Phallic Stage. Around age 4, the genitals become the focus for the child's erotic energy, largely through self-stimulation. During this pivotal stage, the *Oedipal complex* emerges. That is, little boys develop an erotically tinged preference for their mother. They also feel hostility toward their father, whom they view as a competitor for mom's affection. Similarly, little girls develop a special attachment to their father. Around the same time, they learn that little boys have very different genitals, and supposedly they develop *penis envy*. According to Freud, young girls feel hos-

tile toward their mother because they blame her for their anatomical "deficiency."

To summarize, **in the Oedipal complex children manifest erotically tinged desires for their opposite-sex parent, accompanied by feelings of hostility toward their same-sex parent.** The name for this syndrome was taken from a tragic myth from ancient Greece. In this story, Oedipus was separated from his parents at birth. Not knowing the identity of his real parents, when he grew up he inadvertently killed his father and married his mother.

According to Freud, the way parents and children deal with the sexual and aggressive conflicts inherent in the Oedipal complex is of paramount importance. The child has to resolve the Oedipal dilemma by purging the sexual longings for the opposite-sex parent and by crushing the hostility felt toward the same-sex parent. In Freud's view, healthy psychosexual development hinges on the resolution of the Oedipal conflict. Why? Because continued hostility toward the same-sex parent may prevent the child from identifying adequately with that parent. Freudian theory predicts that without such identification, sex typing, conscience, and many other aspects of the child's development won't progress as they should.

Latency and Genital Stages. From around age 6 through puberty, the child's sexuality is largely suppressed—it becomes *latent*. Important events during this *latency stage* center on expanding social contacts beyond the immediate family. With puberty, the child progresses into the *genital stage*. Sexual urges reappear and focus on the genitals once again. At this point, sexual energy is normally channeled toward peers of the other sex, rather than toward oneself as in the phallic stage.

In arguing that the early years shape personality, Freud did not mean that personality development comes to an abrupt halt in middle childhood. However, he did believe that the foundation for adult personality has been solidly entrenched by this time. He maintained that future developments are rooted in



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According to Freud, early childhood experiences such as toilet training (a parental attempt to regulate a child's biological urges) can influence an individual's personality, with consequences lasting throughout adulthood.

early, formative experiences and that significant conflicts in later years are replays of crises from childhood.

In fact, Freud believed that unconscious sexual conflicts rooted in childhood experiences cause most personality disturbances. His steadfast belief in the psychosexual origins of psychological disorders eventually led to bitter theoretical disputes with two of his most brilliant colleagues: Carl Jung and Alfred Adler. Jung and Adler both argued that Freud overemphasized sexuality. Freud rejected their ideas, and the other two theorists felt compelled to go their own way, developing their own theories of personality.

Jung's Analytical Psychology

Carl Jung was born to middle-class Swiss parents in 1875. The son of a Protestant pastor, he was a deeply introverted, lonely child, but an excellent student. Jung had earned his medical degree and was an established young psychiatrist in Zurich when he began to write to Freud in 1906. When the two men had their first meeting, they were so taken by each other's insights, they talked nonstop for 13 hours! They exchanged 359 letters before their friendship and theoretical alliance were torn apart. Their relationship was ruptured irreparably in 1913 by a variety of theoretical disagreements.

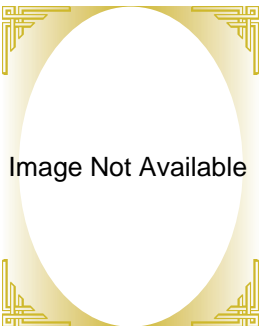
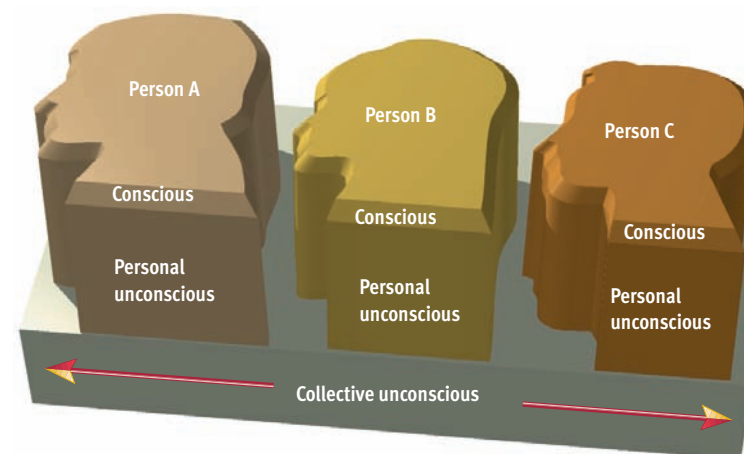
Figure 12.4

Jung's vision of the collective unconscious. Much like Freud, Jung theorized that each person has conscious and unconscious levels of awareness. However, he also proposed that the entire human race shares a collective unconscious, which exists in the deepest reaches of everyone's awareness. He saw the collective unconscious as a storehouse of hidden ancestral memories, called archetypes. Jung believed that important cultural symbols emerge from these universal archetypes. Thus, he argued that remarkable resemblances among symbols from disparate cultures (such as the mandalas shown here) are evidence of the existence of the collective unconscious.

Source: Images from C. G. Jung *Bild Und Wort*, © Walter-Verlag AG, Olten, Switzerland, 1977

Jung called his new approach *analytical psychology* to differentiate it from Freud's psychoanalytic theory. Jung's analytical psychology eventually attracted many followers. Perhaps because of his conflicts with Freud, Jung claimed to deplore the way schools of thought often become dogmatic, discouraging new ideas. Although many theorists came to characterize themselves as "Jungians," Jung himself often remarked, "I am not a Jungian" and said, "I do not want anybody to be a Jungian. I want people above all to be themselves" (van der Post, 1975).

Like Freud, Jung (1921, 1933) emphasized the unconscious determinants of personality. However, he proposed that the unconscious consists of two layers. The first layer, called the *personal unconscious*, is essentially the same as Freud's version of the unconscious. **The *personal unconscious* houses material that is not within one's conscious awareness because it has been repressed or forgotten.** In addition, Jung theorized the existence of a deeper layer he called the collective unconscious. **The *collective unconscious* is a storehouse of latent memory traces inherited from people's ancestral past.** According to Jung, each person shares the collective unconscious with the entire human race (see **Figure 12.4**). It contains the "whole spiritual heritage of mankind's evolution, born anew in the brain struc-



CARL JUNG

"I am not a Jungian . . . I do not want anybody to be a Jungian. I want people above all to be themselves."

ture of every individual” (Jung, quoted in Campbell, 1971, p. 45).

Jung called these ancestral memories *archetypes*. They are not memories of actual, personal experiences. Instead, **archetypes are emotionally charged images and thought forms that have universal meaning**. These archetypal images and ideas show up frequently in dreams and are often manifested in a culture’s use of symbols in art, literature, and religion. According to Jung, symbols from very different cultures often show striking similarities because they emerge from archetypes that are shared by the whole human race. For instance, Jung found numerous cultures in which the *mandala*, or “magic circle,” has served as a symbol of the unified wholeness of the self (see **Figure 12.4**). Jung felt that an understanding of archetypal symbols helped him make sense of his patients’ dreams. This was of great concern to him, as he thought that dreams contain important messages from the unconscious. Like Freud, he depended extensively on dream analysis in his treatment of patients.

Jung’s unusual ideas about the collective unconscious had little impact on the mainstream of thinking in psychology. Their influence was felt more in other fields, such as anthropology, philosophy, art, and religious studies. However, many of Jung’s other ideas *have* been incorporated into the mainstream of psychology. For instance, Jung was the first to describe the introverted (inner-directed) and extraverted (outer-directed) personality types. **Introverts tend to be preoccupied with the internal world of their own thoughts, feelings, and experiences**. Like Jung himself, they generally are contemplative and aloof. In contrast, **extraverts tend to be interested in the external world of people and things**. They’re more likely to be outgoing, talkative, and friendly, instead of reclusive.

Adler’s Individual Psychology

Like Freud, Alfred Adler grew up in Vienna in a middle-class Jewish home. He was a sickly child who struggled to overcome rickets and an almost fatal case of pneumonia. At home, he was overshadowed by an exceptionally bright and successful older brother. Nonetheless, he went on to earn his medical degree, and he practiced ophthalmology and general medicine before his interest turned to psychiatry. He was a charter member of Freud’s inner circle—the Vienna Psychoanalytic Society. However, he soon began to develop his own theory of personality, perhaps because he didn’t want to be dominated once again by an “older brother” (Freud). His theorizing was denounced by Freud in 1911, and Adler was forced to resign from the Psychoanalytic Society. He took 9 of its 23 mem-

bers with him to form his own organization. Adler’s new approach to personality was christened *individual psychology*.

Like Jung, Adler (1917, 1927) argued that Freud had gone overboard in centering his theory on sexual conflicts. According to Adler, the foremost source of human motivation is a striving for superiority. In his view, this striving does not necessarily translate into the pursuit of dominance or high status. Adler saw **striving for superiority as a universal drive to adapt, improve oneself, and master life’s challenges**. He noted that young children understandably feel weak and helpless in comparison with more competent older children and adults. These early inferiority feelings supposedly motivate them to acquire new skills and develop new talents. Thus, Adler maintained that striving for superiority is the prime goal of life, rather than physical gratification (as suggested by Freud).

Adler asserted that everyone has to work to overcome some feelings of inferiority—a process he called compensation. **Compensation involves efforts to overcome imagined or real inferiorities by developing one’s abilities**. Adler believed that compensation is entirely normal. However, in some people inferiority feelings can become excessive, resulting in what is widely known today as an *inferiority complex*—exaggerated feelings of weakness and inadequacy. Adler thought that either parental pampering or parental neglect could cause an inferiority complex. Thus, he agreed with Freud on the importance of early childhood experiences, although he focused on different aspects of parent-child relations.

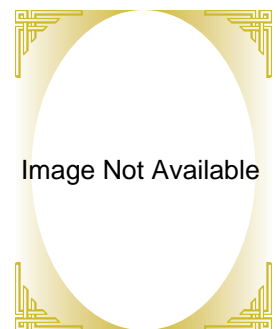
Adler explained personality disturbances by noting that excessive inferiority feelings can pervert the normal process of striving for superiority. He asserted that some people engage in *overcompensation* to conceal, even from themselves, their feelings of inferiority. Instead of working to master life’s challenges, people with an inferiority complex work to achieve status, gain power over others, and acquire the trappings of success (fancy clothes, impressive cars, or whatever looks important to them). They tend to flaunt their success in an effort to cover up their underlying inferiority complex. However, the problem is that such people engage in unconscious self-deception, worrying more about *appearances* than *reality*.

Adler’s theory stressed the social context of personality development (Hoffman, 1994). For instance, it was Adler who first focused attention on the possible importance of *birth order* as a factor governing personality. He noted that first-borns, second children, and later-born children enter varied home environments and are treated differently by parents and that these experiences are likely to affect their personal-

Web Link 12.3



C. G. Jung, Analytical Psychology, & Culture Synchronicity, archetypes, collective unconscious, introversion, extraversion—these and many other important concepts arising from analytical psychology and Jung’s tremendously influential theorizing are examined at this comprehensive site.



ALFRED ADLER

“The goal of the human soul is conquest, perfection, security, superiority.”

Adler's theory has been used to analyze the tragic life of the legendary actress Marilyn Monroe (Ansbacher, 1970). During her childhood, Monroe suffered from parental neglect that left her with acute feelings of inferiority. Her inferiority feelings led her to overcompensate by flaunting her beauty, marrying celebrities (Joe DiMaggio and Arthur Miller), keeping film crews waiting for hours, and seeking the adoration of her fans.



Bettmann/Corbis

ity. For example, he hypothesized that only children are often spoiled by excessive attention from parents and that first-borns are often problem children because they become upset when they're "dethroned" by a second child. Adler's theory stimulated hundreds of studies on the effects of birth order, but these studies generally failed to support his hypotheses and did not uncover any reliable correlations between birth order and personality (Ernst & Angst, 1983; J. R. Harris, 2000).

In recent years, however, Frank Sulloway (1995, 1996) has argued persuasively that birth order *does* have an impact on personality. Sulloway's reformulated hypotheses focus on how the Big Five traits are shaped by competition among siblings as they struggle to find a "niche" in their family environments. For example, he hypothesizes that first-borns should be more conscientious but less agreeable and open to experience than later-borns. In light of these personality patterns, he further speculates that first-borns tend to be conventional and achievement oriented, whereas later-borns tend to be liberal and rebellious. To evaluate his hypotheses, Sulloway reexamined decades of research on birth order. After eliminating many studies that failed to control for important confounding variables, such as social class and family size, he concluded that the results of the remaining, well-controlled studies provided impressive evidence in favor of his hypotheses. Some subsequent studies have provided additional support for Sulloway's analyses (Paulhus, Trapnell, & Chen, 1999; Rohde et al., 2003), but others have not (Freese, Powell, & Steelman, 1999; J. R. Harris, 2000; Skinner, 2003). More

studies will be needed, as research on birth order is enjoying a bit of a renaissance.

Evaluating Psychodynamic Perspectives

The psychodynamic approach has provided a number of far-reaching, truly "grand" theories of personality. These theories yielded some bold new insights when they were first presented. Although one might argue about exact details of interpretation, research has demonstrated that (1) unconscious forces can influence behavior, (2) internal conflict often plays a key role in generating psychological distress, (3) early childhood experiences can have powerful influences on adult personality, and (4) people do use defense mechanisms to reduce their experience of unpleasant emotions (Bornstein, 2003; Westen, 1998; Westen & Gabbard, 1999).

In addition to being praised, psychodynamic formulations have also been criticized on several grounds, including the following (Eysenck, 1990b; Fine, 1990; Macmillan, 1991; Torrey, 1992):

1. *Poor testability.* Scientific investigations require testable hypotheses. Psychodynamic ideas have often been too vague and conjectural to permit a clear scientific test. For instance, how would you prove or disprove the assertion that the id is entirely unconscious?

2. *Inadequate evidence.* The empirical evidence on psychodynamic theories has often been characterized as "inadequate." Psychodynamic theories depend too heavily on clinical case studies in which it's much too easy for clinicians to see what they expect to see. Re-examinations of Freud's own clinical work suggest that he frequently distorted his patients' case histories to make them mesh with his theory (Esterson, 2001; Powell & Boer, 1995). Insofar as researchers have accumulated evidence on psychodynamic theories, the evidence has provided only modest support for many of the central hypotheses (Fisher & Greenberg, 1985, 1996; Westen & Gabbard, 1999).

3. *Sexism.* Many critics have argued that psychodynamic theories are characterized by a sexist bias against women. Freud believed that females' penis envy made them feel inferior to males. He also thought that females tended to develop weaker superegos and to be more prone to neurosis than males. The sex bias in modern psychodynamic theories has been reduced considerably. Nonetheless, the psychodynamic approach has generally provided a rather male-centered point of view (Lerman, 1986; Person, 1990).

It's easy to ridicule Freud for concepts such as penis envy, and it's easy to point to Freudian ideas that have turned out to be wrong. However, you have to re-

member that Freud, Jung, and Adler began to fashion their theories over a century ago. It's not entirely fair to compare these theories to other models that are only a decade or two old. That's like asking the Wright brothers to race a modern military jet. Freud and his colleagues deserve great credit for breaking new ground with their speculations about psychodynamics. In psychology as a whole, no other school of thought has been as influential, with the exception of behaviorism, which we turn to next.

➤ REVIEW OF KEY POINTS

- Psychodynamic approaches include all the theories derived from Freud's insights. Freud described personality structure in terms of three components—the id, ego, and superego—which are routinely involved in an ongoing series of internal conflicts.
- Freud described three levels of awareness: the conscious, the preconscious, and the unconscious. His theory emphasized the importance of unconscious processes. Freud theorized that conflicts centering on sex and aggression are especially likely to lead to significant anxiety. According

to Freud, anxiety and other unpleasant emotions such as guilt are often warded off with defense mechanisms.

- Freud believed that the first five years of life are extremely influential in shaping adult personality. He described a series of five psychosexual stages of development: oral, anal, phallic, latency, and genital. Certain experiences during these stages can have lasting effects on adult personality. Resolution of the Oedipal complex is thought to be particularly critical to healthy development.
- Jung's most innovative concept was the collective unconscious, a storehouse of latent memory traces inherited from people's ancestral past. Archetypes are emotionally charged images that have universal meaning. Jung also provided the first description of introversion and extraversion.
- Adler's individual psychology emphasizes how people strive for superiority to compensate for their feelings of inferiority. He explained personality disturbances in terms of overcompensation and inferiority complexes.
- Overall, psychodynamic theories have produced many groundbreaking insights about the unconscious, the role of internal conflict, and the importance of early childhood experiences in personality development. However, psychodynamic theories have been criticized for their poor testability, their inadequate base of empirical evidence, and their male-centered views.

➤ Behavioral Perspectives

Behaviorism is a theoretical orientation based on the premise that scientific psychology should study only observable behavior. As we saw in Chapter 1, behaviorism has been a major school of thought in psychology since 1913, when John B. Watson began campaigning for the behavioral point of view. Research in the behavioral tradition has focused largely on learning. For many decades behaviorists devoted relatively little attention to the study of personality. However, their interest in personality began to pick up after John Dollard and Neal Miller (1950) attempted to translate selected Freudian ideas into behavioral terminology. Dollard and Miller showed that behavioral concepts could provide enlightening insights about the complicated subject of personality.

In this section, we'll examine three behavioral views of personality, as we discuss the ideas of B. F. Skinner, Albert Bandura, and Walter Mischel. For the most part, you'll see that behaviorists explain personality the same way they explain everything else—in terms of learning.

Skinner's Ideas Applied to Personality



As we noted in Chapters 1 and 6, modern behaviorism's most prominent theorist has been B. F. Skinner, an American psychologist who lived from 1904 to

1990. After earning his doctorate in 1931, Skinner spent most of his career at Harvard University. There he achieved renown for his research on the principles of learning, which were mostly discovered through the study of rats and pigeons. Skinner's (1953, 1957) concepts of *operant conditioning* were never meant to be a theory of personality. However, his ideas have affected thinking in all areas of psychology and have been applied to the explanation of personality. Here we'll examine Skinner's views as they relate to personality structure and development.

Personality Structure: A View from the Outside



Skinner made no provision for internal personality structures similar to Freud's id, ego, and superego because such structures can't be observed. Following in the tradition of Watson's radical behaviorism, Skinner showed little interest in what goes on "inside" people. He argued that it's useless to speculate about private, unobservable cognitive processes. Instead, he focused on how the external environment molds overt behavior. Indeed, he argued for a strong brand of *determinism*, asserting that behavior is fully determined by environmental stimuli. He claimed that free will is but an illusion, saying, "There is no place in the scientific position for a self as a true originator or initiator of action" (Skinner, 1974, p. 225).

PREVIEW QUESTIONS

- How can Skinner's theory explain personality and its development?
- How did Bandura revise the behavioral approach to personality?
- What is self-efficacy, and how does it affect behavior?
- How did Mischel question the concept of personality?
- What are the strengths and weaknesses of the behavioral approach?

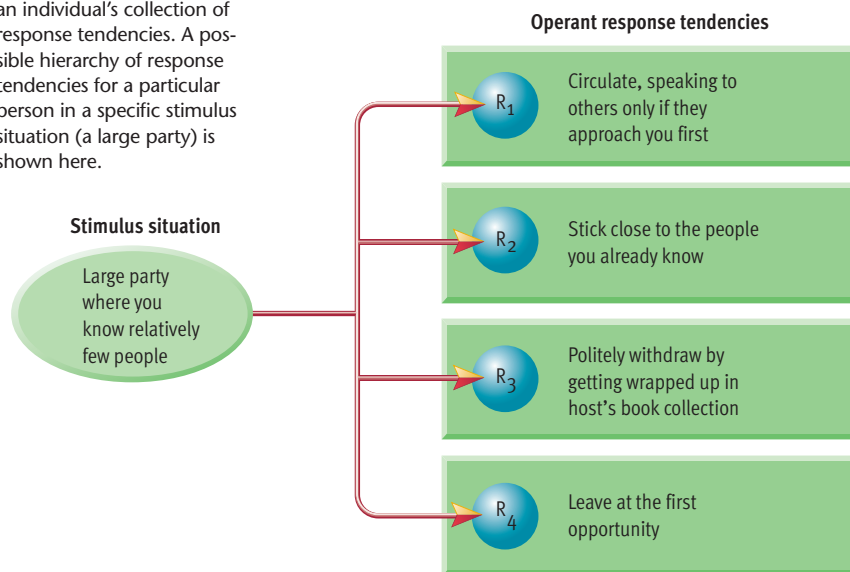


B. F. SKINNER

"The practice of looking inside the organism for an explanation of behavior has tended to obscure the variables which are immediately available for a scientific analysis. These variables lie outside the organism, in its immediate environment and in its environmental history. . . . The objection to inner states is not that they do not exist, but that they are not relevant."

Figure 12.5

A behavioral view of personality. Staunch behaviorists devote little attention to the structure of personality because it is unobservable, but they implicitly view personality as an individual's collection of response tendencies. A possible hierarchy of response tendencies for a particular person in a specific stimulus situation (a large party) is shown here.



How can Skinner's theory explain the consistency that can be seen in individuals' behavior? According to his view, people show some consistent patterns of behavior because they have some stable *response tendencies* that they have acquired through experience. These response tendencies may change in the future, as a result of new experience, but they're enduring enough to create a certain degree of consistency in a person's behavior. Implicitly, then, Skinner viewed an individual's personality as a *collection of response tendencies that are tied to various stimulus situations*. A specific situation may be associated with a number of response tendencies that vary in strength, depending on past conditioning (see **Figure 12.5**).

Personality Development as a Product of Conditioning



Skinner's theory accounts for personality development by explaining how various response tendencies are acquired through learning. He believed that most human responses are shaped by the type of conditioning that he described: operant conditioning. As discussed in Chapter 6, Skinner maintained that environmental consequences—reinforcement, punishment, and extinction—determine people's patterns of responding. On the one hand, when responses are followed by favorable consequences (reinforcement), they are strengthened. For example, if your joking at a party pays off with favorable attention, your tendency to joke at parties will increase (see **Figure 12.6**). On the other hand, when responses lead to negative consequences (punishment), they are weakened. Thus, if your impulsive decisions always backfire, your tendency to be impulsive will decline.

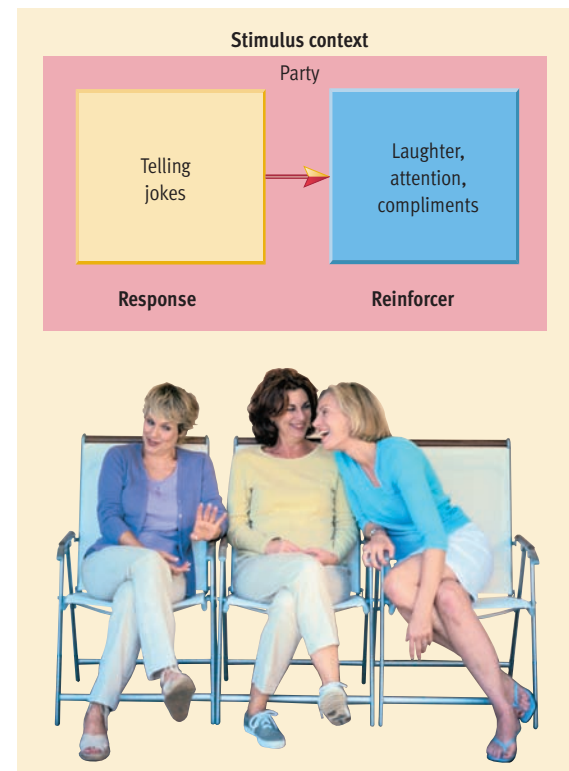
Because response tendencies are constantly being strengthened or weakened by new experiences, Skinner's theory views personality development as a continuous, lifelong journey. Unlike Freud and many other theorists, Skinner saw no reason to break the developmental process into stages. Nor did he attribute special importance to early childhood experiences.

Skinner believed that conditioning in humans operates much the same as it did in the rats and pigeons that he studied in his laboratory. Hence, he assumed that conditioning strengthens and weakens response tendencies "mechanically"—that is, without the person's conscious participation. Thus, Skinner was able to explain consistencies in behavior (personality) without being concerned about individuals' cognitive processes.

Skinner's ideas continue to be highly influential, but his mechanical, deterministic, noncognitive view of personality has not gone unchallenged by other behaviorists. In recent decades, several theorists have developed somewhat different behavioral models with a more cognitive emphasis.

Figure 12.6

Personality development and operant conditioning. According to Skinner, people's characteristic response tendencies are shaped by reinforcers and other consequences that follow behavior. Thus, if your joking at a party leads to attention and compliments, your tendency to be witty and humorous will be strengthened.



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Bandura's Social Cognitive Theory



Albert Bandura is a modern theorist who has helped reshape the theoretical landscape of behaviorism. Bandura grew up in Canada and earned his doctorate in psychology at the University of Iowa. He has spent his entire academic career at Stanford University, where he has conducted influential research on behavior therapy and the determinants of aggression.

Cognitive Processes and Reciprocal Determinism

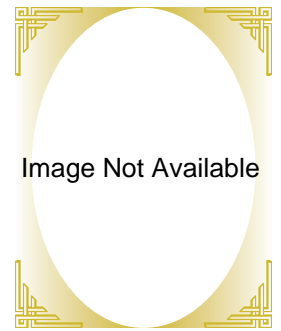


Bandura is one of several theorists who have added a cognitive flavor to behaviorism since the 1960s. Bandura (1977), Walter Mischel (1973), and Julian Rotter (1982) take issue with Skinner's "pure" behaviorism. They point out that humans obviously are conscious, thinking, feeling beings. Moreover, these theorists argue that in neglecting cognitive processes, Skinner ignored the most distinctive and important feature of human behavior. Bandura and like-minded theorists originally called their modified brand of behaviorism *social learning theory*. Today, Bandura refers to his model as *social cognitive theory*.

Bandura (1982, 1986) agrees with the fundamental thrust of behaviorism in that he believes that personality is largely shaped through learning. However, he contends that conditioning is not a mechanical process in which people are passive participants. Instead, he maintains that "people are self-organizing, proactive, self-reflecting, and self-regulating, not just reactive organisms shaped and shepherded by external events" (Bandura, 1999a, p. 154). Bandura (2001) also emphasizes the important role of forward-directed planning, noting that "people set goals for themselves, anticipate the likely consequences of prospective actions, and select and create courses of ac-

tion likely to produce desired outcomes and avoid detrimental ones" (p. 7).

Comparing his theory to Skinner's highly deterministic view, Bandura advocates a position called *reciprocal determinism*. According to this notion, the environment does determine behavior (as Skinner would argue). However, behavior also determines the environment (in other words, people can act to alter their environment). Moreover, personal factors (cognitive structures such as beliefs and expectancies) determine and are determined by both behavior and the environment (see **Figure 12.7**). Thus, **reciprocal determinism is the idea that internal mental events, external environmental events, and overt behavior all influence one another**. According to Bandura, humans are neither masters of their own destiny nor hapless victims buffeted about by the environment. To some extent, people shape their environments, an observation that brings us to our Featured Study, which looked at how individuals mold their physical environments—and the clues that these environments can provide about personality.

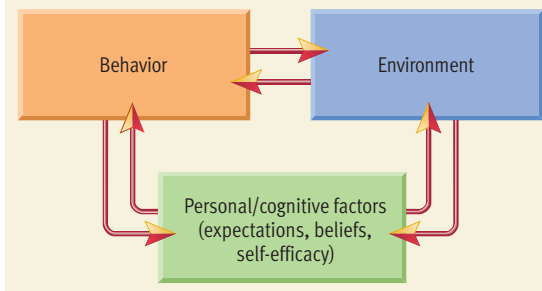


ALBERT BANDURA

"Most human behavior is learned by observation through modeling."

Figure 12.7

Bandura's reciprocal determinism. Bandura rejects Skinner's highly deterministic view that behavior is governed by environment and that freedom is an illusion. Bandura argues that internal mental events, external environmental contingencies, and overt behavior all influence one another.



Can Rooms Really Have Personality?

You may have heard someone comment that a particular house or specific room "has personality." This metaphor is usually intended to convey that the house or room is unusual or distinctive. But Bandura's point that people proactively choose and shape their environments raises the possibility that rooms could *literally* have personality—the personality of their occupants.

A variety of theories assert that individuals select and create their social and physical environments to match their dispositions and self-views. For example, people

who choose formal or informal furniture or conventional versus unconventional decorating convey something about who they are, as do people who display a Kurt Cobain poster or photos of their travels. In places where they dwell, people also leave a *behavioral residue*—remnants of their activities, such as books, magazines, computer printouts, drawings, musical instruments, snacks, and discarded beer cans. Cognizant of these realities, Samuel Gosling and his colleagues set out to determine just how much observers can infer about an individ-

FEATURED Study

Source: Gosling, S. D., Ko, S. J., Mannarelli, T., & Morris, M. E. (2002). A room with a cue: Personality judgments based on offices and bedrooms. *Journal of Personality and Social Psychology*, 82, 379–398.

ual's personality based on visiting the person's office or bedroom. We will examine the study of offices in more detail and then summarize the results of the study of bedrooms.

Method

Occupants and observations. Ninety-four office occupants in five urban office buildings agreed to participate. Eight independent observers examined each participant's office and rated the occupant (who was not present) on a 44-item scale that assessed the Big Five personality traits. All photos of the occupants and references to their names were covered before the observers visited the offices. The intent was to see how ordinary people arrive at everyday impressions, so the observers had no special training or expertise.

Assessments of accuracy. To gauge the accuracy of the observers' personality inferences, the office occupants were asked to submit personality ratings of themselves and to suggest two peers who knew them well and who could also rate their personality (on the same 44-item scale used by the observers). The self-ratings and peer-ratings for each occupant were combined and then compared to the ratings made by the observers.

Results

Moderate positive correlations were found among the eight observers' personality ratings, indicating a reasonable consensus among them. Their combined ratings were then correlated with the self- and peer-ratings of the occupants. These correlations, which averaged .22, indicated that the observers were more accurate at judging some traits than others (see **Figure 12.8**). The assessments of the occupants' openness to experience were impressive, and the judgments of the occupants' extraversion, conscientiousness, and emotional stability were substantial.

Follow-Up Study

A second study, focusing on individuals' bedrooms rather than offices, was conducted using identical methods. The occupants were 83 college students or recent graduates living near a university in apartments, houses, and dormitories. Once again, reasonable consensus was found among the observers' personality ratings. However, the accuracy of the ratings based on people's bedrooms was noticeably higher (average correlation of .37) than it was for offices. As in the first study, the inferences about some traits were more accurate than others (see **Figure 12.8**), with ratings of openness to experience yielding the greatest accuracy.

Discussion

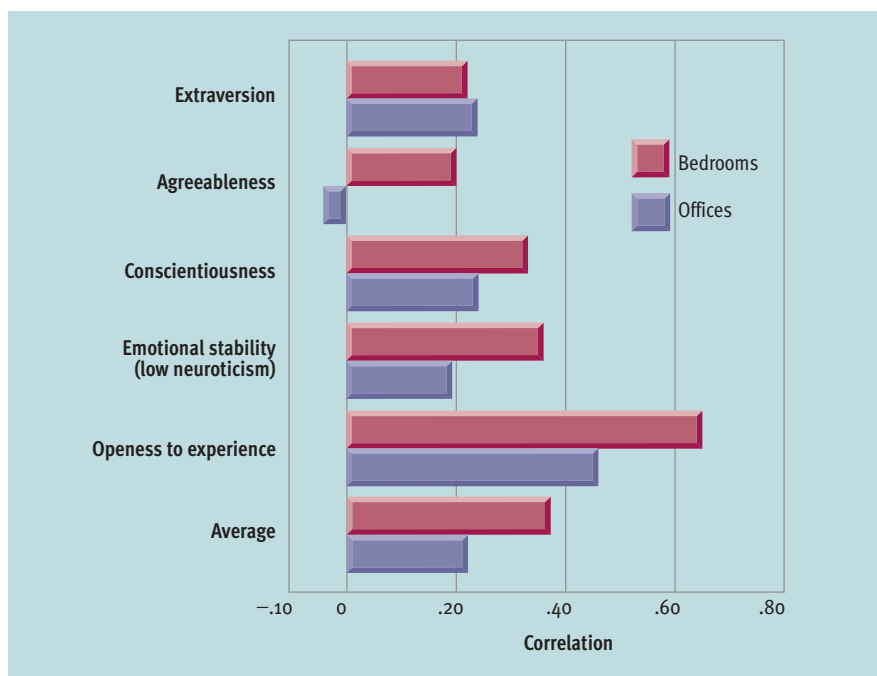
The authors conclude that "much can be learned about persons from the spaces in which they dwell" (p. 397) and that personal dwellings yield more valid cues for certain traits than for others. To put their findings in context, they note that on some personality traits, the room-based ratings were more accurate than similar ratings from other studies that were based on long-term acquaintance! They speculate that bedrooms may be richer sources of information about their occupants than offices because people have more freedom to decorate bedrooms as they please and less need to project a professional image.

Comment

This study was featured because it took a creative approach to exploring an interesting phenomenon that has never before been subjected to scientific analysis. In retrospect, it seems readily apparent that people try to convey something about themselves in their dwellings and that visitors do form impressions based on these cues—but no one had previously thought to study these processes empirically. The creativity required to launch an entirely new line of research is apparent in one of its quirks: Who were the subjects? The occupants of the rooms? The observers who made the personality ratings? The participants in research are normally obvious—but in this case it is rather ambiguous. In any event, this study demonstrated that the relationship between personality and environment is a reciprocal one, as envisioned by Bandura.

Figure 12.8

Accuracy of personality ratings based on people's rooms. To assess the accuracy of observers' personality ratings based on visiting people's offices or bedrooms, Gosling et al. (2002) correlated the observers' aggregated ratings with the combined self- and peer-ratings of the occupants of the rooms. Higher correlations are indicative of greater accuracy. If observers were not able to infer anything meaningful about occupants' personalities based on visiting their offices or bedrooms, these correlations would hover near zero, which was true in only one case (the ratings of agreeableness based on office visits). (Based on data from Gosling et al., 2002)



Observational Learning

Bandura's foremost theoretical contribution has been his description of observational learning, which we introduced in Chapter 6. **Observational learning occurs when an organism's responding is influenced by the observation of others, who are called models.** According to Bandura, both classical and operant conditioning can occur vicariously when one person observes another's conditioning. For example, watching your sister get cheated by someone giving her a bad check for her old stereo could strengthen your tendency to be suspicious of others. Although your sister would be the one actually experiencing the negative consequences, they might also influence you—through observational learning.

Bandura maintains that people's characteristic patterns of behavior are shaped by the *models* that they're exposed to. He isn't referring to the fashion models who dominate the mass media—although they do qualify. In observational learning, **a model is a person whose behavior is observed by another.** At one time or another, everyone serves as a model for others. Bandura's key point is that many response tendencies are the product of *imitation*.

As research has accumulated, it has become apparent that some models are more influential than others (Bandura, 1986). Both children and adults tend to imitate people they like or respect more than people they don't. People are also especially prone to imitate the behavior of people whom they consider attractive or powerful (such as rock stars). In addition, imitation is more likely when people see similarity between models and themselves. Thus, children tend to imitate same-sex role models somewhat more than opposite-sex models. Finally, people are more likely to copy a model if they observe that the model's behavior leads to positive outcomes.

Self-Efficacy

Bandura discusses how a variety of personal factors (aspects of personality) govern behavior. In recent years, the factor he has emphasized most is self-efficacy (Bandura, 1990, 1993, 1995). **Self-efficacy refers to one's belief about one's ability to perform behaviors that should lead to expected outcomes.** When self-efficacy is high, individuals feel confident that they can execute the responses necessary to earn reinforcers. When self-efficacy is low, individuals worry that the necessary responses may be beyond their abilities. Perceptions of self-efficacy are subjective and specific to certain kinds of tasks. For instance, you might feel extremely confident about your ability to handle difficult social situations but doubtful about your ability to handle academic challenges.

Perceptions of self-efficacy can influence which challenges people tackle and how well they perform. Studies have found that feelings of greater self-efficacy are associated with greater success in giving up smoking (Boudreaux et al., 1998), greater adherence to an exercise regimen (Rimal, 2001), better outcomes in substance abuse treatment (Bandura, 1999), more success in coping with medical rehabilitation (Waldrop et al., 2001), better self-care among diabetics (Williams & Bond, 2002), greater persistence and effort in academic pursuits (Zimmerman, 1995), higher levels of academic performance (Chemers, Hu, & Garcia, 2001), reduced vulnerability to anxiety and depression in childhood (Muris, 2002), enhanced performance in athletic competition (Kane et al., 1996), greater receptiveness to technological training (Christoph, Schoenfeld, & Tansky, 1998), higher work-related performance (Stajkovic & Luthans, 1998), and greater resistance to stress (Jex et al., 2001), among many other things.

Mischel and the Person-Situation Controversy

Walter Mischel was born in Vienna, not far from Freud's home. His family immigrated to the United States in 1939, when he was 9. After earning his doctorate in psychology, he spent many years on the faculty at Stanford, as a colleague of Bandura's. He has since moved to Columbia University.

Like Bandura, Mischel (1973, 1984) is an advocate of social learning theory. Mischel's chief contribution to personality theory has been to focus attention on the extent to which situational factors govern behavior. According to social learning theory, people try to gauge the reinforcement contingencies and adjust their behavior to the circumstances. For example, if you believe that hard work in your job will pay off by leading to raises and promotions, you'll probably be diligent and industrious. But if you think that hard work in your job is unlikely to be rewarded, you may act lazy and irresponsible. Thus, social learning theory predicts that people will often behave differently in different situations.

Mischel (1968, 1973) reviewed decades of research and concluded that, indeed, people exhibit far less consistency across situations than had been widely assumed. For example, studies show that a person who is honest in one situation may be dishonest in another. Someone who wouldn't dream of being dishonest in a business deal might engage in wholesale cheating in filling out tax returns. Similarly, some people are quite shy in one situation and outgoing in another. In light of these realities, Mischel maintains that

Web Link 12.4



Personality Theories
C. George Boeree (Shippensburg University) provides access to his electronic textbook on personality theories at this site. Behavioral theorists B. F. Skinner and Albert Bandura are discussed extensively, along with many other theorists covered in this chapter.

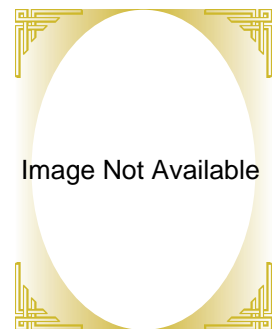


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WALTER MISCHEL

"It seems remarkable how each of us generally manages to reconcile his seemingly diverse behavior into one self-consistent whole."

behavior is characterized by more *situational specificity* than consistency.

Mischel's position has generated great controversy because it strikes at the heart of the concept of personality itself. As we discussed at the beginning of the chapter, the concept of personality is used to explain consistency in people's behavior over time and situations. If there isn't much consistency, there isn't much need for the concept of personality.

Mischel's views have generated many rebuttals that have defended the value of the personality concept. For instance, Epstein (1980, 1986) argued that the methods used in much of the research reviewed by Mischel led to an underestimate of cross-situational consistency. One consideration is that studies have often used young people as subjects, but personality doesn't fully stabilize until middle age (Roberts & Pomerantz, 2004). Critics also noted that it is unreasonable to expect complete cross-situational consistency, because specific traits are more easily expressed in some situations than others (Kenrick & Funder, 1991). For example, a person's fun-loving, humorous qualities aren't likely to be apparent at a funeral.

Thus, Mischel's provocative theories have sparked a robust debate about the relative importance of the *person* as opposed to the *situation* in determining behavior. This debate has led to a growing recognition that *both* the person and the situation are important determinants of behavior (Funder, 2001; Roberts & Pomerantz, 2004). As William Fleeson (2004, p. 83) puts it, "The person-situation debate is coming to an end because both sides of the debate have turned out to be right." Fleeson reconciles the two opposing views by arguing that each prevails at a different level of analysis. When small chunks of behavior are examined on a moment-to-moment basis, situational factors dominate and most individuals' behavior tends to be highly variable. However, when larger chunks of typical behavior over time are examined, people tend to be reasonably consistent and personality traits prove to be more influential.

Evaluating Behavioral Perspectives

Behavioral theories are firmly rooted in extensive empirical research rather than clinical intuition. Skinner's ideas have shed light on how environmental consequences and conditioning mold people's characteristic behavior. Bandura's social cognitive theory has expanded the horizons of behaviorism and increased its relevance to the study of personality. Mischel deserves credit for increasing psychology's aware-

ness of how situational factors shape behavior. Of course, each theoretical approach has its weaknesses and shortcomings, and the behavioral approach is no exception. Major lines of criticism include the following (Liebert & Liebert, 1998; Maddi, 1989):

1. *Overdependence on animal research.* Many principles in behavioral theories have been discovered through research on rats and other animals. Some critics argue that behaviorists have depended too much on animal research and that they have indiscriminately generalized from animal behavior to human behavior.

2. *Dehumanizing nature of radical behaviorism.* Skinner and other radical behaviorists have been criticized heavily for denying the existence of free will and the importance of cognitive processes. The critics argue that the radical behaviorist viewpoint strips human behavior of its most uniquely human elements and that it therefore cannot provide an accurate model of human functioning.

3. *Fragmentation of personality.* Behaviorists have also been criticized for providing a fragmented view of personality. The behavioral approach carves personality up into stimulus-response associations. There are no unifying structural concepts (such as Freud's ego) that tie these pieces together. Humanistic theorists, whom we shall cover next, have been particularly vocal in criticizing this piecemeal analysis of personality.

➤ REVIEW OF KEY POINTS

- Behavioral theories explain how personality is shaped through learning. Skinner had little interest in unobservable cognitive processes and embraced a strong determinism.
- Skinner's followers view personality as a collection of response tendencies tied to specific stimulus situations. They assume that personality development is a lifelong process in which response tendencies are shaped and reshaped by learning, especially operant conditioning.
- Social cognitive theory focuses on how cognitive factors such as expectancies regulate learned behavior. Bandura's concept of observational learning accounts for the acquisition of responses from models. High self-efficacy has been related to successful health regimens, academic success, and athletic performance, among other things.
- Mischel has questioned the degree to which people display cross-situational consistency in behavior. Mischel's arguments have increased psychologists' awareness of the situational determinants of behavior.
- Behavioral approaches to personality are based on rigorous research. They have provided ample insights into how environmental factors and learning mold personalities. The behaviorists have been criticized for their overdependence on animal research, their fragmented analysis of personality, and radical behaviorism's dehumanizing view of human nature.

> Humanistic Perspectives

Humanistic theory emerged in the 1950s as something of a backlash against the behavioral and psychodynamic theories that we have just discussed (Cassel, 2000; DeCarvalho, 1991). The principal charge hurled at these two models was that they are dehumanizing. Freudian theory was criticized for its belief that behavior is dominated by primitive, animalistic drives. Behaviorism was criticized for its preoccupation with animal research and for its mechanistic, fragmented view of personality. Critics argued that both schools of thought are too deterministic and that both fail to recognize the unique qualities of human behavior.

Many of these critics blended into a loose alliance that came to be known as humanism, because of its exclusive focus on human behavior. **Humanism is a theoretical orientation that emphasizes the unique qualities of humans, especially their freedom and their potential for personal growth.** Humanistic psychologists don't believe that animal research can reveal anything of any significance about the human condition. In contrast to most psychodynamic and behavioral theorists, humanistic theorists take an optimistic view of human nature. They assume that (1) people can rise above their primitive animal heritage and control their biological urges, and (2) people are largely conscious and rational beings who are not dominated by unconscious, irrational conflicts.

Humanistic theorists also maintain that a person's subjective view of the world is more important than objective reality. According to this notion, if you think that you're homely or bright or sociable, this belief will influence your behavior more than the realities of how homely, bright, or sociable you actually are. Therefore, the humanists embrace the **phenomenological approach, which assumes that one has to appreciate individuals' personal, subjective experiences to truly understand their behavior.** As Carl Rogers (1951) put it, "The best vantage point for understanding behavior is from the internal frame of reference of the individual himself" (p. 494). Let's look at Rogers's ideas.

Rogers's Person-Centered Theory



Carl Rogers (1951, 1961, 1980) was one of the founders of the human potential movement. This movement emphasizes self-realization through sensitivity training, encounter groups, and other exercises in-

tended to foster personal growth. Rogers grew up in a religious, upper-middle-class home in the Chicago area. He was a bright student, but he had to rebel against his parents' wishes to pursue his graduate study in psychology. While he was working at the University of Chicago in the 1940s, Rogers devised a major new approach to psychotherapy. Like Freud, Rogers based his personality theory on his extensive therapeutic interactions with many clients. Because of its emphasis on a person's subjective point of view, Rogers's approach is called a *person-centered theory*.

The Self



Rogers viewed personality structure in terms of just one construct. He called this construct the *self*, although it's more widely known today as the *self-concept*. **A self-concept is a collection of beliefs about one's own nature, unique qualities, and typical behavior.** Your self-concept is your own mental picture of yourself. It's a collection of self-perceptions. For example, a self-concept might include beliefs such as "I'm easygoing" or "I'm sly and crafty" or "I'm pretty" or "I'm hardworking." According to Rogers, individuals are aware of their self-concept. It's not buried in their unconscious.

Rogers stressed the subjective nature of the self-concept. Your self-concept may not be entirely consistent with your experiences. Most people tend to distort their experiences to some extent to promote a relatively favorable self-concept. For example, you may believe that you're quite bright, but your grade transcript might suggest otherwise. Rogers called the gap between self-concept and reality "incongruence." **Incongruence is the degree of disparity between one's self-concept and one's actual experience.** In contrast, if a person's self-concept is reasonably accurate, it's said to be *congruent* with reality (see **Figure 12.9** on the next page). Everyone experiences *some* incongruence. The crucial issue is how much. As we'll see, Rogers maintained that too much incongruence undermines one's psychological well-being.

Development of the Self



In terms of personality development, Rogers was concerned with how childhood experiences promote congruence or incongruence between one's self-concept and one's experience. According to Rogers, people have a strong need for affection, love, and accep-

PREVIEW QUESTIONS

- What led to the emergence of humanism, and what are its central assumptions?
- How did Rogers explain the development of the self and defensive behavior?
- How did Maslow organize motives?
- What was Maslow's view of the healthy personality?
- What are the strengths and weaknesses of the humanistic approach?

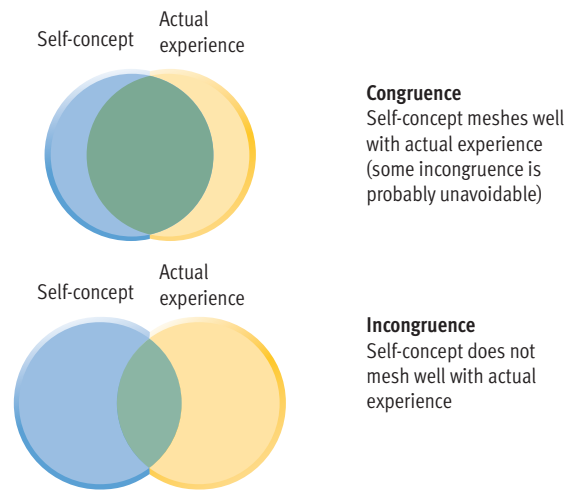


CARL ROGERS

"I have little sympathy with the rather prevalent concept that man is basically irrational, and that his impulses, if not controlled, will lead to destruction of others and self. Man's behavior is exquisitely rational, moving with subtle and ordered complexity toward the goals his organism is endeavoring to achieve."

Figure 12.9

Rogers's view of personality structure. In Rogers's model, the self-concept is the only important structural construct. However, Rogers acknowledged that one's self-concept may not be consistent with the realities of one's actual experience—a condition called incongruence.



tance from others. Early in life, parents provide most of this affection. Rogers maintained that some parents make their affection *conditional*. That is, it depends on the child's behaving well and living up to expectations. When parental love seems conditional, children often block out of their self-concept those experiences that make them feel unworthy of love. They do so because they're worried about parental acceptance, which appears precarious. At the other end of the spectrum, some parents make their affection *unconditional*. Their children have less need to block out unworthy experiences because they've been assured that they're worthy of affection, no matter what they do.

Hence, Rogers believed that unconditional love from parents fosters congruence and that conditional love fosters incongruence. He further theorized that if individuals grow up believing that affection from others is highly conditional, they will go on to distort more and more of their experiences in order to feel worthy of acceptance from a wider and wider array of people (see Figure 12.10).

Anxiety and Defense

According to Rogers, experiences that threaten people's personal views of themselves are the principal cause of anxiety. The more inaccurate your self-

concept, the more likely you are to have experiences that clash with your self-perceptions. Thus, people with highly incongruent self-concepts are especially likely to be plagued by recurrent anxiety (see Figure 12.10).

To ward off this anxiety, individuals often behave defensively in an effort to reinterpret their experience so that it appears consistent with their self-concept. Thus, they ignore, deny, and twist reality to protect and perpetuate their self-concept. Consider a young woman who, like most people, considers herself a "nice person." Let's suppose that in reality she is rather conceited and selfish. She gets feedback from both boyfriends and girlfriends that she is a "self-centered, snotty brat." How might she react in order to protect her self-concept? She might ignore or block out those occasions when she behaves selfishly. She might attribute her girlfriends' negative comments to their jealousy of her good looks. Perhaps she would blame her boyfriends' negative remarks on their disappointment because she won't get more serious with them. As you can see, people will sometimes go to great lengths to defend their self-concept.

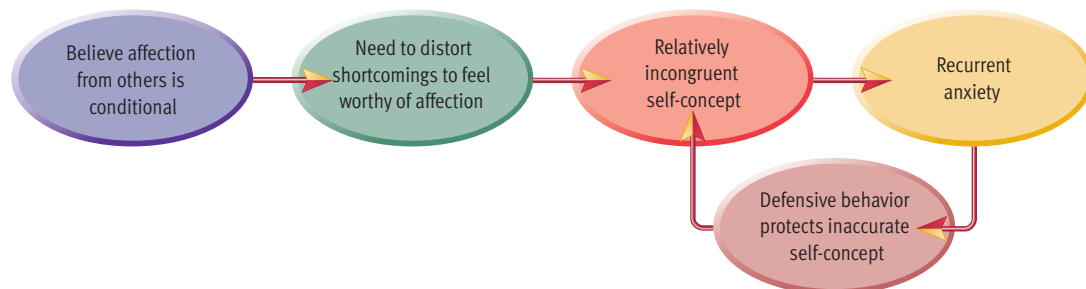
Maslow's Theory of Self-Actualization



Abraham Maslow, who grew up in Brooklyn, described his childhood as "unhappy, lonely, [and] isolated." To follow through on his interest in psychology, he had to resist parental pressures to go into law. Maslow spent much of his career at Brandeis University, where he created an influential theory of motivation and provided crucial leadership for the fledgling humanistic movement. Like Rogers, Maslow (1968, 1970) argued that psychology should take an optimistic view of human nature instead of dwelling on the causes of disorders. "To oversimplify the matter somewhat," he said, "it's as if Freud supplied to us the sick half of psychology and we must now fill it out with the healthy half" (1968, p. 5). Maslow's key contributions were his analysis of how motives are organized hierarchically and his description of the healthy personality.

Figure 12.10

Rogers's view of personality development and dynamics. Rogers's theory of development posits that conditional love leads to a need to distort experiences, which fosters an incongruent self-concept. Incongruence makes one prone to recurrent anxiety, which triggers defensive behavior, which fuels more incongruence.



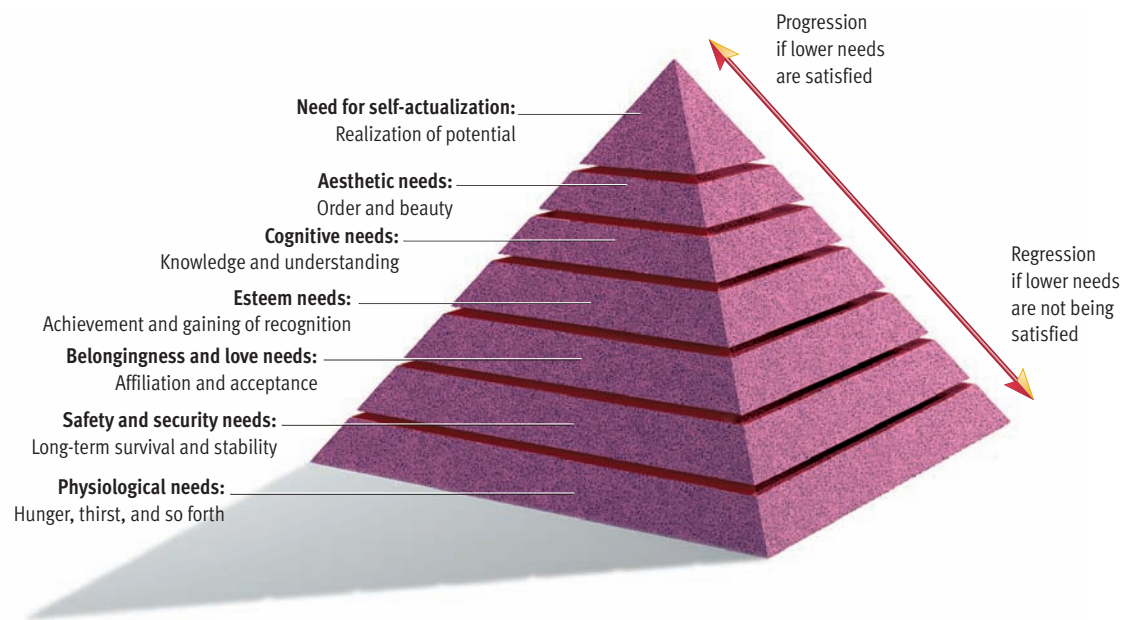


Figure 12.11
Maslow's hierarchy of needs. According to Maslow, human needs are arranged in a hierarchy, and people must satisfy their basic needs before they can satisfy higher needs. In the diagram, higher levels in the pyramid represent progressively less basic needs. Individuals progress upward in the hierarchy when lower needs are satisfied reasonably well, but they may regress back to lower levels if basic needs are no longer satisfied.

Hierarchy of Needs

Maslow proposed that human motives are organized into a **hierarchy of needs**—a **systematic arrangement of needs, according to priority, in which basic needs must be met before less basic needs are aroused**. This hierarchical arrangement is usually portrayed as a pyramid (see **Figure 12.11**). The needs toward the bottom of the pyramid, such as physiological or security needs, are the most basic. Higher levels in the pyramid consist of progressively less basic needs. When a person manages to satisfy a level of needs reasonably well (complete satisfaction is not necessary), *this satisfaction activates needs at the next level*.

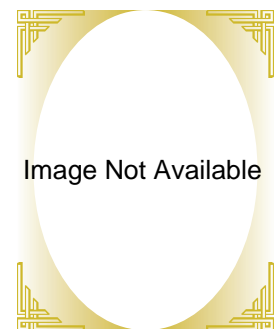
Like Rogers, Maslow argued that humans have an innate drive toward personal growth—that is, evolution toward a higher state of being. Thus, he described the needs in the uppermost reaches of his hierarchy as **growth needs**. These include the needs for knowledge, understanding, order, and aesthetic beauty. Foremost among them is the **need for self-actualization, which is the need to fulfill one's potential**; it is the highest need in Maslow's motivational hierarchy. Maslow summarized this concept with a simple statement: "What a man *can* be, he *must* be." According to Mas-

low, people will be frustrated if they are unable to fully utilize their talents or pursue their true interests. For example, if you have great musical talent but must work as an accountant, or if you have scholarly interests but must work as a sales clerk, your need for self-actualization will be thwarted.

The Healthy Personality

Because of his interest in self-actualization, Maslow set out to discover the nature of the healthy personality. He tried to identify people of exceptional mental health so that he could investigate their characteristics. In one case, he used psychological tests and interviews to sort out the healthiest 1% of a sizable population of college students. He also studied admired historical figures (such as Thomas Jefferson and William James) and personal acquaintances characterized by superior adjustment. Over a period of years, he accumulated his case histories and gradually sketched, in broad strokes, a picture of ideal psychological health.

According to Maslow, **self-actualizing persons are people with exceptionally healthy personalities, marked by continued personal growth**. Maslow identified various traits characteristic of self-



ABRAHAM MASLOW

"It is as if Freud supplied to us the sick half of psychology and we must now fill it out with the healthy half."

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Figure 12.12

Maslow's view of the healthy personality.

Humanistic theorists emphasize psychological health instead of maladjustment. Maslow's description of characteristics of self-actualizing people evokes a picture of the healthy personality.

Source: Adapted from Potkay, C. R., & Allen, B. P. (1986). *Personality: Theory, research and application*. Pacific Grove, CA: Brooks/Cole. Copyright © 1986 by C. R. Potkay & B. P. Allen. Adapted by permission of the author.

Characteristics of self-actualizing people	
• Clear, efficient perception of reality and comfortable relations with it	• Mystical and peak experiences
• Spontaneity, simplicity, and naturalness	• Feelings of kinship and identification with the human race
• Problem centering (having something outside themselves they "must" do as a mission)	• Strong friendships, but limited in number
• Detachment and need for privacy	• Democratic character structure
• Autonomy, independence of culture and environment	• Ethical discrimination between good and evil
• Continued freshness of appreciation	• Philosophical, unhostile sense of humor
	• Balance between polarities in personality


actualizing people. Many of these traits are listed in **Figure 12.12**. In brief, Maslow found that self-actualizers are accurately tuned in to reality and that they're at peace with themselves. He found that they're open and spontaneous and that they retain a fresh appreciation of the world around them. Socially, they're sensitive to others' needs and enjoy rewarding interpersonal relations. However, they're not dependent on others for approval or uncomfortable with solitude. They thrive in their work, and

they enjoy their sense of humor. Maslow also noted that they have "peak experiences" (profound emotional highs) more often than others. Finally, he found that they strike a nice balance between many polarities in personality. For instance, they can be both childlike and mature, both rational and intuitive, both conforming and rebellious.

Evaluating Humanistic Perspectives

The humanists added a refreshing new perspective to the study of personality. Their argument that a person's subjective views may be more important than objective reality has proven compelling. As we noted earlier, even behavioral theorists have begun to take into account subjective personal factors such as beliefs and expectations. The humanistic approach also deserves some of the credit for making the self-concept an important construct in psychology. Today, theorists of many persuasions use the self-concept in their analyses of psychological functioning. Finally, one could argue that the humanists' optimistic, growth- and health-oriented approach laid the foundation for the emergence of the positive psychology movement that is increasingly influential in contemporary psychology (Sheldon & Kasser, 2001; Taylor, 2001).

Of course, there's a negative side to the balance sheet as well. Critics have identified some weaknesses

concept **check 12.2** 

Recognizing Key Concepts in Personality Theories

Check your understanding of psychodynamic, behavioral, and humanistic personality theories by identifying key concepts from these theories in the scenarios below. The answers can be found in Appendix A.

1. Thirteen-year-old Sarah watches a TV show in which the leading female character manipulates her boyfriend by acting helpless and purposely losing a tennis match against him. The female lead repeatedly expresses her slogan, "Never let them [men] know you can take care of yourself." Sarah becomes more passive and less competitive around boys her own age.

Concept: _____

2. Yolanda has a secure, enjoyable, reasonably well-paid job as a tenured English professor at a state university. Her friends are dumbfounded when she announces that she's going to resign and give it all up to try writing a novel. She tries to explain, "I need a new challenge, a new mountain to climb. I've had this lid on my writing talents for years, and I've got to break free. It's something I have to try. I won't be happy until I do."

Concept: _____

3. Vladimir, who is 4, seems to be emotionally distant from and inattentive to his father. He complains whenever he's left with his dad. In contrast, he often cuddles up in bed with his mother and tries very hard to please her by behaving properly.

Concept: _____

Web Link 12.5



The Personality Project
William Revelle, director of the graduate program in personality at Northwestern University's Psychology Department, has assembled a directory to many Internet-based resources in the study of personality.

in the humanistic approach to personality, including the following (Burger, 2004):

1. *Poor testability.* Like psychodynamic theorists, the humanists have been criticized for generating hypotheses that are difficult to put to a scientific test. Humanistic concepts such as personal growth and self-actualization are difficult to define and measure.

2. *Unrealistic view of human nature.* Critics also charge that the humanists have been unrealistic in their assumptions about human nature and their descriptions of the healthy personality. For instance, Maslow's self-actualizing people sound nearly *perfect*. In reality, Maslow had a hard time finding such people. When he searched among the living, the results were so disappointing that he turned to the study of historical figures. Thus, humanistic portraits of psychological health are perhaps a bit too optimistic.

3. *Inadequate evidence.* For the most part, humanistic psychologists haven't been particularly research oriented. Although Rogers and Maslow both conducted and encouraged empirical research, many of their followers have been scornful of efforts to quantify human experience to test hypotheses. Much more research is needed to catch up with the theorizing in

the humanistic camp. This is precisely the opposite of the situation that we'll encounter in the next section, which examines biological approaches to personality.

REVIEW OF KEY POINTS

- Humanistic theories are phenomenological and take an optimistic view of people's conscious, rational ability to chart their own courses of action. Rogers focused on the self-concept as the critical aspect of personality. Incongruence is the degree of disparity between one's self-concept and actual experience.
- Rogers maintained that unconditional love fosters congruence, whereas conditional love fosters incongruence. Incongruence makes one vulnerable to recurrent anxiety, which tends to trigger defensive behavior that protects one's inaccurate self-concept.
- Maslow theorized that needs are organized hierarchically and that psychological health depends on fulfilling one's need for self-actualization, which is the need to realize one's human potential. His work led to the description of self-actualizing persons as idealized examples of psychological health.
- Humanistic theories deserve credit for highlighting the importance of subjective views of oneself and for confronting the question of what makes for a healthy personality. Humanistic theories lack a firm base of research, are difficult to put to an empirical test, and may be overly optimistic about human nature.

Biological Perspectives

Like many identical twins reared apart, Jim Lewis and Jim Springer found they had been leading eerily similar lives. Separated four weeks after birth in 1940, the Jim twins grew up 45 miles apart in Ohio and were reunited in 1979. Eventually, they discovered that both drove the same model blue Chevrolet, chain-smoked Salems, chewed their fingernails, and owned dogs named Toy. Each had spent a good deal of time vacationing at the same three-block strip of beach in Florida. More important, when tested for such personality traits as flexibility, self-control, and sociability, the twins responded almost exactly alike. (Leo, 1987, p. 63)

So began a *Time* magazine summary of a major twin study conducted at the University of Minnesota Center for Twin and Adoption Research. Since 1979 the investigators at this center have been studying the personality resemblance of identical twins reared apart. Not all the twin pairs have been as similar as Jim Lewis and Jim Springer, but many of the parallels have been uncanny (Lykken et al., 1992). Identical twins Oskar Stohr and Jack Yufe were separated soon after birth. Oskar was sent to a Nazi-run school in Czechoslovakia while Jack was raised in a Jewish

home on a Caribbean island. When they were reunited for the first time during middle age, they showed up wearing similar mustaches, haircuts, shirts, and wire-rimmed glasses! A pair of previously separated female twins both arrived at the Minneapolis airport wearing seven rings on their fingers. One had a son named Richard Andrew and the other had a son named Andrew Richard!

Could personality be largely inherited? These anecdotal reports of striking resemblances between identical twins reared apart certainly raise this possibility. In this section we'll discuss Hans Eysenck's theory, which emphasizes the influence of heredity, look at recent behavioral genetics research on the heritability of personality, and outline the evolutionary perspective on personality.

Eysenck's Theory



Hans Eysenck was born in Germany but fled to London during the era of Nazi rule. He went on to become one of Britain's most prominent psychologists. Eysenck (1967, 1982, 1990a) views personality structure as a hierarchy of traits, in which many superficial

PREVIEW QUESTIONS

- How did Eysenck explain variations in personality?
- To what degree is personality heritable?
- Do family environments have much impact on personality?
- What do evolutionary theorists have to say about personality?
- What are the strengths and weaknesses of the biological approach?



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Is personality largely inherited? The story of these identical twins would certainly suggest so. Although they were reared apart from 4 weeks after their birth, Jim Lewis (left) and Jim Springer (right) exhibit remarkable correspondence in personality. Some of the similarities in their lives—such as the benches built around trees in their yards—seem uncanny.



HANS EYSENCK

“Personality is determined to a large extent by a person’s genes.”

traits are derived from a smaller number of more basic traits, which are derived from a handful of fundamental higher-order traits, as shown in **Figure 12.13**. His studies suggest that all aspects of personality emerge from just three higher-order traits: extraversion, neuroticism, and psychoticism. *Extraversion* involves being sociable, assertive, active, and lively. *Neuroticism* involves being anxious, tense, moody, and low in self-esteem. *Psychoticism* involves being egocentric, impulsive, cold, and antisocial.

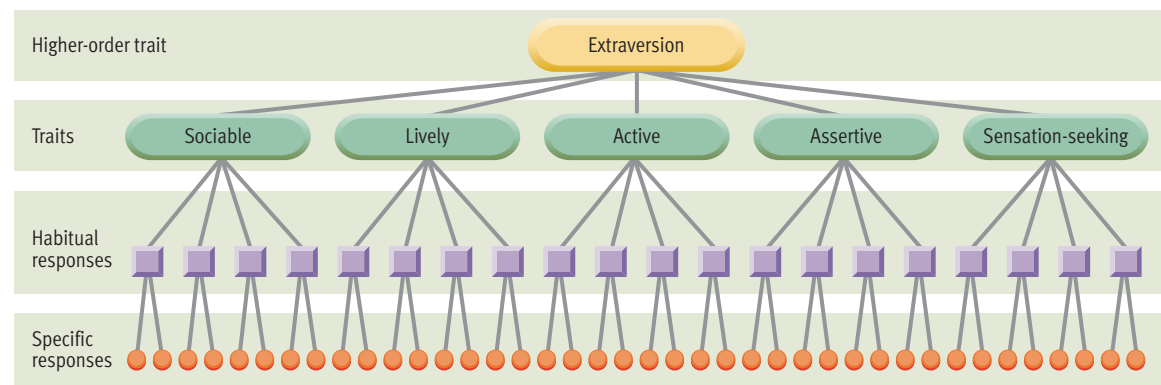
According to Eysenck, “Personality is determined to a large extent by a person’s genes” (1967, p. 20). How is heredity linked to personality in Eysenck’s model? In part, through conditioning concepts borrowed from behavioral theory. Eysenck theorizes that some people can be conditioned more readily than others because of differences in their physiological functioning. These variations in “conditionability” are assumed to influence the personality traits that people acquire through conditioning processes.

Figure 12.13

Eysenck’s model of personality structure.

Eysenck described personality structure as a hierarchy of traits. In this scheme, a few higher-order traits, such as extraversion, determine a number of lower-order traits, which determine a person’s habitual responses.

Source: Eysenck, H. J. (1976). *The biological basis of personality*. Springfield, IL: Charles C. Thomas. Reprinted by permission of the publisher.



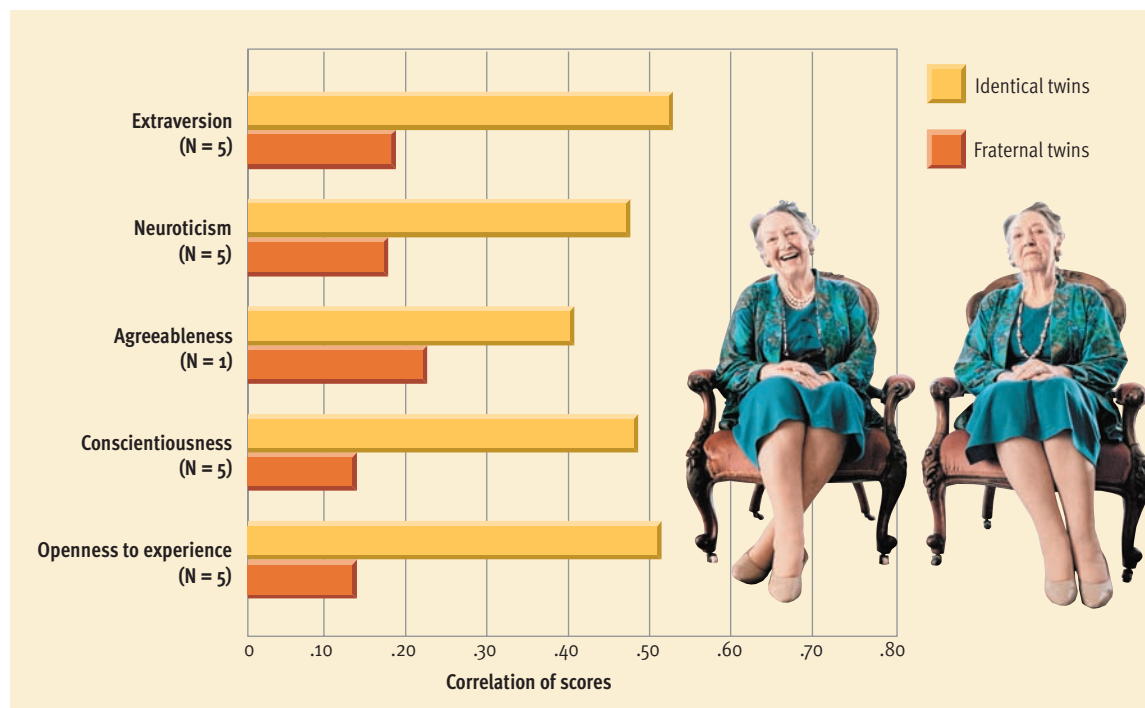
Eysenck has shown a special interest in explaining variations in *extraversion-introversion*, the trait dimension first described years earlier by Carl Jung. He has proposed that introverts tend to have higher levels of physiological arousal, or perhaps higher “arousability,” which make them more easily conditioned than extraverts. According to Eysenck, people who condition easily acquire more conditioned inhibitions than others. These inhibitions make them more bashful, tentative, and uneasy in social situations. This social discomfort leads them to turn inward. Hence, they become introverted.

Behavioral Genetics and Personality



Recent research in behavioral genetics has provided impressive support for the idea that many personality traits are largely inherited (Livesley, Jang, Vernon, 2003; Rowe & van den Oord, 2005). For instance, **Figure 12.14** shows the mean correlations observed for identical and fraternal twins in studies of the Big Five personality traits. Higher correlations are indicative of greater similarity on a trait. On all five traits, identical twins have been found to be much more similar than fraternal twins. Based on these and many other findings, theorists conclude that genetic factors exert considerable influence over personality (see Chapter 3 for an explanation of the logic of twin studies).

Some skeptics wonder whether identical twins might exhibit more trait similarity than fraternal twins because they’re treated more alike. In other words, they wonder whether environmental factors (rather than heredity) could be responsible for identical twins’ greater personality resemblance. This nagging question can be answered only by studying identical twins reared apart, which is why the twin study at the University of Minnesota has been so important. The Minnesota study (Tellegen et al., 1988) was the first to administer the same personality test to identical and fraternal twins reared apart, as well as together. Most of the twins reared apart were separated quite early



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Figure 12.14
Twin studies of personality. Loehlin (1992) has summarized the results of twin studies that have examined the Big Five personality traits. The N under each trait indicates the number of twin studies that have examined that trait. The chart plots the average correlations obtained for identical and fraternal twins in these studies. As you can see, identical twins have shown greater resemblance in personality than fraternal twins have, suggesting that personality is partly inherited. (Based on data from Loehlin, 1992)

in life (median age of 2.5 months) and remained separated for a long time (median period of almost 34 years).

The results revealed that identical twins reared apart were substantially more similar in personality than fraternal twins reared together. The *heritability estimates* (see Chapter 9) for the traits examined ranged from 40% to 58%. The investigators concluded that their results support the hypothesis that genetic blueprints shape the contours of personality.

Research on the heritability of personality has inadvertently turned up an interesting discovery: *shared family environment* appears to have remarkably little impact on personality. This unexpected finding has been observed quite consistently in behavioral genetics research (Beer, Arnold, & Loehlin, 1998; Rowe & van den Oord, 2005). It is surprising in that social scientists have long assumed that the family environment shared by children growing up together led to some personality resemblance among them. *These findings have led some theorists to conclude that parents don't matter—that they wield very little influence over how their children develop* (Cohen, 1999; Harris, 1998; Rowe, 1994).

Critics of this conclusion have argued that the methods used in behavioral genetics studies have probably underestimated the impact of shared environment on personality (Collins et al., 2000; Stoolmiller, 1999). They also note that shared experiences—such as being raised with authoritarian discipline—may often have different effects on two siblings, which obscures the impact of environment but is not the

same result as having no effect (Turkheimer & Waldron, 2000). And the critics argue that decades of research in developmental psychology have clearly demonstrated that parents have significant influence on their children (Maccoby, 2000).

Although the assertion that “parents don’t matter” seems premature and overstated, the perplexing findings in behavioral genetics studies of personality have led researchers to investigate why children from the same family are often so different. Thus far, the evidence suggests that children in the same family experience home environments that are not nearly as homogeneous as previously assumed (Hetherington, Reiss, & Plomin, 1994; Pike et al., 2000). Children in the same home may be treated quite differently, because gender and birth order can influence parents’ approaches to childrearing. Temperamental differences between children may also evoke differences in parenting. Focusing on how environmental factors vary *within* families represents a promising new way to explore the determinants of personality.

The Evolutionary Approach to Personality

In the realm of biological perspectives on personality, another recent development has been the emergence of evolutionary theory. Evolutionary theorists assert that personality has a biological basis because natural selection has favored certain traits over the course of human history (Figueredo et al., 2005). Thus, evolutionary analyses focus on how various

Web Link 12.6



Great Ideas in Personality
Personality psychologist G. Scott Acton (Rochester Institute of Technology) demonstrates that scientific research programs in personality generate broad and compelling ideas about what it is to be a human being. He charts the contours of 12 research perspectives, including behaviorism, behavioral genetics, and sociobiology, and backs them up with extensive links to published and online resources associated with each perspective.

> Illustrated Overview of Major Theories of Personality

Theorist and orientation

A psychodynamic view

Sigmund Freud



Source of data and observations

Case studies from clinical practice of psychoanalysis



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Key motivational forces

Sex and aggression; need to reduce tension resulting from internal conflicts

A behavioral view

B. F. Skinner



Laboratory experiments, primarily with animals

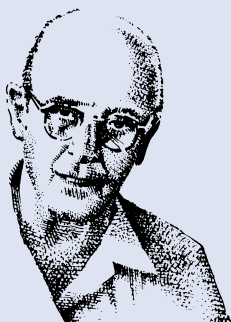


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Pursuit of primary (unlearned) and secondary (learned) reinforcers; priorities depend on personal history

A humanistic view

Carl Rogers



Case studies from clinical practice of client-centered therapy

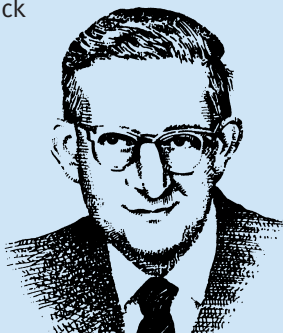


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Actualizing tendency (motive to develop capacities, and experience personal growth) and self-actualizing tendency (motive to maintain self-concept and behave in ways that are consistent with self-concept)

A biological view

Hans Eysenck



Twin, family, and adoption studies of heritability; factor analysis studies of personality structure

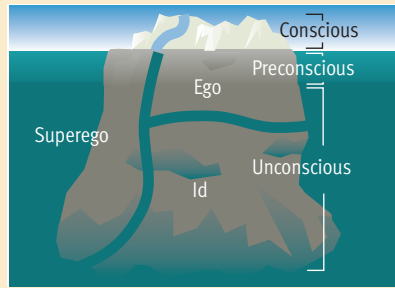


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No specific motivational forces singled out

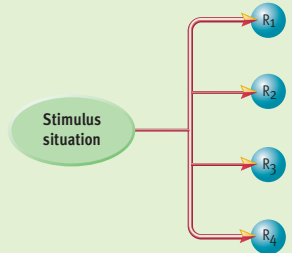
Model of personality structure

Three interacting components (id, ego, superego) operating at three levels of consciousness

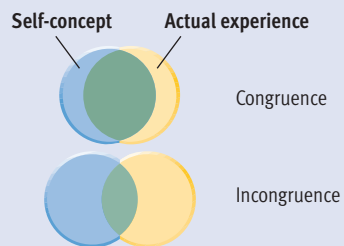


Collections of response tendencies tied to specific stimulus situations

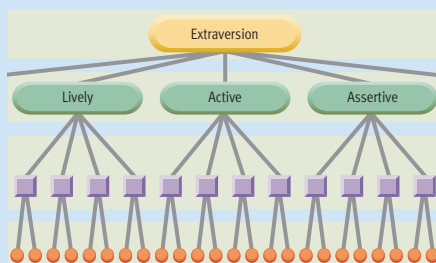
Operant response tendencies



Self-concept, which may or may not mesh well with actual experience



Hierarchy of traits, with specific traits derived from more fundamental, general traits



View of personality development

Emphasis on fixation or progress through psychosexual stages; experiences in early childhood (such as toilet training) can leave lasting mark on adult personality

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Personality evolves gradually over the life span (not in stages); responses (such as extraverted joking) followed by reinforcement (such as appreciative laughter) become more frequent



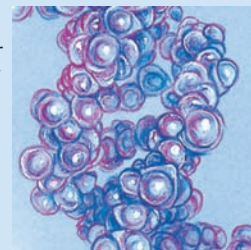
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Children who receive unconditional love have less need to be defensive; they develop more accurate, congruent self-concept; conditional love fosters incongruence



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Emphasis on unfolding of genetic blueprint with maturation; inherited predispositions interact with learning experiences



Roots of disorders

Unconscious fixations and unresolved conflicts from childhood, usually centering on sex and aggression

Maladaptive behavior due to faulty learning; the "symptom" is the problem, not a sign of underlying disease

Incongruence between self and actual experience (inaccurate self-concept); overdependence on others for approval and sense of worth

Genetic vulnerability activated in part by environmental factors

Understanding the Implications of Major Theories: Who Said This?

Check your understanding of the implications of the personality theories we've discussed by indicating which theorist is likely to have made the statements below. The answers are in Appendix A.

Choose from the following theorists:

Alfred Adler

Albert Bandura

Hans Eysenck

Sigmund Freud

Abraham Maslow

Walter Mischel

Quotes

1. "If you deliberately plan to be less than you are capable of being, then I warn you that you'll be deeply unhappy for the rest of your life."
2. "I feel that the major, most fundamental dimensions of personality are likely to be those on which [there is] strong genetic determination of individual differences."
3. "People are in general not candid over sexual matters . . . they wear a heavy overcoat woven of a tissue of lies, as though the weather were bad in the world of sexuality."

personality traits—and the ability to recognize these traits in others—may have contributed to reproductive fitness in ancestral human populations.

For example, David Buss (1991, 1995, 1997) has argued that the Big Five personality traits stand out as important dimensions of personality because those traits have had significant adaptive implications. Buss points out that humans historically have depended heavily on groups, which afford protection from predators or enemies, opportunities for sharing food, and a diverse array of other benefits. In the context of these group interactions, people have had to make difficult but crucial judgments about the characteristics of others, asking such questions as: Who will make a good member of my coalition? Who can I depend on when in need? Who will share their resources? Thus, Buss (1995) argues, "those individuals able to accurately discern and act upon these individual differences likely enjoyed a considerable reproductive advantage" (p. 22).

According to Buss, the Big Five emerge as fundamental dimensions of personality because humans have evolved special sensitivity to variations in the ability to bond with others (extraversion), the willingness to cooperate and collaborate (agreeableness), the tendency to be reliable and ethical (conscientiousness), the capacity to be an innovative problem solver (openness to experience), and the ability to handle stress (low neuroticism). In a nutshell, Buss argues that the Big Five reflect the most salient features of others' adaptive behavior over the course of evolutionary history. MacDonald (1998) takes this line of thinking one step further, asserting that the traits themselves (as opposed to the ability to recognize

them) are products of evolution that were adaptive in ancestral environments.

Evaluating Biological Perspectives

Researchers have compiled convincing evidence that biological factors exert considerable influence over personality. Nonetheless, we must take note of some weaknesses in biological approaches to personality:

1. David Funder (2001, p. 207) has observed that behavioral genetics researchers exhibit something of an "obsession with establishing the exact magnitude of heritability coefficients." As we discussed in Chapter 9, heritability ratios are ballpark estimates that will vary depending on sampling procedures and other considerations. There is no one magic number awaiting discovery, so the inordinate focus on heritability does seem ill-advised.

2. At present there's no comprehensive biological theory of personality. Eysenck's model doesn't provide a systematic overview of how biological factors govern personality structure and development (and was never intended to). In regard to personality, evolutionary theory is even more limited in scope than Eysenck's theory. Additional theoretical work is needed to catch up with recent empirical findings on the biological basis for personality.

➤ REVIEW OF KEY POINTS

- Contemporary biological theories stress the genetic origins of personality. Eysenck views personality structure as a hier-



DAVID BUSS

"In sum, the five factors of personality, in this account, represent important dimensions of the social terrain that humans were selected to attend to and act upon."

archy of traits. He believes that heredity influences individual differences in physiological functioning that affect how easily people acquire conditioned inhibitions.

- Twin studies of the Big Five personality traits find that identical twins are more similar in personality than fraternal twins, thus suggesting that personality is partly inherited. Estimates for the heritability of personality hover in the vicinity of 40%–50%. Recent research in behavioral genetics has suggested that shared family environment has sur-

prisingly little impact on personality, although a variety of theorists have been critical of this conclusion.

- Evolutionary analyses of personality suggest that certain traits and the ability to recognize them may have contributed to reproductive fitness. The biological approach has been criticized because of methodological problems with heritability ratios and because it offers no systematic model of how physiology shapes personality.

> A Contemporary Empirical Approach: Terror Management Theory

So far, our coverage has been largely devoted to grand, panoramic theories of personality. In this section we'll examine a new approach to understanding personality functioning that has a narrower focus than the classic theories of personality. *Terror management theory* emerged as an influential perspective in the 1990s. Although the theory borrows from Freudian and evolutionary formulations, it provides its own unique analysis of the human condition. Developed by Sheldon Solomon, Jeff Greenberg, and Tom Pyszczynski (1991, 2004b), this fresh perspective is currently generating a huge volume of research.

Essentials of Terror Management Theory

One of the chief goals of terror management theory is to explain why people need self-esteem (Solomon, Greenberg, & Pyszczynski, 1991). The theory begins with the assumption that humans share an evolutionary heritage with other animals that includes an instinctive drive for self-preservation. However, unlike other animals, humans have evolved complex cognitive abilities that permit self-awareness and contemplation of the future. These cognitive capacities make humans keenly aware of the inevitability of death—they appreciate that life can be snuffed out unpredictably at any time. The collision between humans' self-preservation instinct and their awareness of the inevitability of death creates the potential for experiencing anxiety, alarm, and terror when people think about their mortality (see **Figure 12.15**).

How do humans deal with this potential for terror? According to terror management theory, "What saves us is culture. Cultures provide ways to view the world—worldviews—that 'solve' the existential crisis engendered by the awareness of death" (Pyszczynski, Solomon, & Greenberg, 2003, p. 16). Cultural worldviews diminish anxiety by providing answers to such universal questions as: Why am I here? What is the

meaning of life? Cultures create stories, traditions, and institutions that give their members a sense of being part of an enduring legacy through their contributions to their families, tribes, schools, churches, professions, and so forth. Thus, faith in a cultural worldview can give people a sense of order, meaning, and context that can soothe humans' fear of death.

Where does self-esteem fit into the picture? Self-esteem is viewed as a sense of personal worth that depends on one's confidence in the validity of one's cultural worldview and the belief that one is living up to the standards prescribed by that worldview. "It is the feeling that one is a valuable contributor to a meaningful universe" (Pyszczynski et al., 2004, p. 437). Hence, self-esteem buffers people from the profound anxiety associated with the awareness that we are transient animals destined to die. In other words, self-esteem serves a *terror management* function (refer to **Figure 12.15**).

The notion that self-esteem functions as an *anxiety buffer* has been supported by numerous studies

PREVIEW QUESTIONS

- What are the chief hypotheses of terror management theory?
- How do reminders of death influence people's behavior?
- Does terror management theory have anything to say about reactions to terrorism?

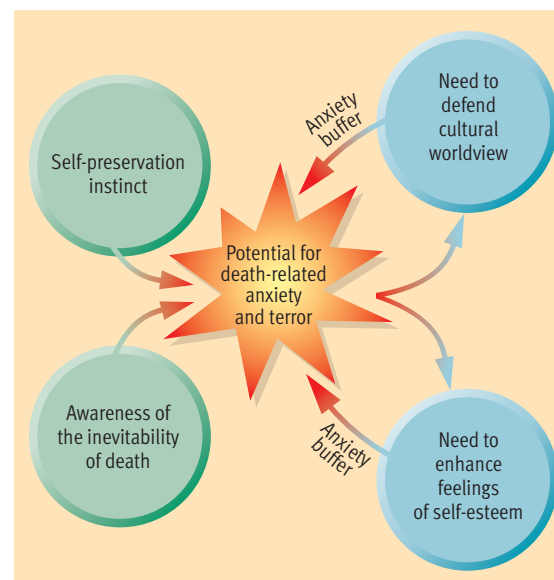


Figure 12.15
Overview of terror management theory. This graphic maps out the relations among the key concepts proposed by terror management theory. The theory asserts that humans' unique awareness of the inevitability of death fosters a need to defend one's cultural worldview and one's self-esteem, which serve to protect one from mortality-related anxiety.

(Pyszczynski et al., 2004). In many of these experiments, researchers have manipulated what they call *mortality salience* by asking subjects to briefly think about their own death. Consistent with the anxiety buffer hypothesis, reminding people of their mortality leads subjects to engage in a variety of behaviors that are likely to bolster their self-esteem, thus reducing anxiety.

Applications of Terror Management Theory

Increasing mortality salience also leads people to work harder at defending their cultural worldview (Arndt, Cook, & Routledge, 2004). For instance, after briefly pondering their mortality, research participants (1) hand out harsher penalties to moral transgressors, (2) respond more negatively to people who criticize their country, (3) give larger rewards to people who uphold cultural standards, and (4) show more respect for cultural icons, such as a flag (Greenberg et al., 1990; Rosenblatt et al., 1989). This need to defend one's cultural worldview may even fuel prejudice and aggression. Reminding subjects of their mortality leads to (1) more negative evaluations of people from different religious or ethnic backgrounds, (2) more stereotypic thinking about minority group members, and (3) more aggressive behavior toward people with opposing political views (McGregor et al., 1998; Schimel et al., 1999).

Terror management theory asserts that much of our behavior is motivated by the overlapping needs to defend our cultural worldview and preserve our self-esteem. This perspective yields novel hypotheses regarding many phenomena. For instance, Solomon, Greenberg, and Pyszczynski (2004a) explain excessive materialism in terms of the anxiety-buffering function of self-esteem. Specifically, they argue that “conspic-

uous possession and consumption are thinly veiled efforts to assert that one is special and therefore more than just an animal fated to die and decay” (p. 134). In another thought-provoking analysis, the architects of terror management theory argue that people high in neuroticism tend to be especially uptight about sex because sexuality lies at the core of humans' animal nature and hence their ultimate mortality (Greenberg et al., 1999). Terror management theory has also been used to explain depressive disorders. According to Arndt et al. (2000), depression occurs when individuals' anxiety buffer fails and they lose faith in the cultural worldview that gave their life meaning. One recent study even applied terror management theory to the political process. Cohen et al. (2004) found that mortality salience increases subjects' preference for “charismatic” candidates who articulate a grand vision that makes people feel like they are part of an important movement of lasting significance.

As you can see, although terror management theory is narrower in scope than psychoanalytic, behavioral, and humanistic theories, it has wide-ranging implications, and it is being applied to more and more aspects of human behavior. In particular, given its focus on death anxiety, it has much to say about people's reactions to the contemporary threat of terrorism. Pyszczynski, Solomon, and Greenberg (2003) point out that terrorist attacks are intended to produce a powerful, nationwide manipulation of mortality salience. When mortality salience is elevated, terror management theory predicts that people will embrace their cultural worldviews even more strongly than before. Consistent with this prediction, in the months following the September 11 terrorist attacks on New York and Washington, D.C., expressions of patriotism and religious faith increased dramatically. Research on terror management processes has also shown that when death anxiety is heightened, peo-

Terror management theory has been applied to a remarkably diverse array of phenomena. For example, it has been used to explain conspicuous consumption and to predict people's voting preferences.



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ple become less tolerant of opposing views and more prejudiced against those who are different. Consistent with this analysis, in the aftermath of September 11, individuals who questioned government policies met more hostility than usual. The theory also predicts that reminders of mortality increase the tendency to admire those who uphold cultural standards. More than ever, people need heroes who personify cultural values. This need was apparent following September 11 in the way the media made firefighters into larger-than-life heroes.

At first glance, a theory that explains everything from prejudice to compulsive shopping in terms of death anxiety may seem highly implausible. After all, most people do not appear to walk around all day obsessing about the possibility of their death. The architects of terror management theory are well aware

of this reality. They explain that the defensive reactions uncovered in their research generally occur when death anxiety surfaces on the fringes of conscious awareness and that these reactions are automatic and subconscious (Pyszczynski, Greenberg, & Solomon, 1999). They also assert that we experience far more reminders of our mortality than most of us appreciate. They point out that people may be reminded of their mortality by a variety of everyday events, such as driving by a cemetery or funeral home, reading about an auto accident, visiting a doctor's office, hearing about a celebrity's heart attack, learning about alarming medical research, skipping over the obituaries in the newspaper, and so forth. Thus, the processes discussed by terror management theory may be more commonplace than one might guess.

> Culture and Personality

Are there connections between culture and personality? The investigation of this question dates back to the 1940s and 1950s, when researchers set out to describe various cultures' *modal personality* (Kardiner & Linton, 1945) or *national character* (Kluckhohn & Murray, 1948). These investigations, which were largely guided by Freud's psychoanalytic theory, met with relatively little success (Bock, 2000; LeVine, 2001). Part of the problem may have been the rather culture-bound, Eurocentric nature of Freudian theory, but the crux of the problem was that it was unrealistic to expect to find a single, dominant personality type in each culture. As we have seen repeatedly, given the realities of multifactorial causation, behavior is never that simple. In retrospect, the research on modal personality overestimated the impact of cultural contexts and the uniformity of people within societies.

Studies of the links between culture and personality dwindled after the disappointments of the 1940s and 1950s. However, in recent years psychology's new interest in cultural factors has led to a renaissance of culture-personality research. This research has sought to determine whether Western personality constructs are relevant to other cultures and whether cultural differences can be seen in the prevalence of specific personality traits. As with cross-cultural research in other areas of psychology, these studies have found evidence of both continuity and variability across cultures.

For the most part, continuity has been apparent in cross-cultural comparisons of the *trait structure* of

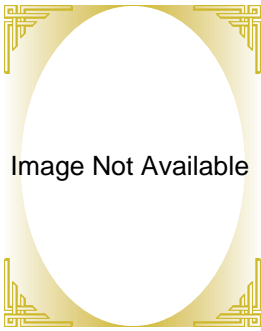
personality. When English language personality scales have been translated and administered in other cultures, the predicted dimensions of personality have emerged from the factor analyses (Paunonen & Ashton, 1998). For example, when scales that tap the Big Five personality traits have been administered and subjected to factor analysis in other cultures, the usual five traits have typically emerged (Katigbak et al., 2002; McCrae et al., 2005).

The cross-cultural similarities observed thus far seem impressive, but skepticism has been voiced in some quarters. Critics argue that the strategy of "exporting" Western tests to other cultures is slanted in favor of finding cross-cultural compatibility and is unlikely to uncover culture-specific traits (Church & Lonner, 1998). They also note that the non-Western samples studied thus far have not been all that culturally different from Western samples (Triandis & Suh, 2002). In sum, preliminary research *tentatively* suggests that the basic dimensions of personality trait structure may be universal, but additional research is needed.

Personality has often been studied in relation to the cultural syndromes of *individualism versus collectivism*, which represent different value systems and worldviews (Triandis & Suh, 2002). **Individualism involves putting personal goals ahead of group goals and defining one's identity in terms of personal attributes rather than group memberships.** In contrast, **collectivism involves putting group goals ahead of personal goals and defining one's identity**

PREVIEW QUESTIONS

- Does the five-factor model have any relevance in non-Western cultures?
- How do the cultural syndromes of individualism and collectivism relate to personality?
- How do conceptions of self vary across cultures?



**HAZEL MARKUS AND
SHINOBU KITAYAMA**

“Most of what psychologists currently know about human nature is based on one particular view—the so-called Western view of the individual as an independent, self-contained, autonomous entity.”

in terms of the groups one belongs to (such as one’s family, tribe, work group, social class, caste, and so on). In comparison to cultures that embrace individualism, cultures that are high in collectivism place a higher priority on shared values and resources, cooperation, mutual interdependence, and concern for how one’s actions will affect other group members (see Chapter 16). Consistent with these realities, individualistic cultures are thought to foster higher scores on personality traits such as extraversion, assertiveness, competitiveness, and self-confidence, whereas collectivist cultures are believed to promote empathy, agreeableness, and cooperativeness (Church & Ortiz, 2005).

Hazel Markus and Shinobu Kitayama (1991, 1994) have conducted some influential research comparing American and Asian conceptions of the self. According to Markus and Kitayama, American parents teach their children to be self-reliant, to feel good about themselves, and to view themselves as special individuals. Children are encouraged to excel in competitive endeavors and to strive to stand out from the crowd. They are told that “the squeaky wheel gets the grease” and that “you have to stand up for yourself.” Thus, Markus and Kitayama argue that *American culture fosters an independent view of the self*. American youngsters learn to define themselves in terms of their personal attributes, abilities, accomplishments, and possessions. Their unique strengths and achievements become the basis for their sense of self-worth. Hence, they are prone to emphasize their uniqueness.

Most of us take this mentality for granted. Indeed, Markus and Kitayama maintain that “most of what psychologists currently know about human nature is based on one particular view—the so-called West-

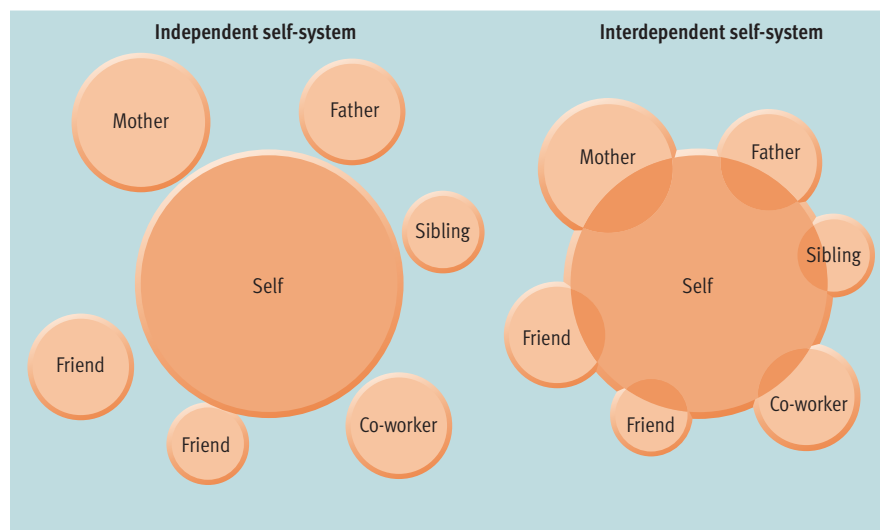
ern view of the individual as an independent, self-contained, autonomous entity” (1991, p. 224). However, they marshal convincing evidence that this view is *not* universal. They argue that in Asian cultures such as Japan and China, socialization practices foster a more *interdependent view of the self*, which emphasizes the fundamental connectedness of people to each other (see **Figure 12.16**). In these cultures, parents teach their children that they can rely on family and friends, that they should be modest about their personal accomplishments so they don’t diminish others’ achievements, and that they should view themselves as part of a larger social matrix. Children are encouraged to fit in with others and to avoid standing out from the crowd. A popular adage in Japan reminds children that “the nail that stands out gets pounded down.” Hence, Markus and Kitayama assert that Asian youngsters typically learn to define themselves in terms of the groups they belong to. Their harmonious relations with others and their pride in group achievements become the basis for their sense of self-worth. Because their self-esteem does not hinge so much on personal strengths, they are less likely to emphasize their uniqueness. Consistent with this analysis, Markus and Kitayama report that Asian subjects tend to view themselves as more similar to their peers than American subjects do.

The ramifications of these discrepant views of self are many. For example, these differing self-views lead to cultural disparities in self-enhancement. **Self-enhancement involves focusing on positive feedback from others, exaggerating one’s strengths, and seeing oneself as above average.** These tendencies are pervasive in Western cultures but are quite rare in Asian cultures, where the norm is to be more sen-

Figure 12.16

Culture and conceptions of self. According to Markus and Kitayama (1991), Western cultures foster an independent view of the self as a unique individual who is separate from others, as diagrammed on the left. In contrast, Asian cultures encourage an interdependent view of the self as part of an interconnected social matrix, as diagrammed on the right. The interdependent view leads people to define themselves in terms of their social relationships (for instance, as someone’s daughter, employee, colleague, or neighbor).

Source: Adapted from Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224–253. Copyright © 1991 by the American Psychological Association. Adapted by permission of the publisher and author.



sitive to negative feedback, to reflect on one's shortcomings, and to look for avenues of improvement (Cross & Markus, 1999).

➤ REVIEW OF KEY POINTS

- Terror management theory proposes that self-esteem and faith in a cultural worldview shield people from the profound anxiety associated with their mortality. Consistent with this analysis, increasing mortality salience leads people to make efforts to bolster their self-esteem and defend their worldviews. These defensive reactions are automatic and subconscious.
- The basic trait structure of personality may be much the same across cultures, as the Big Five traits usually emerge in cross-cultural studies. However, some critics have voiced doubts about this conclusion.
- The cultural syndromes of individualism and collectivism appear to be related to cultural variations in the prevalence of some personality traits. Markus and Kitayama assert that American culture fosters an independent conception of self, whereas Asian cultures foster an interdependent view of the self. These different views of the self lead to cultural disparities in the tendency to engage in self-enhancement.



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Culture can shape personality. Children in Asian cultures, for example, grow up with a value system that allows them to view themselves as interconnected parts of larger social units. Hence, they tend to avoid positioning themselves so that they stand out from others.

➤ Reflecting on the Chapter's Themes

Our discussion of culture and personality obviously highlighted the text's theme that people's behavior is influenced by their cultural heritage. This chapter has also been ideally suited for embellishing two other unifying themes: psychology's theoretical diversity and the idea that psychology evolves in a sociohistorical context.

No other area of psychology is characterized by as much theoretical diversity as the study of personality, where there are literally dozens of insightful theories. Some of this diversity exists because different theories attempt to explain different facets of behavior. However, much of this theoretical diversity reflects genuine disagreements on basic questions about personality. These disagreements are apparent on pages 494–495, which present an illustrated comparative overview of the ideas of Freud, Skinner, Rogers, and Eysenck, as representatives of the psychodynamic, behavioral, humanistic, and biological approaches to personality.

The study of personality also highlights the sociohistorical context in which psychology evolves. Personality theories have left many marks on modern culture. The theories of Freud, Adler, and Skinner have had an enormous impact on childrearing practices. The ideas of Freud and Jung have found their way into literature (influencing the portrayal of fictional

characters) and the visual arts. For example, Freud's theory helped inspire surrealism's interest in the world of dreams (see **Figure 12.17** on the next page). Maslow's hierarchy of needs and Skinner's affirmation of the value of positive reinforcement have influenced approaches to management in the world of business and industry.

Sociohistorical forces also leave their imprint on psychology. This chapter provided many examples of how personal experiences, prevailing attitudes, and historical events have contributed to the evolution of ideas in psychology. For example, Freud's pessimistic view of human nature and his emphasis on the dark forces of aggression were shaped to some extent by his exposure to the hostilities of World War I and prevailing anti-Semitic sentiments. And Freud's emphasis on sexuality was surely influenced by the Victorian climate of sexual repression that existed in his youth. Adler's views also reflected the social context in which he grew up. His interest in inferiority feelings and compensation appear to have sprung from his own sickly childhood and the difficulties he had to overcome. Likewise, it's reasonable to speculate that Jung's childhood loneliness and introversion may have sparked his interest in the introversion-extraversion dimension of personality. In a similar vein, we saw that both Rogers and Maslow had to resist parental



Cultural Heritage



Theoretical Diversity



Sociohistorical Context

Figure 12.17

Freud and surrealism. The theories of Freud and Jung had considerable influence on the arts. For instance, their ideas about the unconscious guided the surrealists' explorations of the irrational world of dreams. Salvador Dali's 1936 painting *Soft Construction with Boiled Beans: Premonition of Civil War* is a bizarre image that symbolizes how a society can tear itself apart. Freud once commented, "I was tempted to consider the surrealists, which apparently have chosen me for their patron saint, as a bunch of complete nuts . . . [but] the young Spaniard [Dali], with the magnificent eyes of a fanatic and his undeniable technical mastery, has caused me to reconsider" (quoted in Gerard, 1968).

Salvador Dali, *Soft Construction with Boiled Beans: Premonitions of Civil War* (1936). Photo by Graydon Wood, 1995, Philadelphia Museum of Art: The Louise and Walter Arensberg Collection. © 2005 Salvador Dali, Gala-Salvador Dali Foundation/Artists Rights Society (ARS), New York.



pressures in order to pursue their career interests. Their emphasis on the need to achieve personal fulfillment may have originated in these experiences.

Progress in the study of personality has also been influenced by developments in other areas of psychology. For instance, the enterprise of psychologi-

cal testing originally emerged out of efforts to measure intelligence. Eventually, however, the principles of psychological testing were applied to the challenge of measuring personality. In the upcoming Personal Application we discuss the logic and limitations of personality tests.

PERSONAL Application

Understanding Personality Assessment

Answer the following "true" or "false."

- ___ 1 Responses to personality tests are subject to unconscious distortion.
- ___ 2 The results of personality tests are often misunderstood.
- ___ 3 Personality test scores should be interpreted with caution.
- ___ 4 Personality tests serve many important functions.

If you answered "true" to all four questions, you earned a perfect score. Yes, personality tests are subject to distortion. Admittedly, test results are often misunderstood, and they should be interpreted cautiously. In spite of these problems, however, psychological tests can be quite useful.

Everyone engages in efforts to size up his or her own personality as well as that of oth-

ers. When you think to yourself that "Mary Ann is shrewd and poised," or when you remark to a friend that "Carlos is timid and submissive," you're making personality assessments. In a sense, then, personality assessment is an ongoing part of daily life. Given the popular interest in personality assessment, it's not surprising that psychologists have devised formal measures of personality.

Personality tests can be helpful in (1) making clinical diagnoses of psychological disorders, (2) vocational counseling, (3) personnel selection in business and industry, and (4) measuring specific personality traits for research purposes. Personality tests can be divided into two broad categories: *self-report inventories* and *projective tests*. In this Personal Application, we'll discuss some representative tests from both categories and discuss their strengths and weaknesses.

Self-Report Inventories



Self-report inventories are personality tests that ask individuals to answer a series of questions about their characteristic behavior. The logic underlying this approach is simple: Who knows you better? Who has known you longer? Who has more access to your private feelings? We'll look at three examples of self-report scales, the MMPI, the 16PF, and the NEO Personality Inventory.

The MMPI

The most widely used self-report inventory is the Minnesota Multiphasic Personality Inventory (MMPI). The MMPI was originally designed to aid clinicians in the diagnosis of psychological disorders. It measures 10 personality traits that, when manifested to

an extreme degree, are thought to be symptoms of disorders. Examples include traits such as paranoia, depression, and hysteria.

Are the MMPI clinical scales valid? That is, do they measure what they were designed to measure? Originally, it was assumed that the 10 clinical subscales would provide direct indexes of specific types of disorders. In other words, a high score on the depression scale would be indicative of depression, a high score on the paranoia scale would be indicative of a paranoid disorder, and so forth. However, research revealed that the relations between MMPI scores and various types of mental illness are much more complex than originally anticipated. People with most types of disorders show elevated scores on *several* MMPI subscales. This means that certain score *profiles* are indicative of specific disorders (see **Figure 12.18**). Thus, the interpretation of the MMPI is quite complicated. Nonetheless, the MMPI can be a helpful diagnostic tool for the clinician. The fact that the inventory has been translated into more than 115 languages is a testimonial to its usefulness (Butcher, 1990).

The 16PF and NEO Personality Inventory



Raymond Cattell (1957, 1965) set out to identify and measure the *basic dimensions* of the *normal* personality. He started with a previously compiled list of 4504 personality traits.

This massive list was reduced to 171 traits by weeding out terms that were virtually synonyms. Cattell then used factor analysis to identify clusters of closely related traits and the factors underlying them. Eventually, he reduced the list of 171 traits to 16 *source traits*. The Sixteen Personality Factor (16PF) Questionnaire is a 187-item scale that assesses these 16 basic dimensions of personality (Cattell, Eber, & Tatsuoka, 1970), which are listed in **Figure 12.19** on the next page.

As we noted in the main body of the chapter, some theorists believe that only five trait dimensions are required to provide a full description of personality. This view has led to the creation of a relatively new test—the NEO Personality Inventory. Developed by Paul Costa and Robert McCrae (1985, 1992), the NEO Inventory is designed to measure the Big Five traits: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. In spite of its short life span, the NEO is already widely used in research and clinical work.

Strengths and Weaknesses of Self-Report Inventories

To appreciate the strengths of self-report inventories, consider how else you might inquire about an individual's personality. For instance, if you want to know how assertive someone is, why not just ask the person? Why administer an elaborate 50-item per-

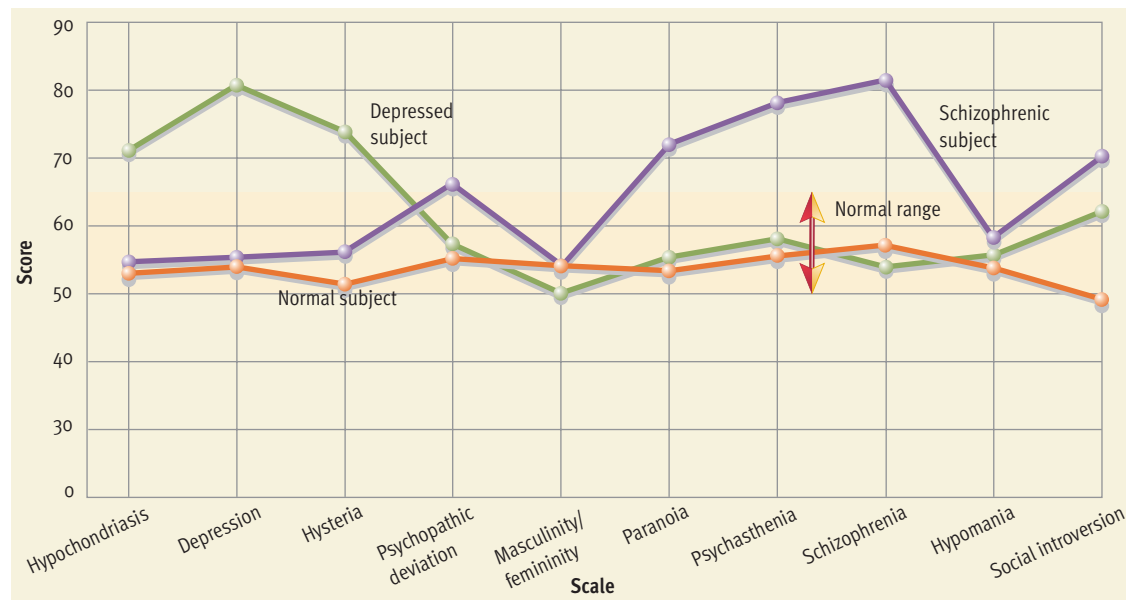
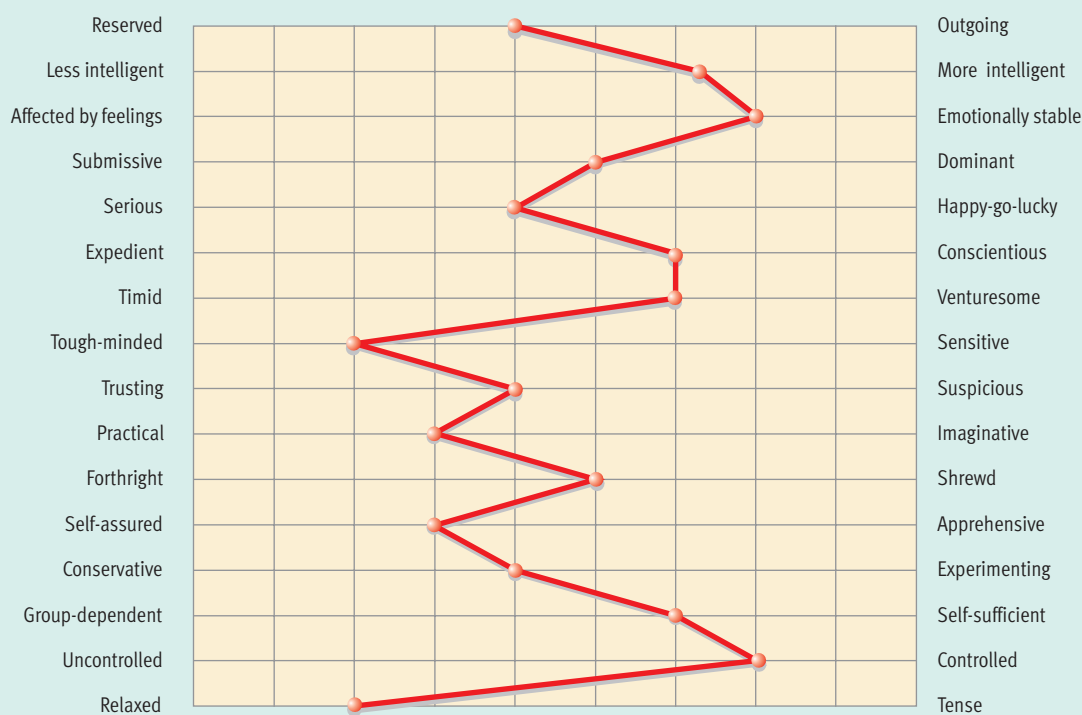


Figure 12.18
MMPI profiles. Scores on the 10 clinical scales of the MMPI are often plotted as shown here to create a profile for a client. The normal range for scores on each subscale is 50 to 65. People with disorders frequently exhibit elevated scores on several clinical scales rather than just one.

Figure 12.19

The Sixteen Personality Factor Questionnaire (16PF). Unlike the MMPI, Cattell's 16PF is designed to assess normal aspects of personality. The pairs of traits listed across from each other in the figure define the 16 factors measured by this self-report inventory. The profile shown is the average profile seen among a group of airline pilots who took the test.

Source: Cattell, R. B. (1973, July). Personality pinned down. *Psychology Today*, 40–46. Reprinted by permission of Psychology Today Magazine. Copyright © 1973 Sussex Publishers, Inc.



sonality inventory that measures assertiveness? The advantage of the personality inventory is that it can provide a more objective and more precise estimate of the person's assertiveness, one that is better grounded in extensive comparative data based on information provided by many other respondents.

Of course, self-report inventories are only as accurate as the information that respondents provide. They are susceptible to several sources of error (Ben-Porath, 2003; Kline, 1995; Paulhus, 1991), including the following:

1. *Deliberate deception.* Some self-report inventories include many questions whose purpose is easy to figure out. This problem makes it possible for some respondents to intentionally fake particular personality traits (Rees & Metcalfe, 2003).

2. *Social desirability bias.* Without realizing it, some people consistently respond to questions in ways that make them look good. The social desirability bias isn't a matter of deception so much as wishful thinking.

3. *Response sets.* A response set is a systematic tendency to respond to test items in a particular way that is unrelated to the content of the items. For instance, some people, called "yea-sayers," tend to agree with virtu-

ally every statement on a test. Other people, called "nay-sayers," tend to disagree with nearly every statement.

Test developers have devised a number of strategies to reduce the impact of deliberate deception, social desirability bias, and response sets (Berry, Wetter, & Baer, 1995; Lanyon & Goodstein, 1997). For instance, it's possible to insert a "lie scale" into a test to assess the likelihood that a respondent is engaging in deception. The best way to reduce the impact of social desirability bias is to identify items that are sensitive to this bias and drop them from the test. Problems with response sets can be reduced by systematically varying the way in which test items are worded.

Projective Tests

Projective tests, which all take a rather indirect approach to the assessment of personality, are used extensively in clinical work.

Projective tests ask participants to respond to vague, ambiguous stimuli in ways that may reveal the subjects' needs, feelings, and personality traits. The Rorschach test, for instance, consists of a series of ten ink-

blots. Respondents are asked to describe what they see in the blots. In the Thematic Apperception Test (TAT), a series of pictures of simple scenes is presented to individuals who are asked to tell stories about what is happening in the scenes and what the characters are feeling. For instance, one TAT card shows a young boy contemplating a violin resting on a table in front of him (see **Figure 12.20** for another example).

The Projective Hypothesis

The "projective hypothesis" is that ambiguous materials can serve as a blank screen onto which people project their characteristic concerns, conflicts, and desires (Frank, 1939). Thus, a competitive person who is shown the TAT card of the boy at the table with the violin might concoct a story about how the boy is contemplating an upcoming musical competition at which he hopes to excel. The same card shown to a person high in impulsiveness might elicit a story about how the boy is planning to sneak out the door to go dirt-bike riding with friends.

The scoring and interpretation of projective tests is very complicated. Rorschach responses may be analyzed in terms of content, originality, the feature of the inkblot that

determined the response, and the amount of the inkblot used, among other criteria. In fact, five different systems exist for scoring the Rorschach (Edberg, 1990). TAT stories are examined in terms of heroes, needs, themes, and outcomes.

Strengths and Weaknesses of Projective Tests

Proponents of projective tests assert that the tests have two unique strengths. First, they are not transparent to respondents. That is, the subject doesn't know how the test provides information to the tester. Hence, it may be difficult for people to engage in intentional deception (Groth-Marnat, 1997). Second, the indirect approach used in these tests may make them especially sensitive to unconscious, latent features of personality.

Unfortunately, the scientific evidence on projective measures is unimpressive (Garb, Florio, & Grove, 1998; Hunsley, Lee, & Wood, 2003). In a thorough review of the relevant research, Lilienfeld, Wood, and Garb (2000) conclude that projective tests tend to be plagued by inconsistent scoring, low reliability, inadequate test norms, cultural bias, and poor validity estimates. They also assert that, contrary to advocates' claims, projective tests are susceptible to some types of intentional deception (primarily, faking poor mental health). Based on their analysis, Lilienfeld and his colleagues argue that projective tests should be referred to as projective "techniques" or "instruments" rather than tests because "most of these techniques as used in daily clinical practice do not fulfill the traditional criteria for psychological tests"

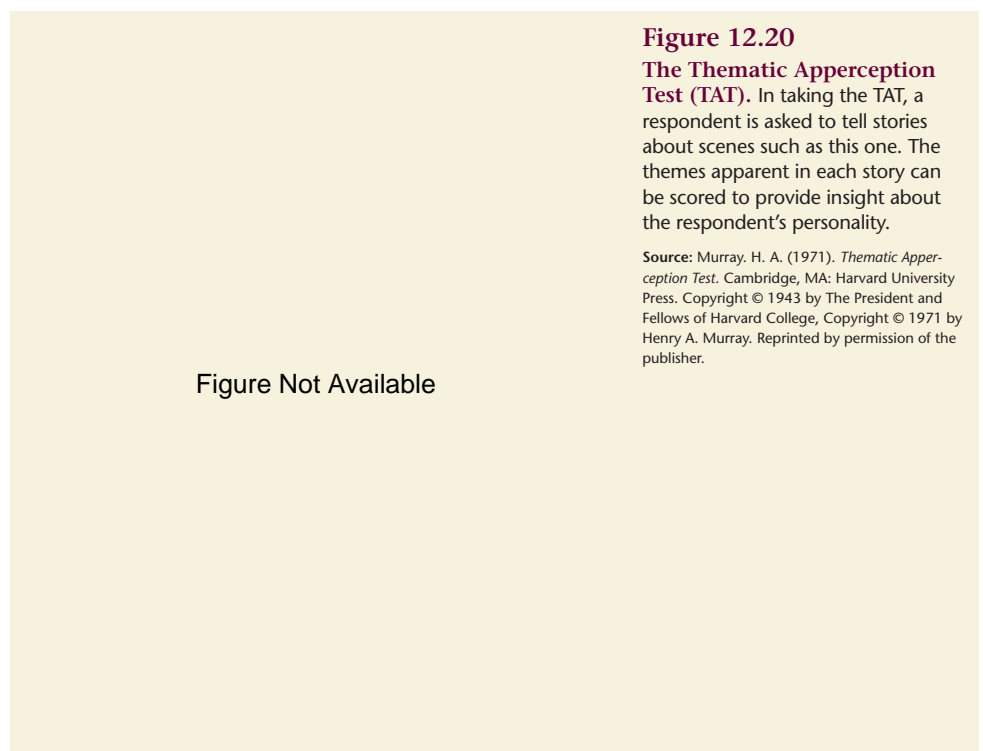


Figure 12.20

The Thematic Apperception Test (TAT). In taking the TAT, a respondent is asked to tell stories about scenes such as this one. The themes apparent in each story can be scored to provide insight about the respondent's personality.

Source: Murray, H. A. (1971). *Thematic Apperception Test*. Cambridge, MA: Harvard University Press. Copyright © 1943 by The President and Fellows of Harvard College, Copyright © 1971 by Henry A. Murray. Reprinted by permission of the publisher.

Figure Not Available

(p. 29). In spite of these problems, projective tests continue to be used by many clinicians. Although the questionable scientific status of these techniques is a very real problem, their continued popularity suggests that they yield subjective information that many clinicians find useful (Viglione & Rivera, 2003).

➤ REVIEW OF KEY POINTS

- Personality assessment is useful in clinical diagnosis, counseling, personnel selection, and research. Personality scales can be divided into self-report inventories and projective tests.

- Self-report measures ask subjects to describe themselves. The MMPI is a widely used inventory that measures pathological aspects of personality. The 16PF assesses 16 dimensions of the normal personality. The NEO personality inventory measures the Big Five personality traits.
- Self-report inventories are vulnerable to certain sources of error, including deception, the social desirability bias, and response sets.
- Projective tests, such as the Rorschach and TAT, assume that subjects' responses to ambiguous stimuli reveal something about their personality. While the projective hypothesis seems plausible, projective tests' reliability and validity are disturbingly low.

CRITICAL THINKING Application

Hindsight in Everyday Analyses of Personality

Consider the case of two close sisters who grew up together: Lorena and Christina. Lorena grew into a frugal adult who is careful about spending her money, only shops when there are sales, and saves every penny she can. In contrast, Christina became an extravagant spender who lives to shop and never saves any money. How do the sisters explain their striking personality differences? Lorena attributes her thrifty habits to the fact that her family was so poor when she was a child that she learned the value of being careful with money. Christina attributes her extravagant spending to the fact that her family was so poor that she learned to really enjoy any money that she might have. Now, it is possible that two sisters could react to essentially the same circumstances quite differently, but the more likely explanation is that both sisters have been influenced by the **hindsight bias**—the tendency to mold one's interpretation of the past to fit how events actually turned out. We saw how hindsight can distort memory in Chapter 7. Here, we

will see how hindsight tends to make everyone feel as if he or she is a personality expert and how it creates interpretive problems even for scientific theories of personality.

The Prevalence of Hindsight Bias

Hindsight bias is *ubiquitous*, which means that it occurs in a variety of settings, with all sorts of people. Most of the time, people are not aware of the way their explanations are skewed by the fact that the outcome is already known. The experimental literature on hindsight bias offers a rich array of findings on how the knowledge of an outcome biases the way people think about its causes (Hawkins & Hastie, 1990). For example, when college students were told the results of hypothetical experiments, each group of students could “explain” why the studies turned out the way they did, even though different groups were given opposite results to explain (Slovic & Fischhoff, 1977). The students be-

lieved that the results of the studies were obvious when they were told what the experimenter found, but when they were given only the information that was available before the outcome was known, it was not obvious at all. This bias is also called the “I knew it all along” effect because that is the typical refrain of people when they have the luxury of hindsight. Indeed, after the fact, people often act as if events that would have been difficult to predict had in fact been virtually *inevitable*. Looking back at the disintegration of the Soviet Union and the end of the Cold War, for instance, many people today act as though these events were bound to happen, but in reality these landmark events were predicted by almost no one.

Hindsight bias shows up in many contexts. For example, when a couple announces that they are splitting up, many people in their social circle will typically claim they “saw it coming.” When a football team loses in a huge upset, you will hear many fans claim, “I knew they were overrated and vulnerable.” When public officials make a difficult decision that leads to a disastrous outcome—such as NASA’s decision to proceed with the space shuttle *Columbia*’s return to earth, which resulted in the shuttle’s disintegration—many of the pundits in the press are quick to criticize, often asserting that only incompetent fools could have failed to foresee the catastrophe. Interestingly, people are not much kinder to themselves when they make ill-fated decisions. When individuals make tough calls that lead to negative results—such as buying a car that turns out to be a lemon, or investing in a stock that plummets—they often say things like, “Why did I ignore the obvious warning signs?” or “How could I be such an idiot?”



When public officials make tough decisions that backfire, critics are often quick to argue that the officials should have shown greater foresight. This type of hindsight bias has been apparent in discussions of whether NASA could have prevented the disintegration of the space shuttle *Columbia*. In retrospect, it is clear that NASA made some disastrous mistakes in its handling of the *Columbia* mission. But mistakes that look obvious with the luxury of hindsight often are far from obvious before the results of a tough decision are known.

Hindsight and Personality

Hindsight bias appears to be pervasive in everyday analyses of personality. Think about

it: If you attempt to explain why you are so suspicious, why your mother is so domineering, or why your best friend is so insecure, the starting point in each case will be the personality outcome. It would probably be impossible to reconstruct the past without being swayed by your knowledge of these outcomes. Thus, hindsight makes everybody an expert on personality, as we can all come up with plausible explanations for the personality traits of people we know well. Perhaps this is why Judith Harris (1998) ignited a firestorm of protest when she wrote a widely read book arguing that parents have relatively little effect on their children's personalities beyond the genetic material that they supply.

In her book *The Nurture Assumption*, Harris summarizes behavioral genetics research and other evidence suggesting that family environment has surprisingly little impact on children's personality (see p. 493). As discussed in the main body of the chapter, there is room for plenty of debate on this complex issue (Kagan, 1998; Tavris, 1998), but our chief interest here is that Harris made a cogent, compelling argument in her book that attracted extensive coverage in the press, which generated an avalanche of commentary from angry parents who argued that *parents do matter*. For example, *Newsweek* magazine received 350 letters, mostly from parents who provided examples of how they thought they influenced their children's personalities. However, parents' retrospective analyses of their children's personality development have to be treated with great skepticism, as they are likely to be distorted by hindsight bias (not to mention the selective recall frequently seen in anecdotal reports).

Unfortunately, hindsight bias is so prevalent it also presents a problem for scientific theories of personality. For example, the spectre of hindsight bias has been raised in many critiques of psychoanalytic theory (Torrey, 1992). Freudian theory was originally built mainly on a foundation of case studies of patients in therapy. Obviously, Freudian therapists who knew what their patients' adult personalities were like probably went looking for the types of childhood experiences hypothesized by Freud (oral fixations, punitive toilet training, Oedipal conflicts, and so

forth) in their efforts to explain their patients' personalities.

Another problem with hindsight bias is that once researchers know an outcome, more often than not they can fashion some plausible explanation for it. For instance, Torrey (1992) describes a study inspired by Freudian theory that examined breast-size preferences among men. The original hypothesis was that men who scored higher in dependence—thought to be a sign of oral fixation—would manifest a stronger preference for women with large breasts. When the actual results of the study showed just the opposite—that dependence was associated with a preference for smaller breasts—the finding was attributed to reaction formation on the part of the men. Instead of failing to support Freudian theory, the unexpected findings were simply reinterpreted in a way that was consistent with Freudian theory.

Hindsight bias also presents thorny problems for evolutionary theorists, who generally work backward from known outcomes to reason out how adaptive pressures in humans' ancestral past may have led to those outcomes (Cornell, 1997). Consider, for instance, evolutionary theorists' assertion that the Big Five traits are found to be fundamental dimensions of personality around the world because those specific traits have had major adaptive implications over the course of human history (Buss, 1995; MacDonald, 1998). Their explanation makes sense, but what would have happened if some *other traits* had shown up in the Big Five? Would the evolutionary view have been weakened if dominance, or paranoia, or high sensation seeking had turned up in the Big Five? Probably not. With the luxury of hindsight, evolutionary theorists surely could have constructed plausible explanations for how these traits promoted reproductive success in the distant past. Thus, hindsight bias is a fundamental feature of human cognition, and the

scientific enterprise is not immune to this problem.

Other Implications of “20/20 Hindsight”

Our discussion of hindsight has focused on its implications for thinking about personality, but there is ample evidence that hindsight can bias thinking in all sorts of domains. For example, consider the practice of obtaining second opinions on medical diagnoses. The doctor providing the second opinion usually is aware of the first physician's diagnosis, which creates a hindsight bias (Arkes et al., 1981). Second opinions would probably be more valuable if the doctors rendering them were not aware of previous diagnoses. Hindsight also has the potential to distort legal decisions in cases involving allegations of negligence. Jurors' natural tendency to think “how could they have failed to foresee this problem,” may exaggerate the appearance of negligence (LaBine & LaBine, 1996).

Hindsight bias is very powerful. The next time you hear of an unfortunate outcome to a decision made by a public official, carefully examine the way news reporters describe the decision. You will probably find that they believe that the disastrous outcome should have been obvious, because they can clearly see what went wrong after the fact. Similarly, if you find yourself thinking “Only a fool would have failed to anticipate this disaster” or “I would have foreseen this problem,” take a deep breath and try to review the decision *using only information that was known at the time the decision was being made*. Sometimes good decisions, based on the best available information, can have terrible outcomes. Unfortunately, the clarity of “20/20 hindsight” makes it difficult for people to learn from their own and others' mistakes.

Table 12.3 Critical Thinking Skill Discussed in This Application

Skill	Description
Recognizing the bias in hindsight analysis	The critical thinker understands that knowing the outcome of events biases our recall and interpretation of the events.

CHAPTER 12 *Recap*

Key Ideas

The Nature of Personality

The concept of personality explains the consistency in people's behavior over time and situations while also explaining their distinctiveness. There is considerable debate as to how many trait dimensions are necessary to account for the variation in personality, but the Big Five model has become the dominant conception of personality structure.

Psychodynamic Perspectives

- Freud's psychoanalytic theory emphasizes the importance of the unconscious. Freud described personality structure in terms of three components—the id, ego, and superego—which are routinely involved in an ongoing series of internal conflicts.
- Freud theorized that conflicts centering on sex and aggression are especially likely to lead to anxiety. According to Freud, anxiety and other unpleasant emotions such as guilt are often ward off with defense mechanisms.
- Freud described a series of five stages of development: oral, anal, phallic, latency, and genital. Certain experiences during these stages can have lasting effects on adult personality.
- Jung's most innovative and controversial concept was the collective unconscious. Adler's individual psychology emphasizes how people strive for superiority to compensate for their feelings of inferiority.
- Overall, psychodynamic theories have produced many groundbreaking insights about the unconscious, the role of internal conflict, and the importance of early childhood experiences in personality development. However, psychodynamic theories have been criticized for their poor testability, their inadequate base of empirical evidence, and their male-centered views.

Behavioral Perspectives

- Behavioral theories view personality as a collection of response tendencies tied to specific stimulus situations. They assume that personality development is a lifelong process in which response tendencies are shaped and reshaped by learning, especially operant conditioning.
- Bandura's social cognitive theory focuses on how cognitive factors such as expectancies and self-efficacy regulate learned behavior. His concept of observational learning accounts for the acquisition of responses from models. Mischel has questioned the degree to which people display cross-situational consistency in behavior.
- Behavioral approaches to personality are based on rigorous research. They have provided ample insights into how environmental factors and learning mold personalities. The behaviorists have been criticized for their overdependence on animal research, their fragmented analysis of personality, and radical behaviorism's dehumanizing view of human nature.

Humanistic Perspectives

- Humanistic theories are phenomenological and take an optimistic view of human potential. Rogers focused on the self-concept as the critical aspect of personality. Maslow theorized that psychological health depends on fulfilling one's need for self-actualization.
- Humanistic theories deserve credit for highlighting the importance of subjective views of oneself and for helping to lay the foundation for positive psychology. Humanistic theories lack a firm base of research, are difficult to put to an empirical test, and may be overly optimistic about human nature.

Biological Perspectives

- Contemporary biological theories stress the genetic origins of personality. Eysenck suggests that heredity influences individual differences in physiological functioning that affect how easily people acquire conditioned responses. Research on the personality resemblance of twins provides impressive evidence that genetic factors shape personality.
- Evolutionary theorists argue that the major dimensions of personality reflect humans' adaptive landscape. The biological approach has demonstrated that personality is partly heritable, but it has been criticized for its narrow focus on heritability and because it offers no systematic model of how physiology shapes personality.

A Contemporary Empirical Approach: Terror Management Theory

- Terror management theory proposes that self-esteem and belief in a cultural worldview shield people from the profound anxiety associated with

their mortality. Consistent with this analysis, increasing mortality salience leads people to make efforts to bolster their self-esteem and defend their worldviews. These defensive reactions are automatic and subconscious.

Culture and Personality

- Research suggests that the basic trait structure of personality may be much the same across cultures, as the Big Five traits usually emerge in cross-cultural studies. The cultural syndromes of individualism and collectivism appear to be related to cultural variations in the prevalence of some personality traits. Markus and Kitayama assert that American culture fosters an independent conception of self, whereas Asian cultures foster an interdependent view of the self.

Reflecting on the Chapter's Themes

- The study of personality illustrates how psychology is characterized by great theoretical diversity. It also demonstrates how ideas in psychology are shaped by sociohistorical forces and how cultural factors influence psychological processes.

PERSONAL APPLICATION • Understanding Personality Assessment

- Personality assessment is useful in clinical diagnosis, counseling, personnel selection, and research. Self-report measures ask subjects to describe themselves. Self-report inventories are vulnerable to certain sources of error, including deception, the social desirability bias, and response sets.
- Projective tests assume that subjects' responses to ambiguous stimuli reveal something about their personality. While the projective hypothesis seems plausible, projective tests' reliability and validity are disturbingly low.

CRITICAL THINKING APPLICATION • Hindsight in Everyday Analyses of Personality

- Hindsight bias often leads people to assert that "I knew it all along" in discussing outcomes that they did not actually predict. Thanks to hindsight, people can almost always come up with plausible-sounding explanations for known personality traits.

Key Terms

Archetypes (p. 479)
Behaviorism (p. 481)
Collective unconscious (p. 478)
Collectivism (p. 499)
Compensation (p. 479)
Conscious (p. 473)
Defense mechanisms (p. 475)
Displacement (p. 475)
Ego (p. 472)
Extraverts (p. 479)
Factor analysis (p. 470)
Fixation (p. 476)
Hierarchy of needs (p. 489)
Hindsight bias (p. 506)
Humanism (p. 487)
Id (p. 472)
Identification (p. 475)
Incongruence (p. 487)
Individualism (p. 499)
Introverts (p. 479)
Model (p. 485)
Need for self-actualization (p. 489)
Observational learning (p. 485)
Oedipal complex (p. 477)
Personal unconscious (p. 478)
Personality (p. 470)
Personality trait (p. 470)
Phenomenological approach (p. 487)
Pleasure principle (p. 472)
Preconscious (p. 473)

Projection (p. 475)
Projective tests (p. 504)
Psychodynamic theories (p. 472)
Psychosexual stages (p. 476)
Rationalization (p. 475)
Reaction formation (p. 475)
Reality principle (p. 472)
Reciprocal determinism (p. 483)
Regression (p. 475)
Repression (p. 475)
Self-actualizing persons (p. 489)
Self-concept (p. 487)
Self-efficacy (p. 485)
Self-enhancement (p. 500)
Self-report inventories (p. 503)
Striving for superiority (p. 479)
Superego (p. 473)
Unconscious (p. 473)

Key People

Alfred Adler (pp. 478–480)
Albert Bandura (pp. 483–485)
Hans Eysenck (pp. 491–492)
Sigmund Freud (pp. 472–478)
Carl Jung (pp. 478–479)
Abraham Maslow (pp. 488–490)
Robert McCrae & Paul Costa (pp. 470–471)
Walter Mischel (pp. 485–486)
Carl Rogers (pp. 487–488)
B. F. Skinner (pp. 481–482)

CHAPTER 12 Practice Test

1. Harvey Hedonist has devoted his life to the search for physical pleasure and immediate need gratification. Freud would say that Harvey is dominated by:
 - A. his ego.
 - B. his superego.
 - C. his id.
 - D. Bacchus.
2. Furious at her boss for what she considers to be unjust criticism, Tyra turns around and takes out her anger on her subordinates. Tyra may be using the defense mechanism of:
 - A. displacement.
 - B. reaction formation.
 - C. identification.
 - D. replacement.
3. Freud believed that most personality disturbances are due to:
 - A. the failure of parents to reinforce healthy behavior.
 - B. a poor self-concept resulting from excessive parental demands.
 - C. unconscious and unresolved sexual conflicts rooted in childhood experiences.
 - D. the exposure of children to unhealthy role models.
4. According to Alfred Adler, the prime motivating force in a person's life is:
 - A. physical gratification.
 - B. existential anxiety.
 - C. striving for superiority.
 - D. the need for power.
5. Which of the following learning mechanisms does B. F. Skinner see as being the major means by which behavior is learned?
 - A. classical conditioning
 - B. operant conditioning
 - C. observational learning
 - D. insight learning
6. Always having been a good student, Irving is confident that he will do well in his psychology course. According to Bandura's social cognitive theory, Irving would be said to have:
 - A. strong feelings of self-efficacy.
 - B. a sense of superiority.
 - C. strong feelings of self-esteem.
 - D. strong defense mechanisms.
7. Which of the following approaches to personality is least deterministic?
 - A. the humanistic approach
 - B. the psychoanalytic approach
 - C. Skinner's approach
 - D. the behavioral approach
8. Which of the following did Carl Rogers believe fosters a congruent self-concept?
 - A. conditional love
 - B. appropriate role models
 - C. immediate-need gratification
 - D. unconditional love
9. The strongest support for the theory that personality is heavily influenced by genetics is provided by strong personality similarity between:
 - A. identical twins reared together.
 - B. identical twins reared apart.
 - C. fraternal twins reared together.
 - D. nontwins reared together.
10. Which of the following is the best way to regard heritability estimates?
 - A. as reliable but not necessarily valid estimates
 - B. as ballpark estimates of the influence of genetics
 - C. as accurate estimates of the influence of genetics
 - D. as relatively useless estimates of the influence of genetics
11. Research on terror management theory has shown that increased mortality salience leads to all of the following except:
 - A. increased striving for self-esteem.
 - B. more stereotypic thinking about minorities.
 - C. more aggressive behavior toward people with opposing views.
 - D. reduced respect for cultural icons.
12. When the values in a culture emphasize putting group goals ahead of personal goals and defining one's identity in terms of the groups one belongs to, the culture is said to be high in:
 - A. self-actualization.
 - B. self-efficacy.
 - C. collectivism.
 - D. individualism.
13. In which of the following cultures is an independent view of the self most likely to be the norm?
 - A. China
 - B. Japan
 - C. Africa
 - D. United States
14. Which of the following is *not* a shortcoming of self-report personality inventories?
 - A. The accuracy of the results is a function of the honesty of the respondent.
 - B. Respondents may attempt to answer in a way that makes them look good.
 - C. There is sometimes a problem with "yea-sayers" or "nay-sayers."
 - D. They are objective measures that are easy to administer and score.
15. In *The Nurture Assumption*, Judith Harris argues that the evidence indicates that family environment has _____ on children's personalities.
 - A. largely positive effects
 - B. largely negative effects
 - C. surprisingly little effect
 - D. a powerful effect

1C pp. 472-473	6A p. 485	11D pp. 497-498	12C pp. 499-500	13D p. 500	14D p. 504	15C p. 507
2A p. 475	7A p. 487	12C pp. 499-500	13D p. 500	14D p. 504	15C p. 507	
3C p. 478	8D p. 488	13D p. 500	14D p. 504	15C p. 507		
4C p. 479	9B pp. 492-493	14D p. 504	15C p. 507			
5B pp. 481-482	10B p. 496	15C p. 507				

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



<http://www.thomsonedu.com>

Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/
Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



CHAPTER

13

Stress, Coping, and Health



The Nature of Stress

Stress as an Everyday Event
Appraisal: Stress Lies in the Eye of the Beholder
Major Types of Stress

Responding to Stress

Emotional Responses
Physiological Responses
Behavioral Responses

The Effects of Stress on Psychological Functioning

Impaired Task Performance
Burnout
Psychological Problems and Disorders
Positive Effects

The Effects of Stress on Physical Health

Personality, Hostility, and Heart Disease
Emotional Reactions, Depression, and Heart Disease

FEATURED STUDY • Is Depression a Risk Factor for Heart Disease?

Stress, Other Diseases, and Immune Functioning
Sizing Up the Link Between Stress and Illness

Factors Moderating the Impact of Stress

Social Support
Optimism and Conscientiousness

Health-Impairing Behavior

Smoking
Poor Nutritional Habits
Lack of Exercise
Alcohol and Drug Use
Behavior and AIDS
How Does Health-Impairing Behavior Develop?

Reactions to Illness

Deciding to Seek Treatment
Communicating with Health Providers
Adhering to Medical Advice

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Improving Coping and Stress Management

Reappraisal: Ellis's Rational Thinking
Using Humor as a Stress Reducer
Releasing Pent-Up Emotions
Managing Hostility and Forgiving Others
Learning to Relax
Minimizing Physiological Vulnerability

CRITICAL THINKING APPLICATION • Thinking Rationally About Health Statistics and Decisions

Evaluating Statistics on Health Risks
Thinking Systematically About Health Decisions

Recap

Practice Test

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You're in your car headed home from school with a classmate. Traffic is barely moving. A radio report indicates that the traffic jam is only going to get worse. You groan audibly as you fiddle impatiently with the radio dial. Another motorist narrowly misses your fender trying to cut into your lane. Your pulse quickens as you shout insults at the unknown driver, who can't even hear you. You think about the term paper that you have to work on tonight. Your stomach knots up as you recall all the crumpled drafts you tossed into the wastebasket last night. If you don't finish that paper soon, you won't be able to find any time to study for your math test, not to mention your biology quiz. Suddenly, you remember that you promised the person you're dating that the two of you would get together tonight. There's no way. Another fight looms on the horizon. Your classmate asks how you feel about the tuition increase that the college announced yesterday. You've been trying not to think about it. You're already in debt up to your ears. Your parents are bugging you about changing schools, but you don't want to leave your friends. Your heartbeat quickens as you contemplate the debate you're sure to have with your parents. You feel wired with tension as you realize that the stress in your life never seems to let up.

Many circumstances can create stress. It comes in all sorts of packages: big and small, pretty and ugly, simple and complex. All too often, the package comes as a surprise. In this chapter we'll try to sort out these

packages. We'll discuss the nature of stress, how people cope with stress, and the potential effects of stress.

Our examination of the relationship between stress and physical illness will lead us into a broader discussion of the psychology of health. The way people in health professions think about physical illness has changed considerably in the past 20 years. The traditional view of physical illness as a purely biological phenomenon has given way to a biopsychosocial model of illness (Smilkstein, 1990). **The biopsychosocial model holds that physical illness is caused by a complex interaction of biological, psychological, and sociocultural factors.** This model does not suggest that biological factors are unimportant. It simply asserts that these factors operate in a psychosocial context that is also influential.

What has led to this shift in thinking? In part, it's a result of changing patterns of illness. Prior to the 20th century, the principal threats to health were *contagious diseases* caused by infectious agents—diseases such as smallpox, typhoid fever, diphtheria, yellow fever, malaria, cholera, tuberculosis, and polio. Today, none of these diseases is among the leading killers in the United States. They were tamed by improvements in nutrition, public hygiene, sanitation, and medical treatment (Grob, 1983). Unfortunately, the void left by contagious diseases has been filled all too quickly by *chronic diseases* that develop gradually, such as heart disease, cancer, and stroke (see **Figure 13.1**). Psycho-

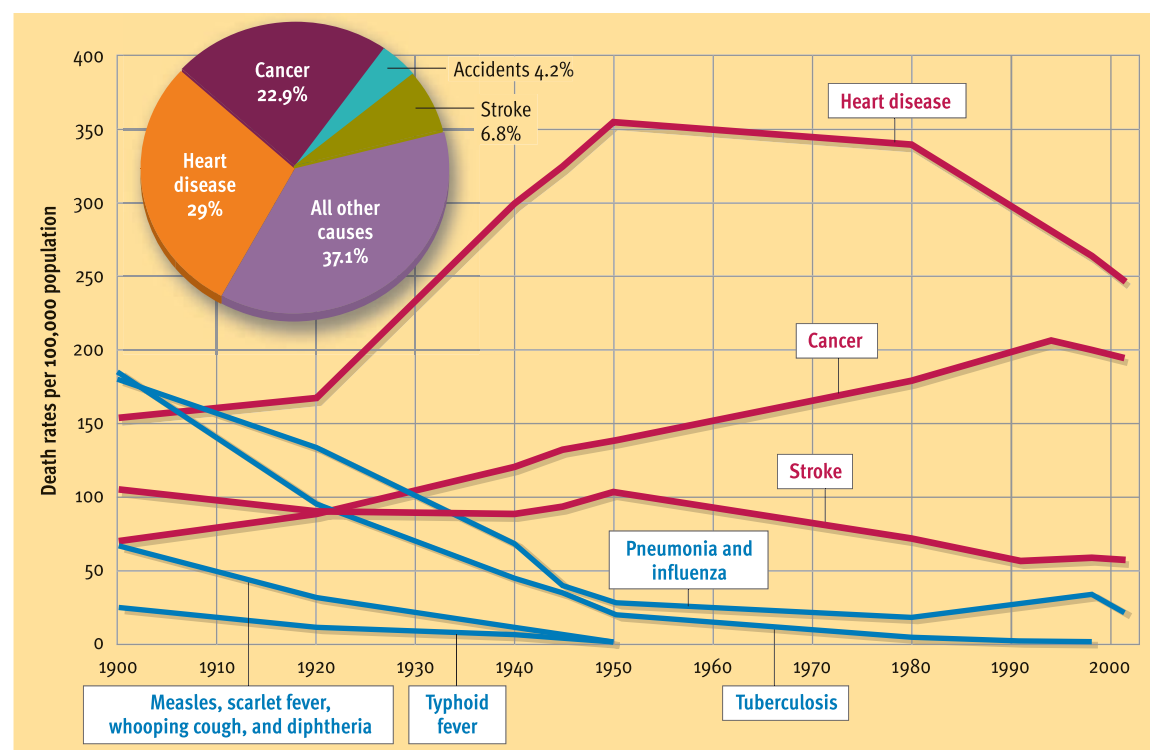


Figure 13.1
Changing patterns of illness. Trends in the death rates for various diseases during the 20th century reveal that contagious diseases (shown in blue) have declined as a threat to health. However, the death rates for stress-related chronic diseases (shown in red) have remained quite high. The pie chart (inset) shows the results of these trends: Three chronic diseases (heart disease, cancer, and stroke) account for almost 60% of all deaths. (Based on data from the U.S. National Center for Health Statistics)

social factors, such as stress and lifestyle, play a large role in the development of these chronic diseases. The growing recognition that psychological factors influence physical health has led to the emergence of a new specialty in psychology. **Health psychology is concerned with how psychosocial factors relate to the promotion and maintenance of health and**

with the causation, prevention, and treatment of illness. In the second half of this chapter, we'll explore this new domain of psychology. In the Personal Application, we'll focus on strategies for enhancing stress management, and in the Critical Thinking Application we'll discuss strategies for improving health-related decision making.

> The Nature of Stress

PREVIEW QUESTIONS

- How significant are minor, everyday stressors?
- How objective are our appraisals of stress?
- What is frustration?
- What are the three types of conflict?
- What evidence led to the conclusion that life changes are stressful?
- What is pressure?

The word *stress* has been used in different ways by different theorists. We'll define **stress as any circumstances that threaten or are perceived to threaten one's well-being and that thereby tax one's coping abilities.** The threat may be to immediate physical safety, long-range security, self-esteem, reputation, peace of mind, or many other things that one values. Stress is a complex concept, so let's explore a little further.

Stress as an Everyday Event

The word *stress* tends to spark images of overwhelming, traumatic crises. People may think of tornadoes, hurricanes, floods, and earthquakes. Undeniably, major disasters of this sort are extremely stressful events. Studies conducted in the aftermath of natural disasters typically find elevated rates of psychological problems and physical illness in the communities affected by these disasters (Brende, 2000; Raphael & Dobson, 2000). However, these unusual events are only a small part of what constitutes stress. Many everyday events, such as waiting in line, having car trouble, shopping for Christmas presents, misplacing your checkbook, and staring at bills you can't pay, are also stressful. Researchers have found that everyday problems and the minor nuisances of life are also important forms of stress (Kohn, Lafreniere, & Gurevich, 1991). Of course, major and minor stressors are not entirely independent. A major stressful event, such as going through a divorce, can trigger a cascade of minor stressors, such as looking for an attorney, changing bank accounts, taking on new household responsibilities, and so forth (Pillow, Zautra, & Sandler, 1996).

You might guess that minor stresses would produce minor effects, but that isn't necessarily true. Richard Lazarus and his colleagues, who developed a scale to measure everyday hassles, have shown that routine hassles may have significant harmful effects on mental and physical health (Delongis, Folkman, & Lazarus, 1988). Other investigators, working with different types of samples and different measures of

hassles, have also found that everyday hassles are predictive of impaired mental and physical health (Chang & Sanna, 2003; Sher, 2003). Why would minor hassles be so troublesome? The answer isn't entirely clear yet, but it may be because of the *cumulative* nature of stress (Seta, Seta, & McElroy, 2002). Stress adds up. Routine stresses at home, at school, and at work might be fairly benign individually, but collectively they could create great strain.

Appraisal: Stress Lies in the Eye of the Beholder

The experience of feeling stressed depends on what events one notices and how one chooses to appraise or interpret them (Lazarus, 1999; Semmer, McGrath, & Beehr, 2005). Events that are stressful for one person may be routine for another. For example, many people find flying in an airplane somewhat stressful, but frequent fliers may not be bothered at all. Some people enjoy the excitement of going out on a date with someone new; others find the uncertainty terrifying.

Often, people aren't very objective in their appraisals of potentially stressful events. A study of hospitalized patients awaiting surgery showed only a slight correlation between the objective seriousness of a person's upcoming surgery and the amount of fear experienced by the patients (Janis, 1958). Clearly, some people are more prone than others to feel threatened by life's difficulties. A number of studies have shown that anxious, neurotic people report more stress than others (Cooper & Bright, 2001; Watson, David, & Suls, 1999), as do people who are relatively unhappy (Seidlitz & Diener, 1993). Thus, stress lies in the eye (actually, the mind) of the beholder. People's appraisals of stressful events are highly subjective.

Major Types of Stress

An enormous variety of events can be stressful for one person or another. To achieve a better under-



RICHARD LAZARUS

"We developed the Hassle Scale because we think scales that measure major events miss the point. The constant, minor irritants may be much more important than the large, landmark changes."

standing of stress, theorists have tried to analyze the nature of stressful events and divide them into subtypes. One sensible distinction involves differentiating between *acute stressors* and *chronic stressors* (Dougall & Baum, 2001). **Acute stressors are threatening events that have a relatively short duration and a clear endpoint.** Examples would include having an encounter with a belligerent drunk, dealing with the challenge of a major exam, or having your home threatened by severe flooding. **Chronic stressors are threatening events that have a relatively long duration and no readily apparent time limit.** Examples would include persistent financial strains produced by huge credit card debts, ongoing pressures from a hostile boss at work, or the demands of caring for a sick family member over a period of years.

None of the proposed schemes for classifying stressful events has turned out to be altogether satisfactory. Classifying stressful events into nonintersecting categories is virtually impossible. Although this problem presents conceptual headaches for researchers, it need not prevent us from describing four major types of stress: frustration, conflict, change, and pressure. As you read about each of them, you'll surely recognize some familiar adversaries.

Frustration

I had a wonderful relationship with a nice man for three months. One day when we planned to spend the entire day together, he called and said he wouldn't be meeting me and that he had decided to stop seeing me. I cried all morning. The grief was like losing someone through death. I still hurt, and I wonder if I'll ever get over him.

This scenario illustrates frustration. As psychologists use the term, **frustration occurs in any situation in which the pursuit of some goal is thwarted.** In essence, you experience frustration when you want something and you can't have it. Everyone has to deal with frustration virtually every day. Traffic jams, difficult daily commutes, and annoying drivers, for instance, are a routine source of frustration that can elicit anger and aggression (Hennessy & Wiesenthal, 1999; Rasmussen, Knapp, & Garner, 2000). Fortunately, most frustrations are brief and insignificant. You may be quite upset when you go to a repair shop to pick up your ailing DVD player and find that it hasn't been fixed as promised. However, a week later you'll probably have your DVD player back, and the frustration will be forgotten.

Of course, some frustrations can be sources of significant stress. Failures and losses are two common kinds of frustration that are often highly stressful. Everyone fails in at least some of his or her endeavors. Some people make failure almost inevitable by

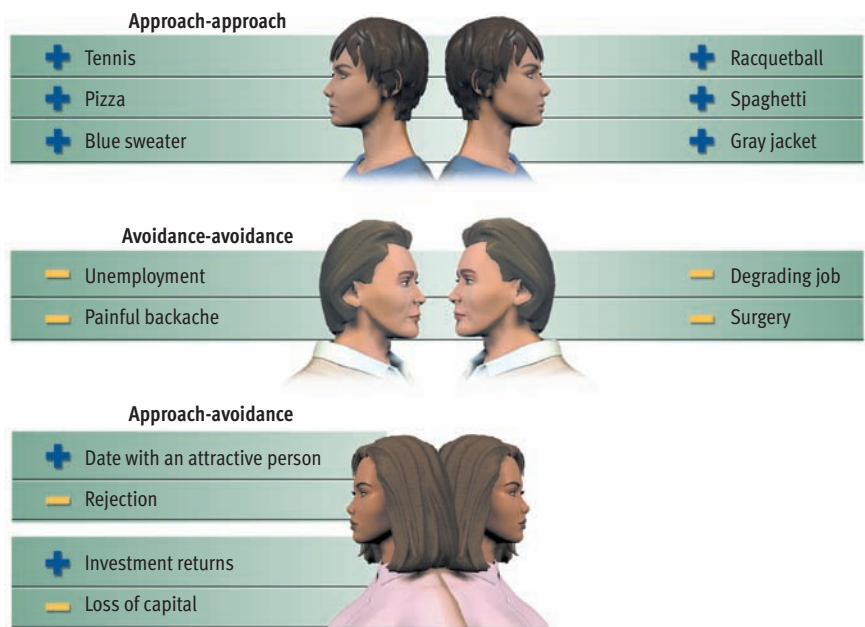
setting unrealistically high goals for themselves. For example, many business executives tend to forget that for every newly appointed vice president in the business world, there are dozens of middle-level executives who don't get promoted. Losses can be especially frustrating because people are deprived of something that they're accustomed to having. For example, few things are more frustrating than losing a dearly loved boyfriend, girlfriend, spouse, or parent.

Conflict

Should I or shouldn't I? I became engaged at Christmas. My fiancé surprised me with a ring. I knew if I refused the ring he would be terribly hurt and our relationship would suffer. However, I don't really know whether or not I want to marry him. On the other hand, I don't want to lose him either.

Like frustration, conflict is an unavoidable feature of everyday life. The perplexing question "Should I or shouldn't I?" comes up countless times in everyone's life. **Conflict occurs when two or more incompatible motivations or behavioral impulses compete for expression.** Conflicts come in three types, which were originally described by Kurt Lewin (1935) and investigated extensively by Neal Miller (1944, 1959). These three basic types of conflict—approach-approach, avoidance-avoidance, and approach-avoidance—are diagrammed in **Figure 13.2**.

In an approach-approach conflict a choice must be made between two attractive goals. The problem, of course, is that you can choose just one of the two goals. For example: You have a free afternoon; should you play tennis or racquetball? You can't



Web Link 13.1

The Web's Stress Management & Emotional Wellness Page Ernesto Randolfi (Montana State University) has gathered a comprehensive set of resources dealing with stress management. Topics covered include cognitive restructuring, relaxation techniques, and stress in the workplace and in college life.

Figure 13.2

Types of conflict. Psychologists have identified three basic types of conflict. In approach-approach and avoidance-avoidance conflicts, a person is torn between two goals. In an approach-avoidance conflict, only one goal is under consideration, but it has both positive and negative aspects.

afford both—should you buy the blue sweater or the gray jacket? Among the three kinds of conflict, the approach-approach type tends to be the least stressful. People don't usually stagger out of restaurants exhausted by the stress of choosing which of several appealing entrees to eat. Nonetheless, approach-approach conflicts over important issues may sometimes be troublesome. If you're torn between two appealing college majors or two attractive boyfriends, you may find the decision-making process quite stressful, since whichever alternative is not chosen represents a loss of sorts.

In an avoidance-avoidance conflict a choice must be made between two unattractive goals. Forced to choose between two repelling alternatives, you are, as they say, "caught between a rock and a hard place." For example, should you continue to collect unemployment checks, or should you take that degrading job at the car wash? Or suppose you have painful backaches. Should you submit to surgery that you dread, or should you continue to live with the back pain? Obviously, avoidance-avoidance conflicts are most unpleasant and highly stressful.

In an approach-avoidance conflict a choice must be made about whether to pursue a single goal that has both attractive and unattractive aspects. For instance, imagine that you're offered a career promotion that will mean a large increase in pay, but you'll have to move to a city where you don't want to live. Approach-avoidance conflicts are common and can be quite stressful. Any time you have to take a risk to pursue some desirable outcome, you're likely to find yourself in an approach-avoidance conflict. Approach-avoidance conflicts often produce *vacilla-*

tion. That is, you go back and forth, beset by indecision. You decide to go ahead, then you decide not to, then you decide to go ahead again. Humans are not unique in this respect. Many years ago, Neal Miller (1944) observed the same vacillation in his groundbreaking research with rats. He created approach-avoidance conflicts in hungry rats by alternately feeding and shocking them at one end of a runway apparatus. Eventually, these rats tended to hover near the center of the runway, alternately approaching and retreating from the goal box at the end of the alley.



Change

After my divorce, I lived alone for four years. Six months ago I married a wonderful woman who has two children from her previous marriage. My biggest stress is suddenly having to adapt to living with three people instead of by myself. I was pretty set in my ways. I had certain routines. Now everything is chaos. I love my wife and I'm fond of the kids. They're not really doing anything wrong. But my house and my life just aren't the same, and I'm having trouble dealing with it all.

It has been proposed that life changes, such as a change in marital status, represent a key type of stress. **Life changes are any significant alterations in one's living circumstances that require readjustment.** The importance of life changes was first demonstrated by Thomas Holmes, Richard Rahe, and their colleagues in the 1960s (Holmes & Rahe, 1967; Rahe & Arthur, 1978). Theorizing that stress might make people more vulnerable to illness, they interviewed thousands of tuberculosis patients to find out what events had preceded the onset of their disease. Surprisingly, the most frequently cited events were not uniformly negative. There were plenty of aversive events, but there were also many positive events, such as getting married, having a baby, or getting promoted.

Why would positive events, such as moving to a nicer home, produce stress? According to Holmes and Rahe, it's because they produce *change*. In their view, changes in personal relationships, changes at work, changes in finances, and so forth can be stressful even when the changes are welcomed.

Based on this analysis, Holmes and Rahe (1967) developed the Social Readjustment Rating Scale (SRRS) to measure life change as a form of stress. The scale assigns numerical values to 43 major life events. These values are supposed to reflect the magnitude of the readjustment required by each change (see **Table 13.1**). In using the scale, respondents are asked to indicate how often they experienced any of these 43 events during a certain time period (typically, the

concept check 13.1

Identifying Types of Conflict

Check your understanding of the three basic types of conflict by identifying the type experienced in each of the following examples. The answers are in Appendix A.

Examples

- _____ 1. John can't decide whether to take a demeaning job in a car wash or to go on welfare.
- _____ 2. Desiree wants to apply to a highly selective law school, but she hates to risk the possibility of rejection.
- _____ 3. Vanessa has been shopping for a new car and is torn between a nifty little sports car and a classy sedan, both of which she really likes.

Types of conflict

- a. approach-approach
- b. avoidance-avoidance
- c. approach-avoidance

Table 13.1 Social Readjustment Rating Scale

Life Event	Mean Value	Life Event	Mean Value
Death of a spouse	100	Change in responsibilities at work	29
Divorce	73	Son or daughter leaving home	29
Marital separation	65	Trouble with in-laws	29
Jail term	63	Outstanding personal achievement	28
Death of a close family member	63	Spouse begins or stops work	26
Personal injury or illness	53	Begin or end school	26
Marriage	50	Change in living conditions	25
Fired at work	47	Revision of personal habits	24
Marital reconciliation	45	Trouble with boss	23
Retirement	45	Change in work hours or conditions	20
Change in health of family member	44	Change in residence	20
Pregnancy	40	Change in school	20
Sex difficulties	39	Change in recreation	19
Gain of a new family member	39	Change in church activities	19
Business readjustment	39	Change in social activities	18
Change in financial state	38	Mortgage or loan for lesser purchase	
Death of a close friend	37	(car, TV, etc.)	17
Change to a different line of work	36	Change in sleeping habits	16
Change in number of arguments with spouse	35	Change in number of family get-togethers	15
Mortgage or loan for major purchase (home, etc.)	31	Change in eating habits	15
Foreclosure of mortgage or loan	30	Vacation	13
		Christmas	12
		Minor violations of the law	11

Source: Adapted from Holmes, T. H., & Rahe, R. (1967). The Social Readjustment Rating Scale. *Journal of Psychosomatic Research*, 11, 213–218. Copyright © 1967 by Elsevier Science Publishing Co. Reprinted by permission.

past year). The numbers associated with each event checked are then added. This total is an index of the amount of change-related stress the person has recently experienced.

The SRRS and similar scales based on it have been used in thousands of studies by researchers all over the world. Overall, these studies have shown that people with higher scores on the SRRS tend to be more vulnerable to many kinds of physical illness and to many types of psychological problems as well (Derogatis & Coons, 1993; Gruen, 1993; Scully, Tosi, & Banning, 2000). These results have attracted a great deal of attention, and the SRRS has been reprinted in many popular newspapers and magazines. The attendant publicity has led to the widespread conclusion that life change is inherently stressful.

More recently, however, experts have criticized this research, citing problems with the methods used and raising questions about the meaning of the findings (Hobson & Delunas, 2001; Jones & Kinman, 2001; Wethington, 2000). At this point, it's a key interpretive issue that concerns us. Many critics have argued that the SRRS does not measure *change* exclusively. The main problem is that the list of life changes on the SRRS is dominated by events that are clearly negative or undesirable (death of a spouse, being fired from a job, and so on). These negative events probably generate great frustration. Although there are some positive events on the scale, it turns out that negative life events cause most of the stress tapped by the

SRRS (McLean & Link, 1994; Turner & Wheaton, 1995). Thus, it has become apparent that the SRRS assesses a wide range of stressful experiences, not just life change. At present, there's little reason to believe that change is inherently or inevitably stressful. Undoubtedly, some life changes may be quite challenging, but others may be quite benign.

Pressure



My father questioned me at dinner about some things I didn't want to talk about. I know he doesn't want to hear my answers, at least not the truth. My father told me when I was little that I was his favorite because I was "pretty near perfect." I've spent my life trying to keep up that image, even though it's obviously not true. Recently, he has begun to realize this, and it's made our relationship very strained and painful.

At one time or another, most people have remarked that they're "under pressure." What does this term mean? **Pressure involves expectations or demands that one behave in a certain way.** You are under pressure to *perform* when you're expected to execute tasks and responsibilities quickly, efficiently, and successfully. For example, salespeople are usually under pressure to move merchandise. Professors at research institutions are often under pressure to publish in prestigious journals. Stand-up comedians are under intense pressure to make people laugh. Pressures to *conform* to others' expectations are also common in

Web Link 12.2



Stress Management
University of Nebraska
Professor Wesley E. Sime
has posted outlines and notes of his lectures on the fundamentals of stress management and on other topics related to stress and its impact on health and performance.



© Allen Birmbach/Masterfile



© Kelvin Murray/Stone/Getty Images

Pressure comes in two varieties: pressure to perform and pressure to conform. For example, workers on assembly lines are often expected to maintain high productivity with few mistakes (performance pressure) and suburban homeowners are typically expected to maintain well-groomed exteriors (conformity pressure).

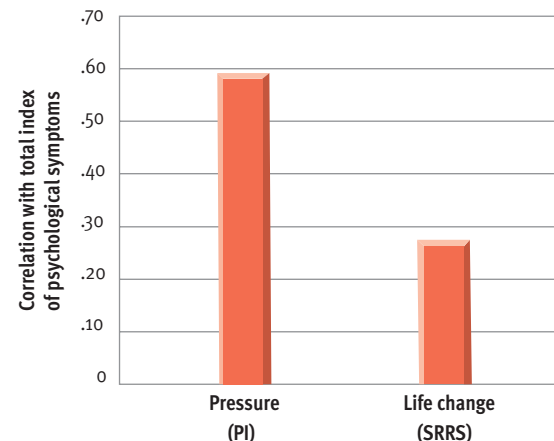
our lives. People in the business world are expected to dress in certain ways. Suburban homeowners are expected to keep their lawns well manicured. Teenagers are expected to adhere to their parents' values and rules.

Although widely discussed by the general public, the concept of pressure has received scant attention

from researchers. However, Weiten (1988b, 1998) has devised a scale to measure pressure as a form of life stress. It assesses self-imposed pressure, pressure from work and school, and pressure from family relations, peer relations, and intimate relations. In research with this scale, a strong relationship has been found between pressure and a variety of psychological symptoms and problems. In fact, pressure has turned out to be more strongly related to measures of mental health than the SRRS and other established measures of stress are (see Figure 13.3).

Figure 13.3

Pressure and psychological symptoms. A comparison of pressure and life change as sources of stress suggests that pressure may be more strongly related to mental health than change is. In one study, Weiten (1988b) found a correlation of .59 between scores on the Pressure Inventory (PI) and symptoms of psychological distress. In the same sample, the correlation between SRRS scores and psychological symptoms was only .28.



➤ REVIEW OF KEY POINTS

- Stress involves circumstances and experiences that are perceived as threatening. Stress is a common, everyday event, and even seemingly minor stressors or hassles can be problematic. To a large degree, stress is subjective and lies in the eye of the beholder.
- Major types of stress include frustration, conflict, change, and pressure. Frustration occurs when an obstacle prevents one from attaining some goal. The three principal types of conflict are approach-approach, avoidance-avoidance, and approach-avoidance. The third type is especially stressful. Vacillation is a common response to approach-avoidance conflict.
- A large number of studies with the SRRS suggest that change is stressful. Although this may be true, it is now clear that the SRRS is a measure of general stress rather than just change-related stress. Two kinds of pressure (to perform and conform) also appear to be stressful.



Recognizing Sources of Stress

Check your understanding of the major sources of stress by indicating which type or types of stress are at work in each of the following examples. Bear in mind that the four basic types of stress are not mutually exclusive. There's some potential for overlap, so a specific experience might include both change and pressure, for instance. The answers are in Appendix A.

Examples

- _____ 1. Marie is late for an appointment but is stuck in line at the bank.
- _____ 2. Tamika decides that she won't be satisfied unless she gets straight A's this year.
- _____ 3. Jose has just graduated from business school and has taken an exciting new job.
- _____ 4. Morris has just been fired from his job and needs to find another.

Types of stress

- a. frustration
- b. conflict
- c. change
- d. pressure

> Responding to Stress

People's response to stress is complex and multidimensional. Stress affects the individual at several levels. Consider again the chapter's opening scenario, in which you're driving home, thinking about overdue papers, tuition increases, and parental pressures. Let's look at some of the reactions that were mentioned. When you groan in reaction to the traffic report, you're experiencing an *emotional response* to stress, in this case annoyance and anger. When your pulse quickens and your stomach knots up, you're exhibiting *physiological responses* to stress. When you shout insults at another driver, your verbal aggression is a *behavioral response* to the stress at hand. Thus, we can analyze a person's reactions to stress at three levels: (1) emotional responses, (2) physiological re-

sponses, and (3) behavioral responses. **Figure 13.4**, which diagrams these three levels of response, provides an overview of the stress process.

Emotional Responses



When people are under stress, they often react emotionally. Studies that have tracked stress and mood on a daily basis have found intimate relationships between the two (Affleck et al., 1994; van Eck, Nicolson, & Berkhof, 1998).

Emotions Commonly Elicited



No simple one-to-one connections have been found between certain types of stressful events and partic-

PREVIEW QUESTIONS

- What are some common emotional reactions to stress?
- How does emotional arousal affect performance?
- What are the three stages of the general adaptation syndrome?
- What tends to happen physiologically when people feel stressed?
- What are some relatively unhealthy coping responses?
- How do defense mechanisms work, and are they healthful?
- What is constructive coping?

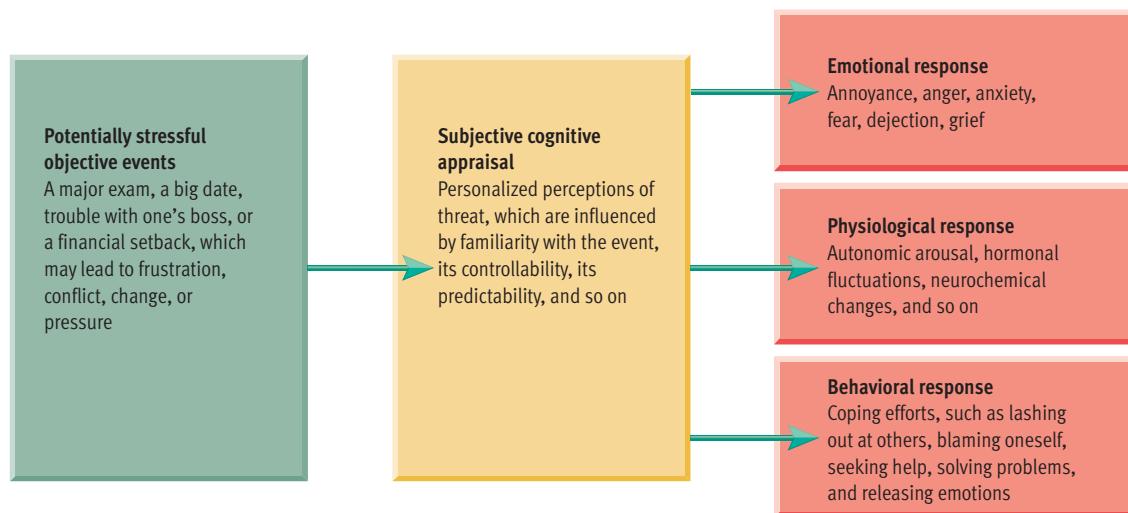


Figure 13.4
Overview of the stress process. A potentially stressful event, such as a major exam, elicits a subjective appraisal of how threatening the event is. If the event is viewed with alarm, the stress may trigger emotional, physiological, and behavioral reactions, as people's response to stress is multidimensional.

ular emotions. However, researchers *have* begun to uncover some strong links between *specific cognitive reactions to stress* (appraisals) and specific emotions (Smith & Lazarus, 1993). For example, self-blame tends to lead to guilt, helplessness to sadness, and so forth. Although many emotions can be evoked by stressful events, some are certainly more likely than others. Common emotional responses to stress include (a) annoyance, anger, and rage, (b) apprehension, anxiety, and fear, and (c) dejection, sadness, and grief (Lazarus, 1993).

Although investigators have tended to focus heavily on the connection between stress and negative emotions, research shows that positive emotions also occur during periods of stress (Folkman, 1997). Although this finding seems counterintuitive, researchers have found that people experience a diverse array of pleasant emotions even while enduring the most dire of circumstances. Consider, for example, the results of a five-year study of coping patterns in 253 caregiving partners of men with AIDS (Folkman et al., 1997). Surprisingly, over the course of the study, the caregivers reported experiencing positive emotions about as often as they experienced negative emotions—except during the time immediately surrounding the death of their partners.

Similar findings have been observed in some other studies of serious stress that made an effort to look for positive emotions. The most interesting of these was a recent study that examined subjects' emotional functioning early in 2001 and again in the weeks following the 9/11 terrorist attacks in the United States (Fredrickson et al., 2003). Like most U.S. citizens, the subjects reported many negative emotions in the aftermath of 9/11, including anger, sadness, and fear. However, within this "dense cloud of anguish" positive emotions also emerged. For example, people felt gratitude for the safety of their loved ones; many took stock and counted their blessings; and quite a few reported renewed love for their friends and family. Fredrickson et al. (2003) also found that the frequency of pleasant emotions correlated positively with a measure of subjects' resilience, whereas the frequency of unpleasant emotions correlated negatively with resilience (see Table 13.2). Thus, contrary to common sense, positive emotions do *not* vanish during times of severe stress. Moreover, these positive emotions appear to play a key role in helping people bounce back from the difficulties associated with stress (Tugade & Fredrickson, 2004).

Effects of Emotional Arousal

Emotional responses are a natural and normal part of life. Even unpleasant emotions serve important

Table 13.2 Correlation Between Resilience and the Frequency of Selected Emotions in the Aftermath of 9/11

Specific Emotions	Correlation with Resilience
Negative Emotions	
Angry/irritated/annoyed	-.44*
Sad/downhearted/unhappy	-.29*
Scared/fearful/afraid	-.19
Disgust/distaste/revulsion	-.09
Positive Emotions	
Grateful/appreciative/thankful	.13
Glad/happy/joyful	.52*
Hopeful/optimistic/encouraged	.40*
Content/serene/peaceful	.47*

*Statistically significant

purposes. Like physical pain, painful emotions can serve as warnings that one needs to take action. However, strong emotional arousal can also interfere with efforts to cope with stress. For example, there is evidence that high emotional arousal can interfere with attention and memory retrieval and can impair judgment and decision making (Janis, 1993; Mandler, 1993).

Although emotional arousal may hurt coping efforts, that isn't *necessarily* the case. The *inverted-U hypothesis* predicts that task performance should improve with increased emotional arousal—up to a point, after which further increases in arousal become disruptive and performance deteriorates (Anderson, 1990; Mandler, 1993). This idea is referred to as the inverted-U hypothesis because when performance is plotted as a function of arousal, the resulting graphs approximate an upside-down U (see Figure 13.5). In these graphs, the level of arousal at which performance peaks is characterized as the *optimal level of arousal* for a task.

This optimal level of arousal appears to depend in part on the complexity of the task at hand. The conventional wisdom is that *as a task becomes more complex, the optimal level of arousal (for peak performance) tends to decrease*. This relationship is depicted in Figure 13.5. As you can see, a fairly high level of arousal should be optimal on simple tasks (such as driving 8 hours to help a friend in a crisis). However, performance should peak at a lower level of arousal on complex tasks (such as making a major decision in which you have to weigh many factors). Thus, the inverted-U hypothesis provides a plausible model of how emotional arousal could have either beneficial or disruptive

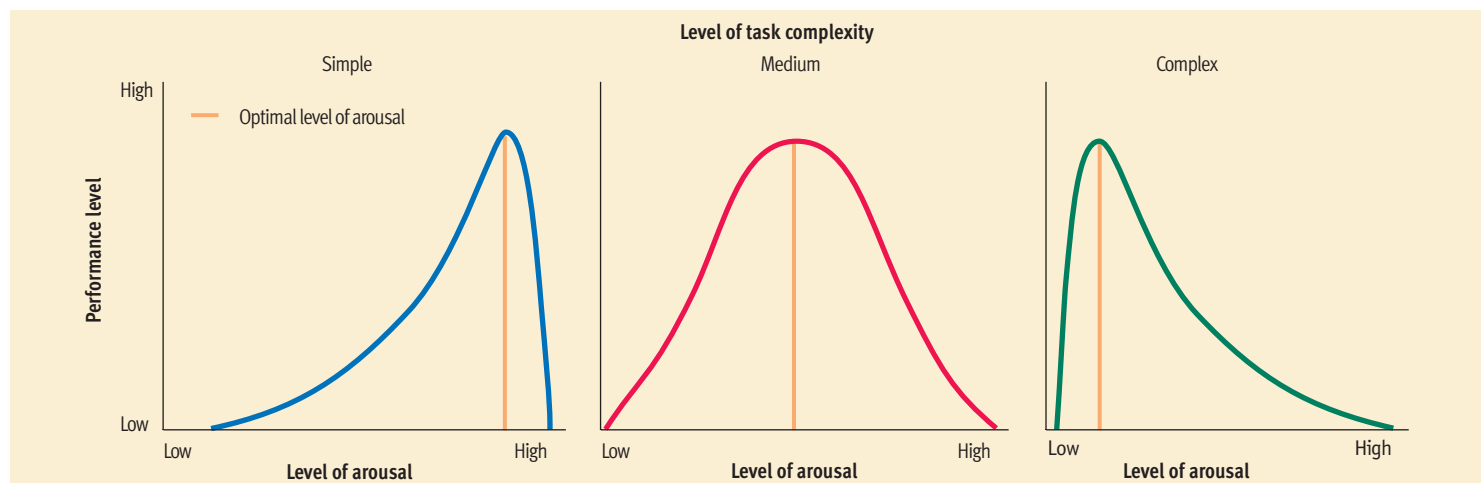
Web Link 13.3



Centre for Stress Management

This British website houses a diverse collection of brief online articles concerned with many aspects of the stress process. It also features links to many additional sites around the world that provide information on stress.





tive effects on coping, depending on the nature of the stressful demands.

Physiological Responses



As we just discussed, stress frequently elicits strong emotional responses. Now we'll look at the important physiological changes that often accompany these responses.

The Fight-or-Flight Response

Walter Cannon (1932) was one of the first theorists to describe the fight-or-flight response. **The fight-or-flight response is a physiological reaction to threat in which the autonomic nervous system mobilizes the organism for attacking (fight) or fleeing (flight) an enemy.** As you may recall from Chapter 3, the *autonomic nervous system (ANS)* controls blood vessels, smooth muscles, and glands. The fight-or-flight response is mediated by the *sympathetic division* of the ANS. In one experiment, Cannon studied the fight-or-flight response in cats by confronting them with dogs. Among other things, he noticed an immediate acceleration in their breathing and heart rate and a reduction in their digestive processes.

The physiological arousal associated with the fight-or-flight response is also seen in humans. In a sense, this automatic reaction is a "leftover" from humanity's evolutionary past. It's clearly an adaptive response in the animal kingdom, where the threat of predators often requires a swift response of fighting or fleeing. But in our modern world, the fight-or-flight response may be less adaptive for human functioning than it was thousands of generations ago (Neese & Young, 2000). Most human stresses can't be handled simply through fight or flight. Work pressures, marital problems, and financial difficulties require far more complex responses.

Shelley Taylor and her colleagues (2000) have questioned whether the fight-or-flight model applies equally well to both males and females. They note that in most species females have more responsibility for the care of young offspring than males do. Using an evolutionary perspective, they argue that this disparity may make fighting and fleeing less adaptive for females, as both responses may endanger offspring and thus reduce the likelihood of an animal passing on its genes. Taylor et al. (2000) maintain that evolutionary processes have fostered more of a "tend and befriend" response in females. According to this analysis, in reacting to stress, females allocate more effort to the care of offspring and to seeking help and support. More research is needed to evaluate this provocative analysis. Although gender differences may exist in behavioral responses to stress, Taylor and her colleagues are quick to note that the "basic neuroendocrine core of stress responses" is largely the same for males and females.

The General Adaptation Syndrome



The concept of stress was identified and named by Hans Selye (1936, 1956, 1982). Selye was born in Vienna but spent his entire professional career at McGill University in Montreal. Beginning in the 1930s, Selye exposed laboratory animals to a diverse array of both physical and psychological stressors (heat, cold, pain, mild shock, restraint, and so on). The resulting patterns of physiological arousal seen in the animals were largely the same, regardless of the type of stress. Thus, Selye concluded that stress reactions are *nonspecific*. In other words, he maintained that the reactions do not vary according to the specific type of stress encountered. Initially, Selye wasn't sure what to call this nonspecific response to a variety of noxious agents. In the 1940s he decided to call it *stress*, and the word has been part of our vocabulary ever since.

Figure 13.5

Arousal and performance. Graphs of the relationship between emotional arousal and task performance tend to resemble an inverted U, as increased arousal is associated with improved performance up to a point, after which higher arousal leads to poorer performance. The optimal level of arousal for a task depends on the complexity of the task. On complex tasks, a relatively low level of arousal tends to be optimal. On simple tasks, however, performance may peak at a much higher level of arousal.

Web Link 13.4



The American Institute of Stress

The American Institute of Stress is a nonprofit organization established in 1978 at the request of stress pioneer Hans Selye. Its Board of Trustees reads like a who's who of stress research. The resources available online are a bit limited as one has to send for the information packets published by the institute. But there is a very interesting online tribute to Selye.



HANS SELYE

"There are two main types of human beings: 'race-horses,' who thrive on stress and are only happy with a vigorous, fast-paced life-style; and 'turtles,' who in order to be happy require peace, quiet, and a generally tranquil environment."

Selye (1956, 1974) formulated an influential theory of stress reactions called the general adaptation syndrome. **The general adaptation syndrome is a model of the body's stress response, consisting of three stages: alarm, resistance, and exhaustion.** In the first stage of the general adaptation syndrome, an *alarm reaction* occurs when an organism first recognizes the existence of a threat. Physiological arousal occurs as the body musters its resources to combat the challenge. Selye's alarm reaction is essentially the fight-or-flight response originally described by Cannon.

However, Selye took his investigation of stress a few steps further by exposing laboratory animals to *prolonged* stress, similar to the chronic stress often endured by humans. As stress continues, the organism may progress to the second phase of the general adaptation syndrome, the *stage of resistance*. During this phase, physiological changes stabilize as coping efforts get under way. Typically, physiological arousal continues to be higher than normal, although it may level off somewhat as the organism becomes accustomed to the threat.

If the stress continues over a substantial period of time, the organism may enter the third stage, the *stage of exhaustion*. According to Selye, the body's resources for fighting stress are limited. If the stress can't be overcome, the body's resources may be depleted, and physiological arousal will decrease. Eventually, the organism may collapse from exhaustion. During this phase, the organism's resistance declines. This reduced resistance may lead to what Selye called "diseases of adaptation."

Brain-Body Pathways

Even in cases of moderate stress, you may notice that your heart has started beating faster, you've begun to breathe harder, and you're perspiring more than usual. How does all this bodily activity (and much more) happen? It appears that there are two major pathways along which the brain sends signals to the endocrine system in response to stress (Clow, 2001; Dallman, Bhatnagar, & Viau, 2000; Tsigos, Kyrou, &



Chrousos, 2005). As we noted in Chapter 3, the *endocrine system* consists of glands located at various sites in the body that secrete chemicals called hormones. The *hypothalamus* is the brain structure that appears to initiate action along these two pathways.

The first pathway (see **Figure 13.6**) is routed through the autonomic nervous system. In response to stress, your hypothalamus activates the sympathetic division of the ANS. A key part of this activation involves stimulating the central part of the adrenal glands (the adrenal medulla) to release large amounts of *catecholamines* into the bloodstream. These hormones radiate throughout your body, producing the physiological changes seen in the fight-or-flight response. The net result of catecholamine elevation is that your body is mobilized for action (Lundberg, 2000). Heart rate and blood flow increase, and more blood is pumped to your brain and muscles. Respiration and oxygen consumption speed up, which facilitates alertness. Digestive processes are inhibited to conserve your energy. The pupils of your eyes dilate, increasing visual sensitivity.

The second pathway involves more direct communication between the brain and the endocrine system (see **Figure 13.6**). The hypothalamus sends signals to the so-called master gland of the endocrine system, the pituitary. In turn, the pituitary secretes a hormone (ACTH) that stimulates the outer part of the adrenal glands (the adrenal cortex) to release another set of hormones—*corticosteroids*. These hormones stimulate the release of chemicals that help increase your energy and inhibit tissue inflammation in case of injury (Munck, 2000).

Behavioral Responses



Although people respond to stress at several levels, it's clear that *behavior* is the crucial dimension of their reactions. Most behavioral responses to stress involve coping. **Coping refers to active efforts to master, reduce, or tolerate the demands created by stress.** Notice that this definition is neutral as to whether

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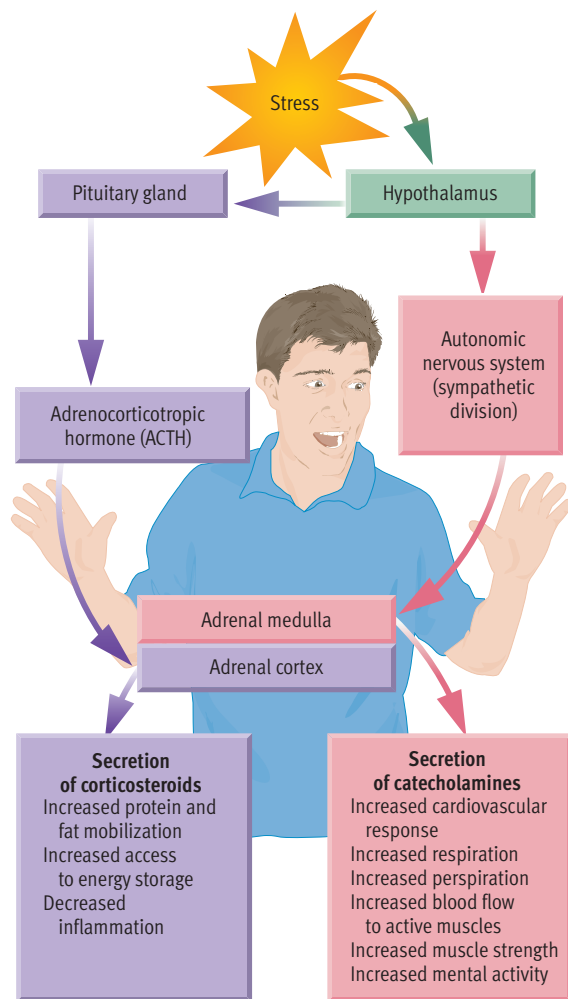


Figure 13.6

Brain-body pathways in stress. In times of stress, the brain sends signals along two pathways. The pathway through the autonomic nervous system controls the release of catecholamine hormones that help mobilize the body for action. The pathway through the pituitary gland and the endocrine system controls the release of corticosteroid hormones that increase energy and ward off tissue inflammation.

coping efforts are healthful or maladaptive. The popular use of the term often implies that coping is inherently healthful. When people say that someone “coped with her problems,” the implication is that she handled them effectively.

In reality, however, coping responses may be adaptive or maladaptive (Moos & Schaefer, 1993; Vaillant, 2000). For example, if you were flunking a history course at midterm, you might cope with this stress by (1) increasing your study efforts, (2) seeking help from a tutor, (3) blaming your professor, or (4) giving up on the class without really trying. Clearly, the first two of these coping responses would be more adaptive than the last two.

People cope with stress in many ways, but most individuals exhibit certain styles of coping that are

fairly consistent across situations (Carver & Scheier, 1994; Heszen-Niejodek, 1997). Given the immense variety in coping strategies, we can only highlight a few of the more common patterns. In this section we’ll focus most of our attention on styles of coping that tend to be less than ideal. We’ll discuss a variety of more healthful coping strategies in the Personal Application on stress management.

Giving Up and Blaming Oneself



When confronted with stress, people sometimes simply give up and withdraw from the battle. Some people routinely respond to stress with fatalism and resignation, passively accepting setbacks that might be dealt with effectively. This syndrome is referred to as *learned helplessness* (Seligman, 1974, 1992). **Learned helplessness is passive behavior produced by exposure to unavoidable aversive events.** Learned helplessness seems to occur when individuals come to believe that events are beyond their control. As you might guess, giving up is not a highly regarded method of coping. Carver and his colleagues (1989, 1993) have studied this coping strategy, which they refer to as *behavioral disengagement*, and found that it is associated with increased rather than decreased distress. Furthermore, many studies suggest that learned helplessness can contribute to depression (Seligman & Isaacowitz, 2000).

Blaming oneself is another common response when people are confronted by stressful difficulties. The tendency to become highly self-critical in response to stress has been noted by a number of influential theorists. Albert Ellis (1973, 1987) calls this phenomenon “catastrophic thinking.” According to Ellis, catastrophic thinking causes, aggravates, and perpetuates emotional reactions to stress that are often problematic (see the Personal Application for this chapter). In a similar vein, Aaron Beck (1976, 1987) argues that negative self-talk can contribute to the development of depressive disorders (see Chapter 15). Although there is something to be said for recognizing one’s weaknesses and taking responsibility for one’s failures, Ellis and Beck agree that excessive self-blame can be unhealthy.



ALBERT ELLIS

“People largely disturb themselves by thinking in a self-defeating, illogical, and unrealistic manner.”

Striking Out at Others



People often respond to stressful events by striking out at others with aggressive behavior. **Aggression is any behavior that is intended to hurt someone, either physically or verbally.** Many years ago, a team of psychologists (Dollard et al., 1939) proposed the *frustration-aggression hypothesis*, which held that aggression is always caused by frustration. Decades of research have supported this idea of a causal link between frustration and aggression (Berkowitz, 1989).

Lashing out at others with verbal aggression tends to be an ineffective coping tactic that often backfires, creating additional stress.



© Paul Thomas/The Image Bank/Getty Images

However, this research has also shown that there isn't an inevitable, one-to-one correspondence between frustration and aggression.

Frequently people lash out aggressively at others who had nothing to do with their frustration, apparently because they can't vent their anger at the real source. For example, you'll probably suppress your anger rather than lash out verbally at your boss or at a police officer who's giving you a speeding ticket. Twenty minutes later, however, you might be verbally brutal to a sales clerk. As we discussed in Chapter 12, this diversion of anger to a substitute target was noticed long ago by Sigmund Freud, who called it *displacement*. Unfortunately, research suggests that when people are provoked, displaced aggression is a common response (Marcus-Newhall et al., 2000).

Freud theorized that behaving aggressively could get pent-up emotion out of one's system and thus be adaptive. He coined the term **catharsis to refer to this release of emotional tension**. The Freudian notion that it is a good idea to vent anger has become widely disseminated and accepted in modern society. Books, magazines, and self-appointed experts routinely advise that it is healthy to "blow off steam" and thereby release and reduce anger. However, ex-

perimental research generally has *not* supported the catharsis hypothesis. Indeed, *most studies find just the opposite: Behaving in an aggressive manner tends to fuel more anger and aggression* (Bushman, 2002; Bushman, Baumeister, & Stack, 1999).



Indulging Oneself

Stress sometimes leads to reduced impulse control, or *self-indulgence* (Tice, Bratslavsky, & Baumeister, 2001). When troubled by stress, many people engage in excessive consumption—unwise patterns of eating, drinking, smoking, using drugs, spending money, and so forth. For example, I have a friend who copes with stress by making a beeline for the nearest shopping mall to indulge in a spending spree. It appears that my friend is not unusual. It makes sense that when things are going poorly in one area of their lives, people may try to compensate by pursuing substitute forms of satisfaction. After all, self-indulgent responses tend to be relatively easy to execute and highly pleasurable. Thus, it's not surprising that studies have linked stress to increases in eating (Laitinen, Ek, & Sovio, 2002), smoking (Kassel, Stroud, & Paronis, 2003), and consumption of alcohol and drugs (Colder, 2001; Goeders, 2004).

A new manifestation of this coping strategy that has attracted much attention recently is the tendency to immerse oneself in the online world of the Internet. Kimberly Young (1996, 1998) has described a syndrome called **Internet addiction, which consists of spending an inordinate amount of time on the Internet and inability to control online use**. People who exhibit this syndrome tend to feel anxious, depressed, or empty when they are not online (Kandell, 1998). Their Internet use is so excessive, it begins to interfere with their functioning at work, at school, or at home, which leads them to start concealing the extent of their dependence on the Internet. It is difficult to estimate the prevalence of Internet addiction, but the syndrome does *not* appear to be rare (Greenfield, 1999; Morahan-Martin & Schumacher, 2000). Although there is active debate about the wisdom of

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Table 13.3 Additional Defense Mechanisms

Mechanism	Description	Example
Denial of reality	Protecting oneself from unpleasant reality by refusing to perceive or face it	A smoker concludes that the evidence linking cigarette use to health problems is scientifically worthless
Fantasy	Gratifying frustrated desires by imaginary achievements	A socially inept and inhibited young man imagines himself chosen by a group of women to provide them with sexual satisfaction
Intellectualization (isolation)	Cutting off emotion from hurtful situations or separating incompatible attitudes so that they appear unrelated	A prisoner on death row awaiting execution resists appeal on his behalf and coldly insists that the letter of the law be followed
Undoing	Atoning for or trying to magically dispel unacceptable desires or acts	A teenager who feels guilty about masturbation ritually touches door knobs a prescribed number of times following each occurrence of the act
Overcompensation	Covering up felt weakness by emphasizing some desirable characteristics, or making up for frustration in one area by overgratification in another	A dangerously overweight woman goes on eating binges when she feels neglected by her husband

Source: Adapted from Carson, R. C., Butcher, J. N., & Coleman, J. C. (1988). *Abnormal psychology and modern life*. Glenview, IL: Scott, Foresman. Copyright © 1988 by Scott, Foresman and Company. Adapted by permission of the publisher.

Note: See Table 12.1 for another list of defense mechanisms.

characterizing excessive Internet surfing as an *addiction* (Griffiths, 1999), it is clear that this new coping strategy is likely to become increasingly common.

Defensive Coping



Many people exhibit consistent styles of defensive coping in response to stress (Vaillant, 1994). We noted in the previous chapter that Sigmund Freud originally developed the concept of the *defense mechanism*. Though rooted in the psychoanalytic tradition, this concept has gained widespread acceptance from psychologists of most persuasions (Cramer, 2000). Building on Freud’s initial insights, modern psychologists have broadened the scope of the concept and added to Freud’s list of defense mechanisms.

Defense mechanisms are largely unconscious reactions that protect a person from unpleasant emotions such as anxiety and guilt. Many specific defense mechanisms have been identified. For example, Laughlin (1979) lists 49 different defenses. We described 7 common defense mechanisms in our

discussion of Freud’s theory in Chapter 12. **Table 13.3** introduces another 5 defenses that people use with some regularity: denial, fantasy, intellectualization, undoing, and overcompensation. Although widely discussed in the popular press, defense mechanisms are often misunderstood. To clear up some of the misconceptions, we’ll use a question/answer format to elaborate on the nature of defense mechanisms.

What exactly do defense mechanisms defend against? Above all else, defense mechanisms shield the individual from the emotional discomfort that’s so often elicited by stress. Their main purpose is to ward off unwelcome emotions or to reduce their intensity. Foremost among the emotions guarded against are anxiety, anger, guilt, and dejection.

How do they work? Through *self-deception*. Defense mechanisms accomplish their goals by distorting reality so that it doesn’t appear so threatening. For example, suppose you’re not doing well in school and you’re in danger of flunking out. Initially you might use *denial* to block awareness of the possibility that you could flunk. This defense might temporarily fend

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SHELLEY TAYLOR

"Rather than perceiving themselves, the world, and the future accurately, most people regard themselves, their circumstances, and the future as considerably more positive than is objectively likely. . . . These illusions are not merely characteristic of human thought; they appear actually to be adaptive, promoting rather than undermining good mental health."

off feelings of anxiety. If it becomes difficult to deny the obvious, you could resort to *fantasy*. You might daydream about how you'll salvage adequate grades by getting spectacular scores on the upcoming final exams, when the objective fact is that you're hopelessly behind in your studies. Thus, defense mechanisms work their magic by bending reality in self-serving ways.

Are they conscious or unconscious? Both. Freudian theory originally assumed that defenses operate entirely at an unconscious level. However, the concept of the defense mechanism has been broadened by other theorists to include maneuvers that people may be aware of. Thus, defense mechanisms may operate at varying levels of awareness, although they're largely unconscious (Cramer, 2001; Erdelyi, 2001).

Are they healthy? This is a complicated question. More often than not, the answer is "no." Generally, defensive coping is less than optimal. Avoidance strategies and wishful thinking rarely provide genuine solutions to personal problems (Bolger, 1990; Holahan & Moos, 1990). Although defensive behavior tends to be relatively unhealthful, Shelley Taylor and Jonathon Brown (1988, 1994) have reviewed several lines of evidence suggesting that "positive illusions" may be adaptive for mental health. First, they note that "normal" people tend to have overly favorable self-images. In contrast, depressed subjects exhibit less favorable—but more realistic—self-concepts. Second, normal subjects overestimate the degree to which they control chance events. In comparison,

depressed subjects are less prone to this illusion of control. Third, normal individuals are more likely than depressed subjects to display unrealistic optimism in making projections about the future. A variety of studies have provided support for the hypothesis that positive illusions can promote well-being (Reed et al., 1999; Taylor et al., 2003).

As you might guess, a variety of critics have expressed skepticism about the idea that illusions are adaptive (Asendorpf & Ostendorf, 1998; Colvin, Block, & Funder, 1995). Perhaps the best analysis of the issue comes from Roy Baumeister (1989), who theorizes that it's all a matter of degree and that there is an "optimal margin of illusion." According to Baumeister, extreme distortions of reality are maladaptive, but small illusions are often beneficial.



Constructive Coping

Our discussion thus far has focused on coping strategies that usually are less than ideal. Of course, people also exhibit many healthful strategies for dealing with stress. The term *constructive coping* refers to **relatively healthful efforts that people make to deal with stressful events**. No strategy of coping can *guarantee* a successful outcome. The coping strategies that are likely to be effective will vary depending on the exact nature of the situation, and even the healthiest coping responses may turn out to be ineffective in some circumstances (Folkman & Moskowitz, 2004). Thus, the concept of constructive coping is simply

concept check 13.3

Identifying More Defense Mechanisms

In the last chapter you checked your understanding of several defense mechanisms by identifying instances of them in a story. In this chapter, you've learned about five additional defense mechanisms that are sometimes used as ways of coping with stress (see Table 13.3). Check your understanding of these defense mechanisms by identifying them in the story below. Each example of a defense mechanism is underlined, with a number beneath it. Write the name of the defense mechanism exemplified in each case in the numbered spaces after the story. The answers are in Appendix A.

The guys at work have been trying to break it to me gently that they think my job's on the line because I've missed work too many days this year. I don't know how they came up with that idea; I've got nothing to worry about¹. Besides, every day I missed, I always did a lot of cleaning up and other chores around here². One of these days the boss will finally recognize how really valuable I am to the company³, and I'll be getting a big promotion. Anyway, since the guys have been dropping these hints ³about my not missing any more days, I've been trying really hard to make a good impression by saying "Hi" to everyone I see, especially the boss, and telling jokes⁴. You know, it's really pretty interesting to observe how all these relationships unfold between guys who work together and the people who manage them⁵.

1. _____ 4. _____

2. _____ 5. _____

3. _____

meant to connote a healthful, positive approach, without promising success.

What makes certain coping strategies constructive? Frankly, it's a gray area in which psychologists' opinions vary to some extent. Nonetheless, a consensus about the nature of constructive coping has emerged from the sizable literature on stress management. Key themes in this literature include the following:

1. Constructive coping involves confronting problems directly. It is task relevant and action oriented. It entails a conscious effort to rationally evaluate your options so that you can try to solve your problems.
2. Constructive coping is based on reasonably realistic appraisals of your stress and coping resources. A little self-deception may sometimes be adaptive, but excessive self-deception and highly unrealistic negative thinking are not.
3. Constructive coping involves learning to recognize, and in some cases inhibit, potentially disruptive emotional reactions to stress.
4. Constructive coping includes making efforts to ensure that your body is not especially vulnerable to the possibly damaging effects of stress.

These principles provide a rather general and abstract picture of constructive coping. We'll look at patterns of constructive coping in more detail in the Personal Application, which discusses various stress management strategies that people can use.

➤ REVIEW OF KEY POINTS

- Stress often triggers emotional reactions. These reactions typically include anger, fear, and sadness. In times of stress, emotions are not uniformly negative, and positive emotions may foster resilience. Emotional arousal may interfere with coping. According to the inverted-U hypothesis, task performance improves with increased arousal up to a point and then declines. The optimal level of arousal on a task depends on the complexity of the task.
- Physiological arousal in response to stress was originally called the fight-or-flight response by Cannon. This automatic response has limited adaptive value in our modern world. Selye's general adaptation syndrome describes three stages in physiological reactions to stress: alarm, resistance, and exhaustion. Diseases of adaptation may appear during the stage of exhaustion.
- There are two major pathways along which the brain sends signals to the endocrine system in response to stress. The first pathway releases a class of hormones called catecholamines. The second pathway releases a class of hormones called corticosteroids.
- The behavioral response to stress takes the form of coping. Some relatively unhealthful coping responses include giving up, blaming oneself, and striking out at others with acts of aggression. Self-indulgence is another coping pattern that tends to be of limited value.
- Defensive coping is quite common. Defense mechanisms protect against emotional distress through self-deception. Several lines of evidence suggest that positive illusions may be healthful, but there is some debate about the matter. It is probably a matter of degree. Relatively healthful coping tactics are called constructive coping.

➤ The Effects of Stress on Psychological Functioning

People struggle with many stresses every day. Most stresses come and go without leaving any enduring imprint. However, when stress is severe or when many stressful demands pile up, one's psychological functioning may be affected.

Research on the effects of stress has focused mainly on negative outcomes, so our coverage is slanted in that direction. However, it's important to emphasize that stress is not inherently bad. You would probably suffocate from boredom if you lived a stress-free existence. Stress makes life challenging and interesting. Along the way, though, stress can be harrowing, sometimes leading to impairments in performance, to burnout, and to other problems.

Impaired Task Performance

Frequently, stress takes its toll on the ability to perform effectively on a task at hand. For instance, Roy Baumeister's work shows how pressure can interfere

with performance. Baumeister's (1984) theory assumes that pressure to perform often makes people self-conscious and that this elevated self-consciousness disrupts their attention. He found support for his theory in a series of laboratory experiments in which he manipulated the pressure to perform well on simple perceptual-motor tasks and found that many people tend to "choke" under pressure (Butler & Baumeister, 1998; Baumeister, 1984). Pressure-induced performance decrements have also been found in studies of mathematical problem-solving and simple sports tasks (Beilock et al., 2002, 2004).

Other research suggests that Baumeister is on the right track in looking to *attention* to explain how stress impairs task performance. In a study of stress and decision making, Keinan (1987) found that stress disrupted two out of the three aspects of attention measured in the study. Stress increased subjects' tendency (1) to jump to a conclusion too quickly without considering all their options and (2) to do an unsystem-

PREVIEW QUESTIONS

- Can stress interfere with task performance?
- What is burnout, and what are its causes?
- What other psychological problems and mental disorders are stress related?
- Can stress have positive effects?

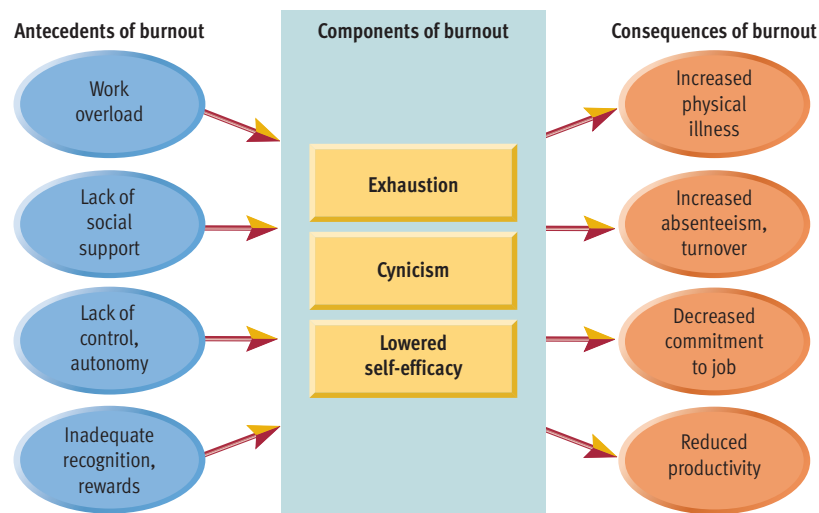


Figure 13.7

The antecedents, components, and consequences of burnout. Christina Maslach and Michael Leiter have developed a systematic model of burnout that specifies the antecedents, components, and consequences of this syndrome. The antecedents on the left in the diagram are the stressful features of the work environment that cause burnout. The syndrome itself consists of the three components shown in the center of the diagram. Some of the unfortunate results of burnout are listed on the right. (Based on Leiter & Maslach, 2001)

atic, poorly organized review of their available options. In a more recent study, Keinan and colleagues (1999) found that stress impaired performance on cognitive tasks. The results suggested that stress makes it harder for people to suppress competing thoughts. Research also suggests that stress can have detrimental effects on certain memory functions (Kellogg, Hopko, & Ashcraft, 1999; Shors, 2004), especially working memory (Beilock & Carr, 2005).

Burnout

Burnout is an overused buzzword that means different things to different people. Nonetheless, a few researchers have described burnout in a systematic way that has facilitated scientific study of the syndrome (Maslach & Leiter, 1997; Pines, 1993). ***Burnout involves physical and emotional exhaustion, cynicism, and a lowered sense of self-efficacy that can be brought on gradually by chronic work-related stress.*** Exhaustion, which is central to burnout, includes chronic fatigue, weakness, and low energy. Cynicism is manifested in highly negative attitudes toward oneself, one's work, and life in general. Reduced self-efficacy involves declining feelings of competence at work which give way to feelings of hopelessness and helplessness.

What causes burnout? Factors in the workplace that appear to promote burnout include work overload, struggling with interpersonal conflicts at work, lack of control over work responsibilities and out-

comes, and inadequate recognition for one's work (Maslach & Leiter, 2005; see **Figure 13.7**). As you might expect, burnout is associated with increased absenteeism and reduced productivity at work, as well as increased vulnerability to a variety of health problems (Maslach & Leiter, 2000). Burnout is a potential problem in a wide variety of occupations (Lee & Ashforth, 1996).

Psychological Problems and Disorders

On the basis of clinical impressions, psychologists have long suspected that chronic stress might contribute to many types of psychological problems and mental disorders. Since the late 1960s, advances in the measurement of stress have allowed researchers to verify these suspicions in empirical studies. In the domain of common psychological problems, studies indicate that stress may contribute to poor academic performance (Akgun & Ciarrochi, 2003), insomnia and other sleep disturbances (Vgontzas, Bixler, & Kales, 2000), sexual difficulties (Lemack, Uzzo, & Poppas, 1998), alcohol abuse (Colder, 2001), and drug abuse (Goeders, 2004).

Above and beyond these everyday problems, research reveals that stress often contributes to the onset of full-fledged psychological disorders, including depression (Rehm, Wagner, & Ivens-Tyndal, 2001), schizophrenia (McGlashan & Hoffman, 2000), and anxiety disorders (Falsetti & Ballenger, 1998). In particular, stress plays a central role in the development of *posttraumatic stress disorder (PTSD)*, which involves an enduring psychological disturbance attributable to the experience of a major traumatic event. We'll discuss these relations between stress and mental disorders in detail in Chapter 14. Of course, stress is only one of many factors that may contribute to psychological disorders. Nonetheless, it's sobering to realize that stress can have a dramatic impact on one's mental health.

Positive Effects

The effects of stress are not entirely negative. Recent years have brought increased interest in the positive aspects of the stress process, including favorable outcomes that follow in the wake of stress (Folkman & Moskowitz, 2000). To some extent, the new focus on the possible benefits of stress reflects a new emphasis on "positive psychology." As we noted in Chapters 1 and 10, some theorists have argued that the field of psychology has historically devoted too much attention to pathology and suffering (Seligman &

Web Link 13.5



David Baldwin's Trauma Information Pages

This site has long been recognized as the premier repository for web-based and other resources relating to emotional trauma, traumatic stress, and post-traumatic stress disorder. David Baldwin has assembled more than 1,000 links to information about these issues.

Csikszentmihalyi, 2000). The advocates of positive psychology argue for increased research on well-being, hope, courage, perseverance, tolerance, and other human strengths and virtues (Seligman, 2003). One of these strengths is resilience in the face of stress.

Research on resilience suggests that stress can promote personal growth or self-improvement (Tedeschi, Park, & Calhoun, 1998). For example, studies of people grappling with major health problems show that the majority of respondents report that they derived benefits from their adversity (Tennen & Affleck, 1999). Stressful events sometimes force people to develop new skills, reevaluate priorities, learn new insights, and acquire new strengths. In other words, the adaptation process initiated by stress may lead to personal changes that are changes for the better. Confronting and conquering a stressful challenge may lead to improvements in specific coping abilities and to an enhanced self-concept. Moreover, even if people do not conquer stressors, they may be able to learn from their mistakes. Thus, researchers have begun to explore the growth potential of stressful events (Calhoun & Tedeschi, 2001; Park & Fenster, 2004).

➤ REVIEW OF KEY POINTS

- Several lines of research, including Baumeister's work on choking under pressure, suggest that stress can interfere



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with task performance. Burnout involves exhaustion, cynicism, and lowered self-efficacy as a result of chronic work-related stress.

- Stress can contribute to a number of common problems, such as poor academic performance, insomnia, and sexual difficulties. Stress has also been related to the development of various psychological disorders, including depression, schizophrenia, anxiety disorders, and PTSD.
- Research on the effects of stress has concentrated on negative outcomes, but positive effects may also occur. Research on resilience suggests that stress can promote personal growth and improved coping.

Major disasters are just one of about a half-dozen types of calamitous events that can lead to posttraumatic stress disorder.

➤ The Effects of Stress on Physical Health

The idea that stress can contribute to physical ailments is not entirely new. Evidence that stress can cause physical illness began to accumulate back in the 1930s. By the 1950s, the concept of *psychosomatic disease* was widely accepted. **Psychosomatic diseases were genuine physical ailments that were thought to be caused in part by stress and other psychological factors.** The classic psychosomatic illnesses were high blood pressure, peptic ulcers, asthma, skin disorders such as eczema and hives, and migraine and tension headaches (Kaplan, 1989; Rogers, Frichione, & Reich, 1999). Please note, these diseases were not regarded as *imagined* physical ailments. The term *psychosomatic* has often been misused to refer to physical ailments that are “all in one’s head,” but that is an entirely different syndrome (see Chapter 14). Rather, psychosomatic diseases were viewed as *authentic* organic maladies that were heavily stress related.

Since the 1970s, the concept of psychosomatic disease has gradually fallen into disuse because re-

search has shown that stress can contribute to the development of a diverse array of other diseases previously believed to be purely physiological in origin (Dougall & Baum, 2001; Hubbard & Workman, 1998). Thus, it has become apparent that there is nothing unique about the psychosomatic diseases that requires a special category. In this section we’ll look at the evidence on the apparent link between stress and physical illness, beginning with heart disease, which is far and away the leading cause of death in North America.

Personality, Hostility, and Heart Disease

Heart disease accounts for nearly 30% of the deaths in the United States every year. *Coronary heart disease* involves a reduction in blood flow in the coronary arteries, which supply the heart with blood. This type of heart disease accounts for about 90% of heart-related deaths.

PREVIEW QUESTIONS

- What is the Type A personality, and how is hostility related to heart disease?
- Can stress trigger emotional reactions that cause heart attacks?
- How is depression related to heart disease?
- How does stress affect immune function and vulnerability to the common cold?
- How strong is the association between stress and illness?

Atherosclerosis is the principal cause of coronary heart disease. This condition is characterized by a gradual narrowing of the coronary arteries. A buildup of fatty deposits and other debris on the inner walls of the arteries is the usual cause of this narrowing. Atherosclerosis progresses slowly over a period of years. However, when a narrowed coronary artery is blocked completely (by a blood clot, for instance), the abrupt interruption of blood flow can produce a heart attack. Atherosclerosis is more prevalent in men than women and tends to increase with age. Other established risk factors for atherosclerosis include smoking, lack of exercise, high cholesterol levels, and high blood pressure (Greenland et al., 2003; Khot et al., 2003). Contrary to public perception, cardiovascular diseases kill women just as much as men, but these diseases tend to emerge in women about 10 years later than in men (Stoney, 2003).

Recently, attention has shifted to the possibility that *inflammation* may contribute to atherosclerosis and elevated coronary risk (Hackam & Anand, 2003). Evidence is mounting that inflammation plays a key role in the initiation and progression of atherosclerosis, as well as in the acute complications that trigger heart attacks (Albert et al., 2002; Libby, Ridker, & Maseri, 2002). Fortunately, researchers have found a marker—levels of C-reactive protein (CRP) in the blood—that may help physicians estimate individuals' coronary risk more accurately than was possible previously (Ridker et al., 2005). **Figure 13.8** shows

how combined levels of CRP and cholesterol appear to be related to coronary risk.

Research on the relationship between *psychological* factors and heart attacks began in the 1960s and 1970s, when a pair of cardiologists, Meyer Friedman and Ray Rosenman (1974), discovered an apparent connection between coronary risk and a syndrome they called the *Type A personality*, which involves self-imposed stress and intense reactions to stress. **The Type A personality includes three elements: (1) a strong competitive orientation, (2) impatience and time urgency, and (3) anger and hostility.** Type A's are ambitious, hard-driving perfectionists who are exceedingly time-conscious. They routinely try to do several things at once. They fidget frantically over the briefest delays. Often they are highly competitive, achievement-oriented workaholics who drive themselves with many deadlines. They are easily irritated and are quick to anger. In contrast, **the Type B personality is marked by relatively relaxed, patient, easygoing, amicable behavior.** Type B's are less hurried, less competitive, and less easily angered than Type A's.

Decades of research uncovered a tantalizingly modest correlation between Type A behavior and increased coronary risk. More often than not, studies found an association between Type A personality and an elevated incidence of heart disease, but the findings were not as strong or as consistent as expected (Ragland & Brand, 1988; Smith & Gallo, 2001). How-

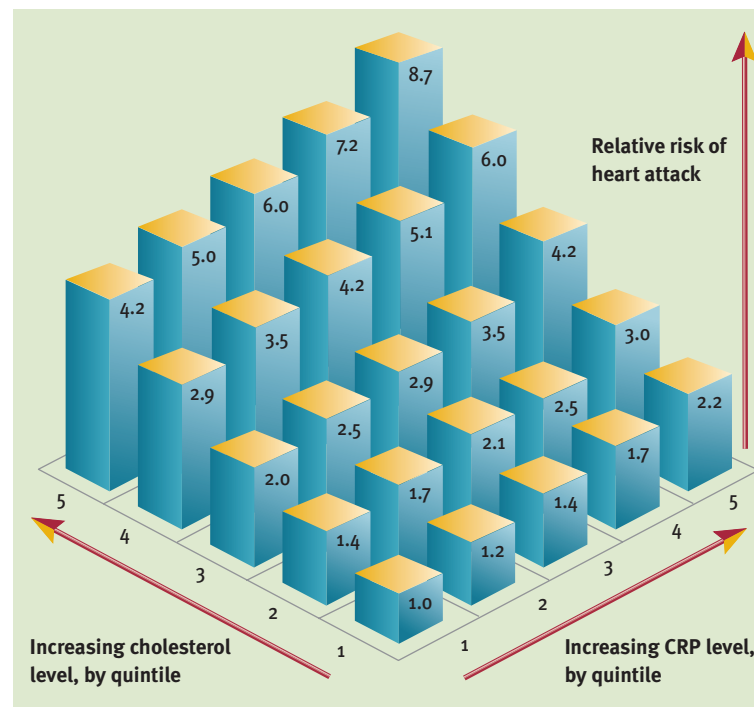


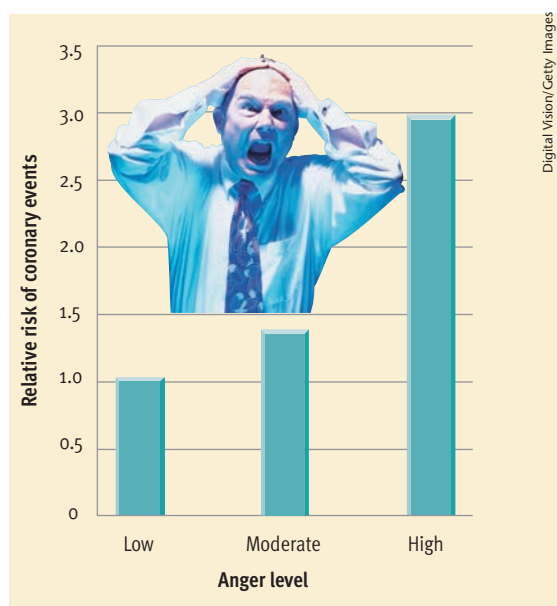
Figure 13.8
The relationship of cholesterol and inflammation to coronary risk. Levels of C-reactive protein (CRP) in the blood appear to be a useful index of the inflammation that contributes to atherosclerosis (Ridker, 2001). This graph shows how increasing CRP levels and increasing cholesterol levels combine to elevate cardiovascular risk (for a heart attack or stroke). The relative risks shown are for successive quintiles on each measure (each quintile represents one-fifth of the sample, ordered from those who scored lowest to those who scored highest). The relative risks are in relation to those who fall in the lowest quintile on both measures.

SOURCE: Ridker, P. M. (2001). High sensitivity C-reactive protein: Potential adjunct for global risk assessment in primary prevention of cardiovascular disease, *Circulation*, 103, 1813–1818. Copyright © 2001 American Heart Association. Adapted by permission of the publisher Lippincott Williams & Wilkins and the author. <http://lww.com>

ever, more recently, researchers have found a stronger link between personality and coronary risk by focusing on a specific component of the Type A personality—*anger and hostility* (Eaker et al., 2004; Niaura et al., 2002). For example, in one study of almost 13,000 men and women who had no prior history of heart disease (Williams et al., 2000), investigators found an elevated incidence of heart attacks among participants who exhibited an angry temperament. The participants, who were followed for a median period of 4.5 years, were classified as being low (37.1%), moderate (55.2%), or high (7.7%) in anger. Among participants with normal blood pressure, the high-anger subjects experienced almost three times as many coronary events as the low-anger subjects (see **Figure 13.9**). In another study, CT scans were used to look for signs of atherosclerosis in a sample of 374 young men and women whose hostility had been assessed a decade earlier when they were 18 to 30 years old (Irabarren et al., 2000). Participants with above-average hostility scores were twice as likely to exhibit atherosclerosis as participants with below-average hostility scores. Thus, recent research suggests that hostility may be the crucial toxic element in the Type A syndrome.

Figure 13.9

Anger and coronary risk. Working with a large sample of healthy men and women who were followed for a median of 4.5 years, Williams et al. (2000) found an association between anger and the likelihood of a coronary event. Among subjects who manifested normal blood pressure at the beginning of the study, a moderate anger level was associated with a 36% increase in coronary attacks and a high level of anger nearly tripled participants' risk for coronary disease. (Based on data in Williams et al., 2000)



Emotional Reactions, Depression, and Heart Disease

Although work on personality risk factors has dominated research on how psychological functioning contributes to heart disease, recent studies suggest that emotional reactions may also be critical. *One line of research has supported the hypothesis that transient mental stress and the resulting emotions that people experience can tax the heart.* Based on anecdotal evidence, cardiologists and laypersons have long voiced suspicions that strong emotional reactions might trigger heart attacks in individuals with coronary disease, but it has been difficult to document this connection. However, advances in cardiac monitoring have facilitated investigation of the issue.

As suspected, laboratory experiments with cardiology patients have shown that brief periods of mental stress can trigger acute symptoms of heart disease (Gottdiener et al., 1994). Overall, the evidence suggests that mental stress can elicit cardiac symptoms in about 30%–70% of patients with coronary disease (Kop, Gottdiener, & Krantz, 2001). Moreover, research indicates that these patients have a higher risk for heart attack than the cardiology patients who do not exhibit symptoms in response to mental stress (Krantz et al., 2000). In a study that approached the issue from another angle, 660 patients who experienced a nonfatal heart attack were subsequently interviewed about events that occurred in the 6 hours prior to the onset of their heart attack (Möller et al., 1999). The interviews suggested that episodes of anger were a frequent trigger for the participants' heart attacks. Taken together, these studies suggest that emotional reactions to stressful events may precipitate heart attacks in people with coronary disease (Strike & Step-toe, 2005).

Another line of research has recently implicated depression as a risk factor for heart disease (Krantz & McCeney, 2002). *Depressive disorders*, which are characterized by persistent feelings of sadness and despair, are a fairly common form of mental illness (see Chapter 14). Elevated rates of depression have been found among patients suffering from heart disease, but most experts used to explain this correlation by asserting that being diagnosed with heart disease makes people depressed. Recent evidence, however, suggests that the causal relations may be just the opposite—that *the emotional dysfunction of depression may cause heart disease* (Frasure-Smith & Lesperance, 2005; Thomas, Karaia, & O'Brien, 2004). This issue brings us to our Featured Study for this chapter, which examined the relationship between depression and cardiac health.

Web Link 13.6



Healthfinder

Through the Department of Health and Human Services, the U.S. government has opened an ambitious online gateway to consumer-oriented information about health in all its aspects. Annotated descriptions are available for all resources identified in no-cost searches of this database.

Source: Pennix, B. W. J. H., Beekman, A. T. F., Honig, A., Deeg, D. J. H., Schoevers, R. A., van Eijk, J. T. M., & van Tilburg, W. (2001). Depression and cardiac mortality: Results from a community-based longitudinal survey. *Archives of General Psychiatry*, 58, 221–227.

Is Depression a Risk Factor for Heart Disease?

In the 1990s investigators began to suspect that depression might increase vulnerability to heart disease. A correlation between depression and coronary risk was reported in several studies, but given the profound importance of this issue, additional studies have been needed to replicate the finding in different types of samples and to get a more precise reading on the *degree* to which depression elevates coronary risk. Also, previous studies yielded conflicting results about whether depression elevates cardiac risk for healthy individuals or only among people who already have heart disease. Thus, the present study examined the impact of depression on cardiac mortality in people with and without preexisting coronary disease.

Method

Participants. The sample was made up of 2847 men and women between the ages of 55 and 85 who were participating in an ongoing study of aging based in Amsterdam. The subjects were a randomly selected sample of community-dwelling older persons drawn from 11

municipalities in the Netherlands. The mean age of the participants was 70.5, and 52% were female.

Procedure and measures. The study used a longitudinal design (see Chapter 11), which entailed following the participants' health and mortality over a period of four years. Subjects were carefully screened for the existence of cardiac disease at the beginning of the study. Depressed subjects were identified through a two-step process. First, all subjects completed a widely used 20-item self-report measure of depression. Those who scored above a standard cutoff on this scale were evaluated four weeks later with a diagnostic interview. Those who met the criteria for a diagnosis of depressive disorder (based on the interview) were categorized as suffering from *major depression*. The remaining subjects who had scored above the cutoff on the screening scale, but did not meet the criteria for a full-fledged depressive disorder, were categorized as suffering from *minor depression*. The key dependent variable at the end of the study was the cardiac mortality rate among the subjects, which was based on tracking death certificates in the 11 municipalities where the participants resided.

Results

At the beginning of the study, 450 of the 2847 participants were found to have cardiac disease. Among these subjects, the cardiac mortality rate was elevated for those who had exhibited either minor or major depression (see **Figure 13.10a**). Similar trends were observed among the remaining 2397 subjects who were free of cardiac disease when the study was initiated (see **Figure 13.10b**). The risk trends for both groups remained largely the same even after statistical adjustments were made to control for confounding variables, such as age, sex, weight, and smoking history.

Discussion

The increased cardiac mortality rate associated with depression was fairly similar in both subjects with and without preexisting cardiac disease. For both groups, minor depression was associated with a 60% increase in cardiac mortality, and major depression roughly tripled subjects' risk of cardiac death. The findings for subjects without preexisting cardiac disease were especially important. Given that these subjects' depressive disorders preceded their cardiac disease, one cannot argue that their heart disease caused their depression. It is far more

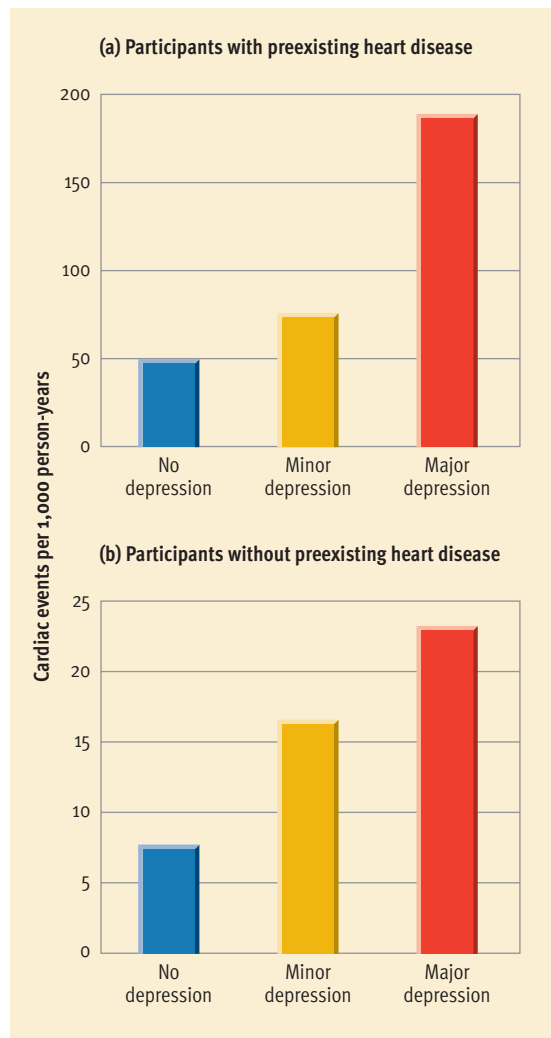


Figure 13.10

Depression and heart disease. These data show how minor and major depression were associated with elevated cardiac mortality rates both among participants with preexisting heart disease (a) and participants who were free of heart disease at the beginning of the study (b).

Source: Pennix, B. W. J. H., Beekman, A. T. F., Honig, A., Deeg, D. J. H., Schoevers, R. A., van Eijk, J. T. M., & van Tilburg, W. (2001). Depression and cardiac mortality: Results from a community-based longitudinal survey. *Archives of General Psychiatry*, 58, 221–227. Copyright © 2001 by American Medical Association. Reprinted with permission.

likely that depression somehow contributed to the emergence of cardiac disease in these subjects.

Comment

This study is representative of a rich research tradition in health psychology in which various psychological fac-

tors (depression in this case) are examined in relation to health outcomes. These studies are crucial to our understanding of the determinants of wellness and disease. They illustrate the importance of correlational research, since predictors of disease generally cannot be studied using the experimental method.

The tripled cardiac risk observed in our Featured Study was partly a function of the older age group (over age 55) that was studied. Overall, when broader age ranges are examined, recent studies have found that depression roughly doubles one's chances of developing heart disease (Lett et al., 2004; Rudisch & Nemeroff, 2003). Moreover, as suggested by our Featured Study, depression also appears to influence how heart disease progresses, as it is associated with a worse prognosis among cardiology patients (Glassman et al., 2003). Although the new emphasis is on how depression contributes to heart disease, experts caution that the relationship between the two conditions is surely bidirectional and that heart disease also increases vulnerability to depression (Sayers, 2004).

Stress, Other Diseases, and Immune Functioning

The development of questionnaires to measure life stress has allowed researchers to look for correlations between stress and a variety of diseases. These researchers have uncovered many connections between stress and illness. For example, Zautra and Smith (2001) found an association between life stress and the course of rheumatoid arthritis. Another study found an association between stressful life events and the emergence of lower back pain (Lampe et al., 1998). Other studies have connected stress to the development of diabetes (Landel-Graham, Yount, & Rudnicki, 2003), herpes (Padgett & Sheridan, 2000), and flare-ups of irritable bowel syndrome (Blanchard & Keefer, 2003).

These are just a handful of representative examples of studies relating stress to physical diseases. Table 13.4 provides a longer list of health problems that have been linked to stress. Many of these stress-illness connections are based on tentative or inconsistent findings, but the sheer length and diversity of the list is remarkable. Why should stress increase the risk for so many kinds of illness? A partial answer may lie in the immune system.

The apparent link between stress and many types of illness raises the possibility that stress may undermine immune functioning. The immune response is the body's defensive reaction to invasion by bac-

Table 13.4 Health Problems That May Be Linked to Stress

Health Problem	Representative Evidence
AIDS	Stetler et al. (2005)
Appendicitis	Creed (1989)
Asthma	Lehrer et al. (2002)
Cancer	Dalton & Johansen (2005)
Chronic back pain	Lampe et al. (1998)
Common cold	Stone et al. (1992)
Complications of pregnancy	Dunkel-Schetter et al. (2001)
Heart disease	Theorell (2005)
Diabetes	Landel-Graham, Yount, & Rudnicki (2003)
Epileptic seizures	Kelly & Schramke (2000)
Hemophilia	Buxton et al. (1981)
Herpes virus	Padgett & Sheridan (2000)
Hypertension	O'Callahan, Andrews, & Krantz (2003)
Hyperthyroidism	Yang, Liu, & Zang (2000)
Inflammatory bowel disease	Searle & Bennett (2001)
Migraine headaches	Ramadan (2000)
Multiple sclerosis	Grant et al. (1989)
Periodontal disease	Marcenes & Sheiham (1992)
Premenstrual distress	Stanton et al. (2002)
Rheumatoid arthritis	Keefe et al. (2002)
Skin disorders	Arnold (2000)
Stroke	Harmsen et al. (1990)
Ulcers	Levenstein (2002)
Vaginal infections	Williams & Deffenbacher (1983)

teria, viral agents, or other foreign substances. The immune response works to protect the body from many forms of disease. Immune reactions are multifaceted, but they depend heavily on actions initiated by specialized white blood cells, called lymphocytes.

A wealth of studies indicate that experimentally induced stress can impair immune functioning in animals (Moynihan & Ader, 1996). That is, stressors such as crowding, shock, food restriction, and restraint

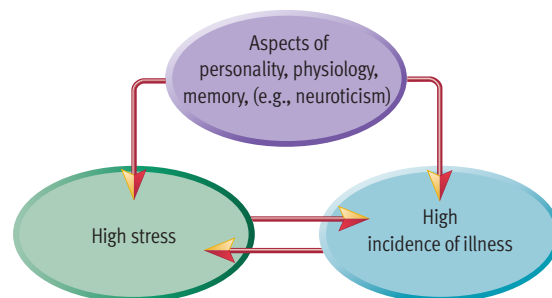
reduce various aspects of immune reactivity in laboratory animals (Chiappelli & Hodgson, 2000).

Studies by Janice Kiecolt-Glaser and her colleagues have related stress to suppressed immune activity *in humans* (Kiecolt-Glaser & Glaser, 1995). In one study, medical students provided researchers with blood samples so that their immune response could be assessed (Kiecolt-Glaser et al., 1984). The students provided the baseline sample a month before final exams and contributed the “high-stress” sample on the first day of their finals. The subjects also responded to the SRRS as a measure of recent stress. Reduced levels of immune activity were found during the extremely stressful finals week. Reduced immune activity was also correlated with higher scores on the SRRS. In another study, investigators exposed quarantined volunteers to respiratory viruses that cause the common cold and found that those under high stress were more likely to be infected by the viruses (Cohen, Tyrell, & Smith, 1993).

In a thorough review of 30 years of research on stress and immunity, Segerstrom and Miller (2004) conclude that chronic stress can reduce both *cellular immune responses* (which attack intracellular pathogens, such as viruses) and *humoral immune responses* (which attack extracellular pathogens, such as bacteria). They also report that the *duration* of a stressful event is a key factor determining its impact on immune function. Long-lasting stressors, such as caring for a seriously ill spouse or enduring unemployment for months, are associated with greater immune suppression than relatively brief stressors. Underscoring the importance of the link between stress and immune function, a recent study found evidence that chronic stress may produce *premature aging of immune system cells* (Epel et al., 2004). The study revealed that women who were dealing with heavy, long-term stress (caring for a child with a serious, chronic illness, such as cerebral palsy) had immune system cells that appeared to be a decade older than their chronological age, perhaps shedding light for the first time on why people under severe stress often look old and haggard.

Figure 13.11

The stress-illness correlation. One or more aspects of personality, physiology, or memory could play the role of a postulated third variable in the relationship between high stress and high incidence of illness. For example, neuroticism may lead some subjects to view more events as stressful and to remember more illness, thus inflating the apparent correlation between stress and illness.



Sizing Up the Link Between Stress and Illness

A wealth of evidence shows that stress is related to physical health, and converging lines of evidence suggest that stress contributes to the *causation* of illness. But we have to put this intriguing finding in perspective. Virtually all of the relevant research is correlational, so it can't demonstrate *conclusively* that stress causes illness (Smith & Gallo, 2001). Subjects' elevated levels of stress and illness could both be due to a third variable, perhaps some aspect of personality (see **Figure 13.11**). For instance, some evidence suggests that neuroticism may make people overly prone to interpret events as stressful and overly prone to interpret unpleasant sensations as symptoms of illness, thus inflating the correlation between stress and illness (Turner & Wheaton, 1995).

In spite of methodological problems favoring inflated correlations, the research in this area consistently indicates that the *strength* of the relationship between stress and health is *modest*. The correlations typically fall in the .20s and .30s (Cohen, Kessler, & Gordon, 1995). Clearly, stress is not an irresistible force that produces inevitable effects on health. Actually, this fact should come as no surprise, as stress is but one factor operating in a complex network of biopsychosocial determinants of health. Other key factors include one's genetic endowment, exposure to infectious agents and environmental toxins, nutrition, exercise, alcohol and drug use, smoking, use of medical care, and cooperation with medical advice. Furthermore, some people handle stress better than others, which is the matter we turn to next.

➤ REVIEW OF KEY POINTS

- Stress appears to play a role in many types of illnesses, not just psychosomatic diseases. The Type A personality has been implicated as a contributing cause of coronary heart disease, but hostility may be the most toxic element of the Type A syndrome. Transient, stress-induced emotional reactions and depression have also been identified as cardiovascular risk factors.
- Researchers have found associations between stress and the onset of a great variety of specific diseases, although the evidence on many is tentative. Stress may play a role in a host of diseases because it can temporarily suppress the effectiveness of the immune system. Long-lasting stressors have even been linked to premature aging of immune system cells.
- Although there's little doubt that stress can contribute to the development of physical illness, the link between stress and illness is modest. Stress is only one factor in a complex network of biopsychosocial variables that shape health.

> Factors Moderating the Impact of Stress

Some people seem to be able to withstand the ravages of stress better than others (Holohan & Moos, 1994). Why? Because a number of *moderator variables* can lessen the impact of stress on physical and mental health. We'll look at three key moderator variables—social support, optimism, and conscientiousness—to shed light on individual differences in how well people tolerate stress.

Social Support

Friends may be good for your health! This startling conclusion emerges from studies on social support as a moderator of stress. **Social support refers to various types of aid and succor provided by members of one's social networks.** In one study, Jemmott and Magloire (1988) examined the effect of social support on immune functioning in a group of students going through the stress of final exams. They found that students who reported stronger social support had higher levels of an antibody that plays a key role in warding off respiratory infections. Positive correlations between high social support and greater immune functioning have also been found in other studies (Uchino, Uno, & Holt-Lunstad, 1999).

In recent decades, a vast number of studies have found evidence that social support is favorably related to physical health (Uchino, 2004; Wills & Fegan, 2001), including all-important coronary health (Rutledge et al., 2004). Social support seems to be good medicine for the mind as well as the body, as most studies also find an association between social support and mental health (Davis, Morris, & Kraus, 1998). It appears that social support serves as a protective buffer during times of high stress, reducing the negative impact of stressful events, and that social support has its own positive effects on health, which may be apparent even when people aren't under great stress (Wills & Fegan, 2001). Interestingly, a recent study suggests that *providing* social support to others can also be beneficial (Brown et al., 2003). Another study has demonstrated that pet owners who view their pets as sources of support experience health benefits (Allen, Blascovich, & Mendes, 2002).

Of course, social *bonds* are not equivalent to social *support*. Indeed, some people in one's social circles may be a source of more *stress* than *support* (Vinokur & van Ryn, 1993). Friends and family can be argumentative, put one under pressure, make one feel guilty, break promises, and so forth. Research sug-

gests that social conflicts can increase susceptibility to illness (Cohen, 2004).

Optimism and Conscientiousness

Defining *optimism* as a general tendency to expect good outcomes, Michael Scheier and Charles Carver (1985) found a correlation between optimism and relatively good physical health in a sample of college students. Another study found optimism to be associated with more effective immune functioning (Segerstrom et al., 1998). Research suggests that optimists cope with stress in more adaptive ways than pessimists (Aspinwall, Richter, & Hoffman, 2001; Carver & Scheier, 1999). Optimists are more likely to engage in action-oriented, problem-focused coping. They are more willing than pessimists to seek social support, and they are more likely to emphasize the positive in their appraisals of stressful events. In comparison, pessimists are more likely to deal with stress by giving up or engaging in denial.

In a related line of research, Christopher Peterson and Martin Seligman have studied how people explain bad events (personal setbacks, mishaps, disappointments, and such). They identified a *pessimistic explanatory style*, in which people tend to blame setbacks on their own personal shortcomings, versus an *optimistic explanatory style*, which leads people to attribute setbacks to temporary situational factors. In two retrospective studies of people born many decades ago, they found an association between an optimistic explanatory style and relatively good health (Peterson, Seligman, & Vaillant, 1988) and increased longevity (Peterson et al., 1998). Many other studies have linked this optimistic explanatory style to superior physical health (Peterson & Bossio, 2001), as well as higher academic achievement, increased job productivity, enhanced athletic performance, and higher marital satisfaction (Gillham et al., 2001).

Optimism versus pessimism is not the only dimension of personality that has been examined as a possible moderator of physical health. Howard Friedman and his colleagues have found evidence that *conscientiousness*, one of the Big Five personality traits discussed in Chapter 12, may have an impact on physical health. Friedman et al. (1993) related personality measures to longevity in the gifted individuals first studied by Lewis Terman (see Chapter 9), who have been followed closely by researchers since 1921.

PREVIEW QUESTIONS

- How does social support influence people's health?
- How is optimism related to health?
- How is conscientiousness related to health?



Image Not Available

MARTIN SELIGMAN

"The concept of explanatory style brings hope into the laboratory, where scientists can dissect it in order to understand how it works."

Data were available on six personality traits, which were measured when the subjects were children. The one trait that predicted greater longevity was conscientiousness. Why does conscientiousness promote longevity? Accumulating evidence indicates that conscientiousness fosters better health habits. People who are high in conscientiousness are less likely than others to exhibit unhealthy habits, such as excessive drinking, drug abuse, dangerous driving, smoking, overeating, and risky sexual practices (Bogg & Roberts, 2004; Roberts, Walton, & Bogg, 2005).

Individual differences among people in social support, optimism, and conscientiousness explain why stress doesn't have the same impact on everyone.

Differences in lifestyle may play an even larger role in determining health. We'll examine some critical aspects of lifestyle in the next section.

➤ REVIEW OF KEY POINTS

- There are individual differences in how much stress people can tolerate without experiencing ill effects. Social support is a key moderator of the relationship between stress and both physical and mental health.
- Optimism may lead to more effective coping with stress, whereas pessimism has been related to passive coping and poor health practices. A study of Terman's sample of gifted children suggests that conscientiousness is associated with greater longevity. Conscientiousness appears to be related to better health habits.

➤ Health-Impairing Behavior

PREVIEW QUESTIONS

- Why does smoking increase mortality?
- What are some examples of links between nutrition and health?
- What are the health benefits of exercise?
- What are some misconceptions about HIV transmission?
- How do health-impairing habits get started?

Some people seem determined to dig an early grave for themselves. They do precisely those things that are bad for their health. For example, some people drink heavily even though they know that they're damaging their liver. Others eat all the wrong foods even though they know that they're increasing their risk of a second heart attack. Behavior that's downright *self-destructive* is surprisingly common. In this section we'll discuss how health is affected by smoking, nutrition, exercise, and drug use, and we'll look at behavioral factors in AIDS. We'll also discuss *why* people develop health-impairing lifestyles.

Smoking

The percentage of people who smoke has declined noticeably since the mid-1960s (see **Figure 13.12**). Nonetheless, about 25.7% of adult men and 21% of

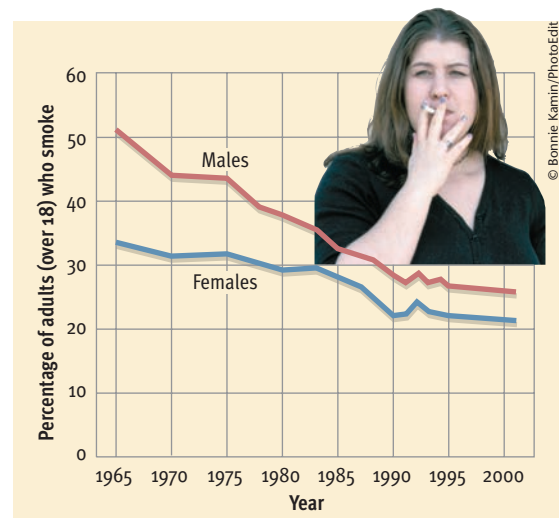
adult women in the United States continue to smoke regularly. Unfortunately, these figures are slightly higher (28% for both sexes) among college students (Rigotti, Lee, & Wechsler, 2000). Moreover, smoking is even more common in many other societies.

The evidence clearly shows that smokers face a much greater risk of premature death than nonsmokers. For example, the average smoker has an estimated life expectancy *13–14 years shorter* than that of a similar nonsmoker (Schmitz & Delaune, 2005). The overall risk is positively correlated with the number of cigarettes smoked and their tar and nicotine content. Cigar smoking, which has increased dramatically in recent years, elevates health risks almost as much as cigarette smoking (Baker et al., 2000).

Why are mortality rates higher for smokers? Smoking increases the likelihood of developing a surprisingly large range of diseases (Thun, Apicella, & Henley, 2000; Woloshin, Schwartz, & Welch, 2002). Lung cancer and heart disease kill the largest number of smokers. However, smokers also have an elevated risk for oral, bladder, and kidney cancer, as well as cancers of the larynx, esophagus, and pancreas; for arteriosclerosis, hypertension, stroke, and other cardiovascular diseases; and for bronchitis, emphysema, and other pulmonary diseases. Most smokers know about the risks associated with tobacco use, but they tend to underestimate the actual risks as applied to themselves (Ayanian & Cleary, 1999).

The dangers of smoking are not limited to smokers themselves. Family members and co-workers who spend a lot of time around smokers are exposed to *second-hand smoke* or *environmental tobacco smoke*, which can increase their risk for a variety of illnesses, including lung cancer (Wells, 1998), heart disease

Figure 13.12
The prevalence of smoking in the United States. This graph shows how the percentage of U.S. adults who smoke has declined steadily since the mid-1960s. Although considerable progress has been made, smoking still accounts for a huge number of premature deaths each year. (Based on data from the Centers for Disease Control and Prevention)



(Howard et al., 1998), and breast cancer in women (Lash & Aschengrau, 1999). Young children with asthma are particularly vulnerable to the effects of second-hand smoke (Stoddard & Miller, 1995).

Studies show that if people can give up smoking, their health risks decline reasonably quickly (Williams et al., 2002; see **Figure 13.13**). Evidence suggests that most smokers would like to quit but are reluctant to give up a major source of pleasure, and they worry about craving cigarettes, gaining weight, becoming anxious and irritable, and feeling less able to cope with stress (Grunberg, Faraday, & Rahman, 2001).

Unfortunately, it's difficult to give up cigarettes. People who enroll in formal smoking cessation programs are only slightly more successful than people who try to quit on their own (Swan, Hudman, Khroyan, 2003). Long-term success rates are in the vicinity of only 25%, and some studies report even lower figures. For example, in one study of self-quitters, after six months only 3% had maintained complete abstinence from smoking (Hughes et al., 1992). Nonetheless, the fact that there are nearly 40 million ex-smokers in the United States indicates that it is possible to quit smoking successfully. Interestingly, many people fail several or more times before they eventually succeed. Evidence suggests that the readiness to give up smoking builds gradually as people cycle through periods of abstinence and relapse (Herzog et al., 1999; Prochaska, 1994).

Poor Nutritional Habits

Evidence is accumulating that patterns of nutrition influence susceptibility to a variety of diseases and health problems. For example, in a study of over 42,000 women, investigators found an association between a measure of overall diet quality and mortality. Women who reported poorer quality diets had elevated mortality rates (Kant et al., 2000). What are the specific links between diet and health? In addition to the problems associated with obesity, which we discussed in Chapter 10, other possible connections between eating patterns and health include the following:

1. Heavy consumption of foods that elevate serum cholesterol level (eggs, cheeses, butter, shellfish, sausage, and the like) appears to increase the risk of cardiovascular disease (Stamler et al., 2000; see **Figure 13.14**). Eating habits are only one of several factors that influence serum cholesterol level, but they do make an important contribution.
2. Vulnerability to cardiovascular diseases may also be influenced by other dietary factors. For example, low-fiber diets may increase the likelihood of

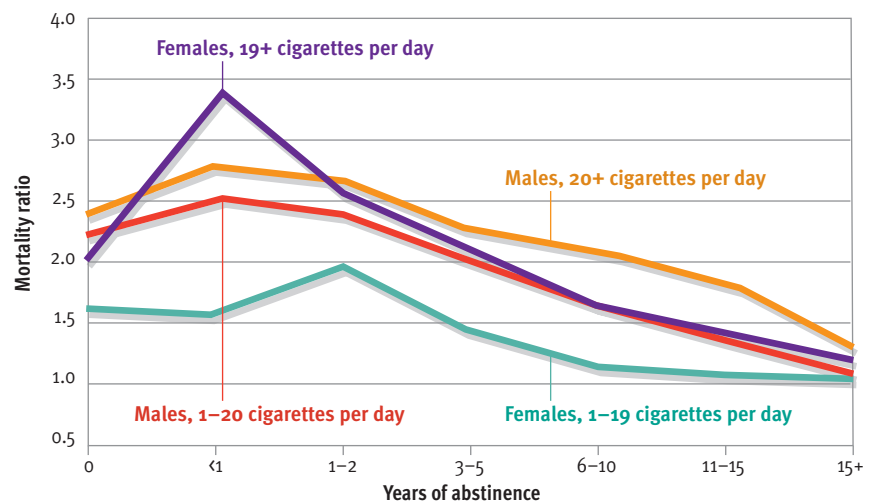


Figure 13.13

Quitting smoking and health risk. Research suggests that various types of health risks associated with smoking decline gradually after people give up tobacco. The data shown here, from the U.S. Surgeon General's (1990) report on smoking, illustrate the overall effects on mortality rates. (Based on data from U.S. Department of Health and Human Services, 1990)

coronary disease (Ludwig et al., 1999; Wolk et al., 1999), and high intake of red and processed meats, sweets, potatoes, and refined grains is associated with increased cardiovascular risk (Hu & Willett, 2002). Recent research indicates that the omega 3 fatty acids found in fish and fish oils offer some protection against coronary disease (Din, Newby, & Flapan, 2004).

3. High salt intake is thought to be a contributing factor in the development of hypertension (Vollmer et al., 2001), although there is still some debate about its exact role.

4. High caffeine consumption may elevate one's risk for hypertension (James, 2004) and for coronary

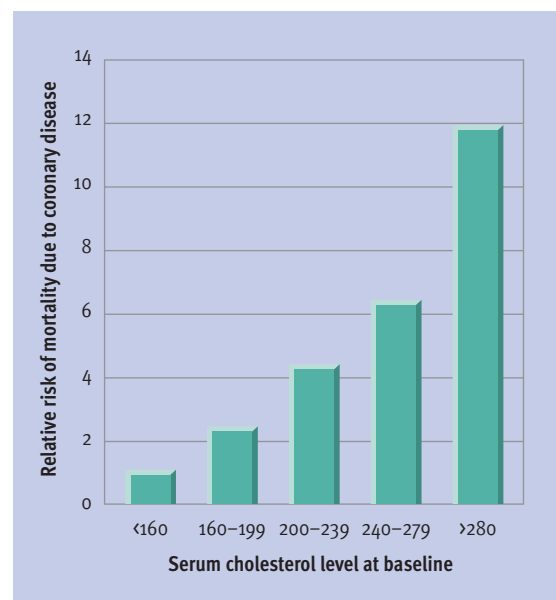


Figure 13.14

The link between cholesterol and coronary risk. In a review of several major studies, Stamler et al. (2000) summarize crucial evidence on the association between cholesterol levels and the prevalence of cardiovascular disease. This graph is based on a sample of over 11,000 men who were ages 18 to 39 at the beginning of the study (1967–1973) when their serum cholesterol level was measured. The data shown here depict participants' relative risk for coronary heart disease during the ensuing 25 years, as a function of their initial cholesterol level. (Data from Stamler et al., 2000)

disease (Happonen, Voutilainen, & Salonen, 2004), although the negative effects of caffeine appear relatively modest.

5. High-fat diets have been implicated as possible contributors to some forms of cancer, especially prostate cancer (Rose, 1997), colon and rectal cancer (Shike, 1999), and breast cancer (Wynder et al., 1997). Some studies also suggest that high-fiber diets may reduce one's risk for colon and rectal cancer (Reddy, 1999), but the evidence is not conclusive.

6. Vulnerability to osteoporosis, an abnormal loss of bone mass observed most commonly in postmenopausal women, appears to be elevated by a life-long pattern of inadequate calcium intake (Kalkwarf, Khoury, Lanphear, 2003).

Of course, nutritional habits interact with other factors—genetics, exercise, environment, and so on—to determine whether one develops a particular disease. Nonetheless, the examples just described indicate that eating habits can influence one's physical health.

Lack of Exercise

There is considerable evidence linking lack of exercise to poor health. Research indicates that regular exercise is associated with increased longevity (Lee & Skerrett, 2001). Why would exercise help people live longer? For one thing, an appropriate exercise program can enhance cardiovascular fitness and thereby reduce susceptibility to deadly cardiovascular problems (Lee et al., 2001a; Phillips, Kiernan, & King, 2001). Second, fitness may indirectly reduce one's risk for a variety of obesity-related health problems, such as diabetes and respiratory difficulties (Corsica & Perri, 2003). Third, recent studies suggest that physical fitness is also associated with a decreased risk for colon cancer in men and for breast and reproductive cancer in women (Thune & Furberg, 2001). The apparent link between exercise and reduced cancer risk has been a pleasant surprise for scientists, who are now scrambling to figure out the physiological mechanisms underlying this association. Fourth, exercise can serve as a buffer that reduces the potentially damaging physical effects of stress (Plante, 1999b; Plante, Caputo, & Chizmar, 2000). This buffering effect may occur because people high in fitness show less physiological reactivity to stress than those who are less fit.

Alcohol and Drug Use

Recreational drug use is another common health-impairing habit. The risks associated with the use of

various drugs were discussed in detail in Chapter 5. Unlike smoking, poor eating habits, and inactivity, drugs can kill directly and immediately when they are taken in an overdose or when they impair the user enough to cause an accident. In the long run, various recreational drugs may also elevate one's risk for infectious diseases; respiratory, pulmonary, and cardiovascular diseases; liver disease; gastrointestinal problems; cancer; neurological disorders; and pregnancy complications (see Chapter 5). Ironically, the greatest physical damage in the population as a whole is caused by alcohol, the one recreational drug that's legal.

Behavior and AIDS

Some of the most problematic links between behavior and health may be those related to AIDS. AIDS stands for *acquired immune deficiency syndrome*, a disorder in which the immune system is gradually weakened and eventually disabled by the human immunodeficiency virus (HIV). Being infected with the HIV virus is *not* equivalent to having AIDS. AIDS is the final stage of the HIV infection process, typically manifested about 7–10 years after the original infection (Carey & Vanable, 2003). With the onset of AIDS, one is left virtually defenseless against a variety of opportunistic infectious agents. AIDS inflicts its harm indirectly by opening the door to other diseases. The symptoms of AIDS vary widely, depending on the specific constellation of diseases that one develops (Cunningham & Selwyn, 2005). Unfortunately, the worldwide prevalence of this deadly disease continues to increase at an alarming rate, especially in certain regions of Africa (De Cock & Janssen, 2002).

Prior to 1996–1997, the average length of survival for people after the onset of the AIDS syndrome was about 18 to 24 months. Encouraging advances in the treatment of AIDS with drug regimens referred to as *highly active antiretroviral therapy* hold out promise for *substantially* longer survival (Sande & Ronald, 2004). But these drugs have been rushed into service, and their long-term efficacy is yet to be determined (Lee et al., 2001b; Tang & Glatt, 2001). Medical experts are concerned that the general public has gotten the impression that these treatments have transformed AIDS from a fatal disease to a manageable one, which is a premature conclusion. HIV strains are evolving, and many have developed resistance to the currently available antiretroviral drugs (Trachtenberg & Sande, 2002). Moreover, many patients do not respond well to the new drugs, and many patients who are responsive have difficulty sticking to the complicated drug administration regimens that often require people to take 20–30 pills daily and that often have adverse side

Web Link 13.7



Exercise and Sport Psychology
For anyone wondering about how psychological science deals with sports and athletics, this site, maintained by Division 47 of the American Psychological Association, is an excellent starting point, especially for those looking for career information.



effects (Catz & Kelly, 2001; Sorenson, Haug, & Batki, 2005).

Transmission

The HIV virus is transmitted through person-to-person contact involving the exchange of bodily fluids, primarily semen and blood. The two principal modes of transmission in the United States have been sexual contact and the sharing of needles by intravenous (IV) drug users. In the United States, sexual transmission has occurred primarily among gay and bisexual men, but heterosexual transmission has increased in recent years (Catania et al., 2001). In the world as a whole, infection through heterosexual relations has been much more common from the beginning. In heterosexual relations, male-to-female transmission is estimated to be about eight times more likely than female-to-male transmission (Ickovics, Thayaparan, & Ethier, 2001). The HIV virus can be found in the tears and saliva of infected individuals, but the concentrations are low, and there is no evidence that the infection can be spread through casual contact. Even most forms of noncasual contact, including kissing, hugging, and sharing food with infected individuals, appear safe (Kalichman, 1995).

Misconceptions

Misconceptions about AIDS are widespread. Ironically, the people who hold these misconceptions fall into two polarized camps. On the one hand, a great many people have unrealistic fears that AIDS can be readily transmitted through casual contact with infected individuals. These people worry unnecessarily about contracting AIDS from a handshake, a sneeze, or an eating utensil. They tend to be paranoid about interacting with homosexuals, thus fueling discrimination against gays in regard to housing, employment, and so forth. Some people also believe that it is dangerous to donate blood, when in fact blood donors are at no risk whatsoever.

On the other hand, many young heterosexuals who are sexually active with a variety of partners foolishly downplay their risk for HIV, naively assuming that they are safe as long as they avoid IV drug use and sexual relations with gay or bisexual men. They greatly underestimate the probability that their sexual partners previously may have used IV drugs or had unprotected sex with an infected individual. They don't understand, for instance, that most bisexual men do not disclose their bisexuality to their female partners (Kalichman et al., 1998). Also, because AIDS is usually accompanied by discernible symptoms, many young people believe that prospective sexual partners who carry the HIV virus will exhibit telltale signs of illness. However, as we have already noted,

having AIDS and being infected with HIV are not the same thing, and HIV carriers often remain healthy and symptom-free for many years after they are infected. In sum, many myths about AIDS persist, in spite of extensive efforts to educate the public about this complex and controversial disease. **Figure 13.15** contains a short quiz to test your knowledge of the facts about AIDS.

Prevention

The behavioral changes that minimize the risk of developing AIDS are fairly straightforward, although making the changes is often much easier said than done (Coates & Collins, 1998). In all groups, the more sexual partners a person has, the higher the risk that one will be exposed to the HIV virus. Thus, people can reduce their risk by having sexual contacts with fewer partners and by using condoms to control the exchange of semen. It is also important to curtail certain sexual practices (in particular, anal sex) that increase the probability of semen/blood mixing. The 1980s and early 1990s saw considerable progress towards wider use of safe sex practices, but new cohorts of young people appear to be much less concerned about the risk of HIV infection than the generation that witnessed the original emergence of AIDS (Catania et al., 2001). In particular, experts are concerned

Web Link 13.8



Centers for Disease Control and Prevention (CDC)

The CDC is the federal agency charged with monitoring and responding to serious threats to the nation's health as well as taking steps to prevent illness. This site's "Health Information from A to Z" offers the public in-depth medical explanations of many health problems both common (flu, allergies, etc.) and less common (fetal alcohol syndrome, meningitis, etc.).

AIDS Risk Knowledge Test

Answer the following "true" or "false."

- | | | | |
|---|---|-----|---|
| T | F | 1. | The AIDS virus cannot be spread through kissing. |
| T | F | 2. | A person can get the AIDS virus by sharing kitchens and bathrooms with someone who has AIDS. |
| T | F | 3. | Men can give the AIDS virus to women. |
| T | F | 4. | The AIDS virus attacks the body's ability to fight off diseases. |
| T | F | 5. | You can get the AIDS virus by someone sneezing, like a cold or the flu. |
| T | F | 6. | You can get AIDS by touching a person with AIDS. |
| T | F | 7. | Women can give the AIDS virus to men. |
| T | F | 8. | A person who got the AIDS virus from shooting up drugs cannot give the virus to someone by having sex. |
| T | F | 9. | A pregnant woman can give the AIDS virus to her unborn baby. |
| T | F | 10. | Most types of birth control also protect against getting the AIDS virus. |
| T | F | 11. | Condoms make intercourse completely safe. |
| T | F | 12. | Oral sex is safe if partners "do not swallow." |
| T | F | 13. | A person must have many different sexual partners to be at risk for AIDS. |
| T | F | 14. | It is more important to take precautions against AIDS in large cities than in small cities. |
| T | F | 15. | A positive result on the AIDS virus antibody test often occurs for people who do not even have the virus. |
| T | F | 16. | Only receptive (passive) anal intercourse transmits the AIDS virus. |
| T | F | 17. | Donating blood carries no AIDS risk for the donor. |
| T | F | 18. | Most people who have the AIDS virus look quite ill. |

Answers: 1. T 2. F 3. F 4. T 5. F 6. F 7. T 8. F 9. T 10. F 11. F 12. F 13. F 14. F 15. F 16. F 17. T 18. F

Figure 13.15

A quiz on knowledge of AIDS. Because misconceptions about AIDS abound, it may be wise to take this brief quiz to test your knowledge of AIDS. The answers are shown at the bottom of the figure.

Adapted from Kalichman, S. C., (1995). *Understanding AIDS: A guide for mental health professionals*. Washington, D.C.: American Psychological Association. Copyright © 1995 American Psychological Association. Reprinted by permission of the publisher and author.

that recent advances in treatment may lead to more casual attitudes about risky sexual practices, a development that would not bode well for public health efforts to slow the spread of AIDS (Crepaz, Hart, & Marks, 2004).

How Does Health-Impairing Behavior Develop?

It may seem puzzling that people behave in self-destructive ways. How does this happen? Several factors are involved. First, many health-impairing habits creep up on people slowly. For instance, drug use may grow imperceptibly over years, or exercise habits may decline ever so gradually. Second, many health-impairing habits involve activities that are quite pleasant at the time. Actions such as eating favorite foods, smoking cigarettes, or getting “high” are potent reinforcing events. Third, the risks associated with most health-impairing habits are chronic diseases such as cancer that usually lie 10, 20, or 30 years down the road. It’s relatively easy to ignore risks that lie in the distant future.

Finally, people have a curious tendency to underestimate the risks that accompany their own health-impairing behaviors while viewing the risks associated with others’ self-destructive behaviors much more accurately (Weinstein, 2003; Weinstein & Klein, 1996). Many people are well aware of the dangers associated with certain habits, but when it’s time to apply this

information to themselves, they often discount it. They figure, for instance, that smoking will lead to cancer or a heart attack in *someone else*.

So far, we’ve seen that physical health may be affected by stress and by aspects of lifestyle. Next, we’ll look at the importance of how people react to physical symptoms, health problems, and health care efforts.

REVIEW OF KEY POINTS

- People frequently display health-impairing lifestyles. Smokers have much higher mortality rates than nonsmokers because they are more vulnerable to a host of diseases. Health risks decline reasonably quickly for people who give up smoking, but quitting is difficult and relapse rates are high.
- Poor nutritional habits have been linked to heart disease, hypertension, and cancer, among other things. Lack of exercise elevates one’s risk for cardiovascular diseases. Alcohol and drug use carry the immediate risk of overdose and elevate the long-term risk of many diseases.
- Aspects of behavior influence one’s risk of AIDS, which is transmitted through person-to-person contact involving the exchange of bodily fluids, primarily semen and blood. Misconceptions about AIDS are common, and the people who hold these misconceptions tend to fall into polarized camps, either overestimating or underestimating their risk of infection.
- Health-impairing habits tend to develop gradually and often involve pleasant activities. The risks may be easy to ignore because they lie in the distant future and because people tend to underestimate risks that apply to them personally.

> Reactions to Illness

PREVIEW QUESTIONS

- What is the biggest problem related to people’s decisions to seek medical treatment?
- What are some barriers to effective communication between patients and their health providers?
- What can patients do to improve communication?
- How much of a problem is nonadherence to medical advice?
- What are the causes of nonadherence?

Some people respond to physical symptoms and illnesses by ignoring warning signs of developing diseases, while others engage in active coping efforts to conquer their diseases. Let’s examine the decision to seek medical treatment, communication with health providers, and compliance with medical advice.

Deciding to Seek Treatment

Have you ever experienced nausea, diarrhea, stiffness, headaches, cramps, chest pains, or sinus problems? Of course you have; we all experience some of these problems periodically. However, whether we view these sensations as *symptoms* is a matter of individual interpretation. When two persons experience the same unpleasant sensations, one may shrug them off as a nuisance while the other may rush to a physician (Martin & Leventhal, 2004). Studies sug-

gest that people who are relatively high in anxiety and neuroticism tend to report more symptoms of illness than others do (Petrie & Pennebaker, 2004). Those who are extremely attentive to bodily sensations and health concerns also report more symptoms than the average person (Barsky, 1988).

Variations in the perceived seriousness and disruptiveness of symptoms help explain the differences among people in their readiness to seek medical treatment (Cameron, Leventhal, & Leventhal, 1993). The biggest problem in regard to treatment seeking is the tendency of many people to delay the pursuit of needed professional consultation. Delays can be critical, because early diagnosis and quick intervention may facilitate more effective treatment of many health problems (Petrie & Pennebaker, 2004). Unfortunately, procrastination is the norm even when people are faced with a medical emergency, such as a heart attack



Communication between health care providers and patients tends to be far from optimal, for a variety of reasons.

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(Martin & Leventhal, 2004). Why do people dawdle in the midst of a crisis? Robin DiMatteo (1991), a leading expert on patient behavior, mentions a number of reasons, noting that people delay because they often (a) misinterpret and downplay the significance of their symptoms, (b) fret about looking silly if the problem turns out to be nothing, (c) worry about “bothering” their physician, (d) are reluctant to disrupt their plans (to go out to dinner, see a movie, and so forth), and (e) waste time on trivial matters (such as taking a shower, gathering personal items, or packing clothes) before going to a hospital emergency room.

Communicating with Health Providers

A large portion of medical patients leave their doctors’ offices not understanding what they have been told and what they are supposed to do (Johnson & Carlson, 2004). This situation is unfortunate, because good communication is a crucial requirement for sound medical decisions, informed choices about treatment, and appropriate follow-through by patients (Buckman, 2002; Gambone, Reiter, & DiMatteo, 1994).

There are many barriers to effective provider-patient communication (DiMatteo, 1997; Marteau &

Weinman, 2004). Economic realities dictate that medical visits are generally quite brief, allowing little time for discussion. Many providers use too much medical jargon and overestimate their patients’ understanding of technical terms. Patients who are upset and worried about their illness may simply forget to report some symptoms or to ask questions they meant to ask. Other patients are evasive about their real concerns because they fear a serious diagnosis. Many patients are reluctant to challenge doctors’ authority and are too passive in their interactions with providers.

What can you do to improve your communication with health care providers? The key is to not be a passive consumer of medical services (Ferguson, 1993; Kane, 1991). Arrive at a medical visit on time, with your questions and concerns prepared in advance. Try to be accurate and candid in replying to your doctor’s questions. If you don’t understand something the doctor says, don’t be embarrassed about asking for clarification. If you have doubts about the suitability or feasibility of your doctor’s recommendations, don’t be afraid to voice them.

Adhering to Medical Advice

Many patients fail to adhere to the instructions they receive from physicians and other health care professionals. The evidence suggests that noncompli-



ROBIN DiMATTEO

“A person will not carry out a health behavior if significant barriers stand in the way, or if the steps interfere with favorite or necessary activities.”

ance with medical advice may occur 30% of the time when short-term treatments are prescribed for acute conditions and 50% of the time when long-term treatments are needed for chronic illness (Johnson & Carlson, 2004). Nonadherence takes many forms. Patients may fail to begin a treatment regimen, stop the regimen early, reduce or increase the levels of treatment that were prescribed, or be inconsistent and unreliable in following treatment procedures (Dunbar-Jacob & Schlenk, 2001). Nonadherence is a major problem in our medical care system that has been linked to increased sickness, treatment failures, and higher mortality (Christensen & Johnson, 2002; DiMatteo et al., 2002). Moreover, nonadherence wastes expensive medical visits and medications and increases hospital admissions, leading to enormous economic costs. Robin DiMatteo (2004b) speculates that in the United States alone, nonadherence may be a \$300 billion a year drain on the health care system.

Concern about nonadherence does not mean that patients should passively accept all professional advice from medical personnel. However, when patients have doubts about a prescribed treatment, they should speak up and ask questions. Passive resistance can backfire. For instance, if a physician sees no improvement in a patient who falsely insists that he has been taking his medicine, the physician may abandon an accurate diagnosis in favor of an inaccurate one. The inaccurate diagnosis could then lead to inappropriate treatments that might be harmful to the patient.

Why don't people comply with the advice that they've sought out from highly regarded health care professionals? Physicians tend to attribute noncompliance to patients' personal characteristics, but research indicates that personality traits and demographic factors are surprisingly unrelated to adherence rates (DiMatteo, 2004b; Marteau & Weinman, 2004). One factor that *is* related to adherence is patients' *social support*. Adherence is improved when patients have family members, friends, or co-workers who remind them and help them to comply with treatment re-

quirements (DiMatteo, 2004a). Several other considerations can adversely influence the likelihood of adherence (Dunbar-Jacob & Schlenk, 2001; Johnson & Carlson, 2004):

1. Frequently, noncompliance is a result of the patient's failure to understand the instructions as given. Highly trained professionals often forget that what seems obvious and simple to them may be obscure and complicated to many of their patients.
2. Another key factor is how aversive or difficult the instructions are. If the prescribed regimen is unpleasant, compliance will tend to decrease. And the more that following instructions interferes with routine behavior, the less probable it is that the patient will cooperate successfully.
3. If a patient has a negative attitude toward a physician, the probability of noncompliance will increase. When patients are unhappy with their interactions with the doctor, they're more likely to ignore the medical advice provided.

In response to the noncompliance problem, researchers have investigated many methods of increasing patients' adherence to medical advice. Interventions have included simplifying instructions, providing more rationale for instructions, reducing the complexity of treatment regimens, helping patients with emotional distress that undermines adherence, and training patients in the use of behavior modification strategies. All of these interventions can improve adherence, although their effects tend to be modest (Christensen & Johnson, 2002; Roter et al., 1998).

➤ REVIEW OF KEY POINTS

- Ignoring physical symptoms may result in the delay of medical treatment. There are many barriers to effective communication between patients and health care providers.
- Noncompliance with medical advice is a major problem. The likelihood of nonadherence is greater when instructions are difficult to understand, when recommendations are difficult to follow, and when patients are unhappy with their doctor.

➤ Reflecting on the Chapter's Themes

Multifactorial
Causation



Subjectivity of
Experience



Which of our themes were prominent in this chapter? As you probably noticed, our discussion of stress and health illustrated multifactorial causation and the subjectivity of experience. As we noted in Chapter 1, people tend to think simplistically, in terms of single causes. In recent years, the highly publicized

research linking stress to health has led many people to point automatically to stress as an explanation for illness. In reality, stress has only a modest impact on physical health. Stress can increase the risk for illness, but health is governed by a dense network of factors. Important factors include inherited vulnera-

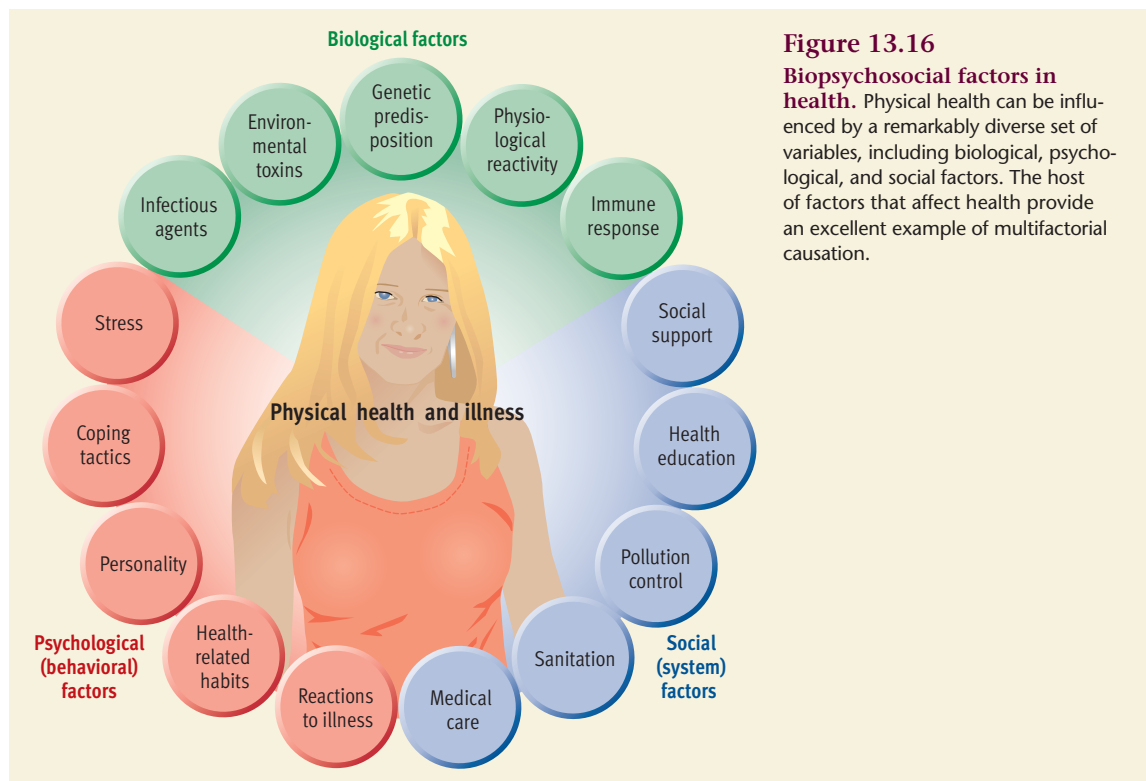


Figure 13.16
Biopsychosocial factors in health. Physical health can be influenced by a remarkably diverse set of variables, including biological, psychological, and social factors. The host of factors that affect health provide an excellent example of multifactorial causation.

bilities, physiological reactivity, exposure to infectious agents, health-impairing habits, reactions to symptoms, treatment-seeking behavior, compliance with medical advice, personality, and social support. In other words, stress is but one actor on a crowded stage. This should be apparent in **Figure 13.16**, which shows the multitude of biopsychosocial factors that jointly influence physical health. It illustrates multifactorial causation in all its complexity.

The subjectivity of experience was demonstrated by the frequently repeated point that stress lies in the eye of the beholder. The same job promotion may

be stressful for one person and invigorating for another. One person's pressure is another's challenge. When it comes to stress, objective reality is not nearly as important as subjective perceptions. More than anything else, the impact of stressful events seems to depend on how people view them. The critical importance of individual stress appraisals will continue to be apparent in the Personal Application on coping and stress management. Many stress management strategies depend on altering one's appraisals of events.

PERSONAL Application

Improving Coping and Stress Management

Answer the following "true" or "false."

- ___ 1 The key to managing stress is to avoid or circumvent it.
- ___ 2 It's best to suppress emotional reactions to stress.
- ___ 3 Laughing at one's problems is immature.

Courses and books on stress management have multiplied at a furious pace in the last couple of decades. They summarize experts' advice on how to cope with stress more effectively. How do these experts feel about the statements above? As you'll see in this Application, most would agree that all are false.

The key to managing stress does *not* lie in avoiding it. Stress is an inevitable element in the fabric of modern life. As Hans Selye (1973) noted, "Contrary to public opinion, we must not—and indeed can't—avoid stress" (p. 693). Thus, most stress management programs encourage people to confront

stress rather than sidestep it. This requires training people to engage in action-oriented, rational, reality-based *constructive coping*.

As we noted earlier, some coping tactics are more healthful than others. In this Application, we'll examine a variety of constructive coping tactics, beginning with Albert Ellis's ideas about changing one's appraisals of stressful events.

Reappraisal: Ellis's Rational Thinking

Albert Ellis is a prominent theorist who believes that people can short-circuit their emotional reactions to stress by altering their appraisals of stressful events. Ellis's insights about stress appraisal are the foundation for a widely used system of therapy, called *rational emotive behavior therapy* (Ellis, 1977, 1987), and several popular books on effective coping (Ellis, 1985, 1999, 2001).

Ellis maintains that *you feel the way you think*. He argues that problematic emotional reactions are caused by negative self-talk, which he calls catastrophic thinking. **Catastrophic thinking involves unrealistically pessimistic appraisals of stress that exaggerate the magnitude of one's problems.** According to Ellis, people unwittingly believe

that stressful events cause their emotional turmoil, but he maintains that emotional reactions to personal setbacks are actually caused by overly negative appraisals of stressful events (see **Figure 13.17**).

Ellis theorizes that unrealistic appraisals of stress are derived from irrational assumptions that people hold. He maintains that if you scrutinize your catastrophic thinking, you'll find that your reasoning is based on a logically indefensible premise, such as "I must have approval from everyone" or "I must perform well in all endeavors." These faulty assumptions, which people often hold unconsciously, generate catastrophic thinking and emotional turmoil. How can you reduce your unrealistic appraisals of stress? Ellis asserts that you must learn (1) how to detect catastrophic thinking and (2) how to dispute the irrational assumptions that cause it.

Using Humor as a Stress Reducer

A number of years ago, the Chicago area experienced its worst flooding in about a century. Thousands of people saw their homes wrecked when two rivers spilled over their banks. As the waters receded, the flood victims returning to their homes were subjected

to the inevitable TV interviews. A remarkable number of victims, surrounded by the ruins of their homes, *joked* about their misfortune. When the going gets tough, it may pay to laugh about it. In a study of coping styles, McCrae (1984) found that 40% of his subjects used humor to deal with stress.

Empirical evidence showing that humor moderates the impact of stress has been accumulating over the last 25 years (M. H. Abel, 1998; Lefcourt, 2001). How does humor help to reduce the effects of stress and promote wellness? Several explanations have been proposed (see **Figure 13.18**). One possibility is that humor affects appraisals of stressful events (Abel, 2002). Jokes can help people to put a less threatening spin on their trials and tribulations. Another possibility is that humor increases the experience of positive emotions (Martin, 2002), which can help people bounce back from stressful events (Tugade & Fredrickson, 2004). Another hypothesis is that a good sense of humor facilitates rewarding social interactions, which promote social support, which is known to buffer the effects of stress (Martin, 2002). Finally, Lefcourt and colleagues (1995) argue that high-humor people may benefit from not taking themselves as seriously as low-humor people do. As they put

Figure 13.17

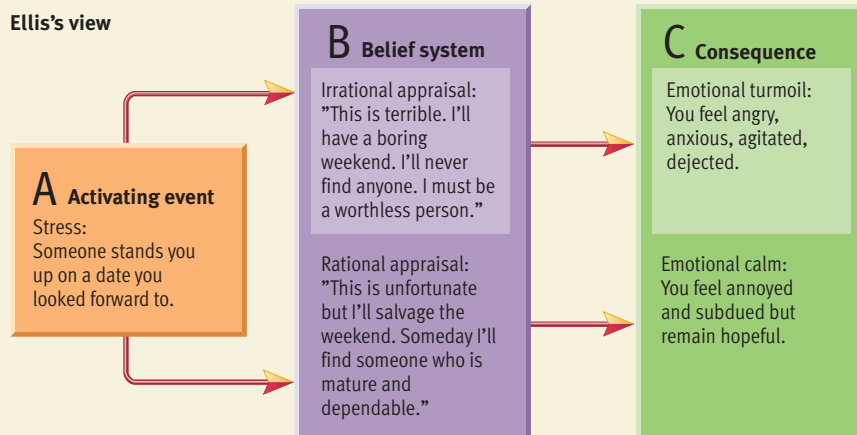
Albert Ellis's A-B-C model of emotional reactions.

Although most people attribute their negative emotional reactions directly to negative events that they experience, Ellis argues that events themselves do *not* cause emotional distress; rather, distress is caused by the way people *think* about negative events. According to Ellis, the key to managing stress is to change one's appraisal of stressful events.

The commonsense view



Ellis's view



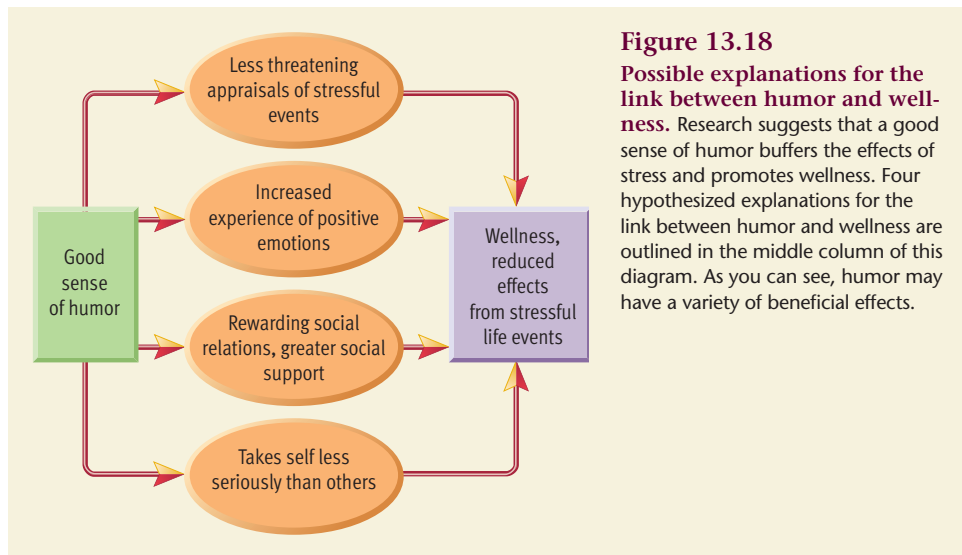


Figure 13.18
Possible explanations for the link between humor and wellness. Research suggests that a good sense of humor buffers the effects of stress and promotes wellness. Four hypothesized explanations for the link between humor and wellness are outlined in the middle column of this diagram. As you can see, humor may have a variety of beneficial effects.

it, “If persons do not regard themselves too seriously and do not have an inflated sense of self-importance, then defeats, embarrassments, and even tragedies should have less pervasive emotional consequences for them” (p. 375).

Releasing Pent-Up Emotions

As we discussed in the main body of the chapter, stress often leads to emotional arousal. When this happens, there’s merit in the commonsense notion that you should try to release the emotions welling up inside. Why? Because the physiological arousal that accompanies emotions can become problematic. For example, research suggests that people who inhibit the expression of anger and other emotions are somewhat more likely than other people to have elevated blood pressure (Jorgensen et al., 1996). Moreover, research suggests that efforts to actively suppress emotions result in increased stress and autonomic arousal (Butler et al., 2003; Gross, 2001).

Although there’s no guarantee of it, you can sometimes reduce your physiological arousal by *expressing* your emotions. Evidence is accumulating that writing or talking about life’s difficulties can be valuable in dealing with stress (Hemenover, 2003; Smyth & Pennebaker, 1999). For example, in one study of college students, half the subjects were asked to write three essays about their difficulties in adjusting to college. The other half

wrote three essays about superficial topics. The subjects who wrote about their personal problems enjoyed better health in the following months than the other subjects did (Pennebaker, Colder, & Sharp, 1990). Subsequent, similar studies have replicated this finding and shown that emotional disclosure is associated with better immune functioning (Slatcher & Pennebaker, 2005; Smyth & Pennebaker, 2001). So, if you can find a

good listener, you may be able to discharge problematic emotions by letting your secret fears, misgivings, and suspicions spill out in a candid conversation.

Managing Hostility and Forgiving Others

Scientists have compiled quite a bit of evidence that hostility is related to increased risk for heart attacks and other types of illness (Williams, 2001). In light of this situation, many experts assert that people should strive to learn how to manage their feelings of hostility more effectively (Williams & Williams, 2001). The goal of hostility management is not merely to suppress the overt expression of hostility that may continue to seethe beneath the surface, but to actually reduce the frequency and intensity of one’s hostile feelings.

We tend to experience hostility and other negative emotions when we feel “wronged”—that is, when we believe that the actions of another person were harmful, immoral, or unjust. Our natural inclination in such situations is either to seek revenge or to avoid further contact with the offender (McCul-



In September 1994, Reg and Maggie Green were vacationing in Italy when their seven-year-old son Nicholas was shot and killed during a highway robbery. In an act of forgiveness that stunned Europe, the Greens chose to donate their son’s organs, which went to seven Italians. The Greens, shown here five years after the incident, have weathered their horrific loss better than most, perhaps in part because of their willingness to forgive.

© Acey Harper/Time Life Pictures/Getty Images

lough, 2001). *Forgiving* someone involves counteracting these natural tendencies and releasing the person from further liability for his or her transgression. Research suggests that forgiving is associated with better adjustment and well-being (McCollough & Witvliet, 2002; Worthington & Scherer, 2004). For example, in one study of divorced or permanently separated women reported by McCollough (2001), the extent to which the women had forgiven their former husbands was positively related to several measures of well-being and inversely related to measures of anxiety and depression. Research also shows that vengefulness is correlated with more rumination and negative emotion and with lower life satisfaction (McCullough et al., 2001). Taken together, these findings suggest that it may be healthful for people to learn to forgive others more readily.

Learning to Relax

Relaxation is a valuable stress management technique that can soothe emotional turmoil and reduce problematic physiological arousal (Lehrer & Woolfolk, 1984, 1993;

Smyth et al., 2001). The value of relaxation became apparent to Herbert Benson (1975; Benson & Klipper, 1988) as a result of his research on meditation. Benson, a Harvard Medical School cardiologist, believes that relaxation is the key to the beneficial effects of meditation. According to Benson, the elaborate religious rituals and beliefs associated with meditation are irrelevant to its effects. After “demystifying” meditation, Benson set out to devise a simple, nonreligious procedure that could provide similar benefits. He calls his procedure the *relaxation response*. Although there are several other worthwhile approaches to relaxation training, we’ll examine Benson’s procedure, as its simplicity makes it especially useful. From his study of a variety of relaxation techniques, Benson concluded that four factors promote effective relaxation:

1. *A quiet environment.* It’s easiest to induce the relaxation response in a distraction-free environment. After you become experienced with the relaxation response, you may be able to practice it in a crowded subway. Initially, however, you should practice it in a quiet, calm place.

2. *A mental device.* To shift attention inward and keep it there, you need to focus your attention on a constant stimulus, such as a sound or word recited repetitively.

3. *A passive attitude.* It’s important not to get upset when your attention strays to distracting thoughts. You must realize that such distractions are inevitable. Whenever your mind wanders from your attentional focus, calmly redirect attention to your mental device.

4. *A comfortable position.* Reasonable body comfort is essential to avoid a major source of potential distraction. Simply sitting up straight generally works well. Lying down is too conducive to sleep.

Benson’s simple relaxation procedure is described in **Figure 13.19**. For full benefit, it should be practiced daily.

Minimizing Physiological Vulnerability

Your body is intimately involved in your response to stress, and the wear and tear of stress can be injurious to your health. To combat this potential problem, it helps to

Figure 13.19

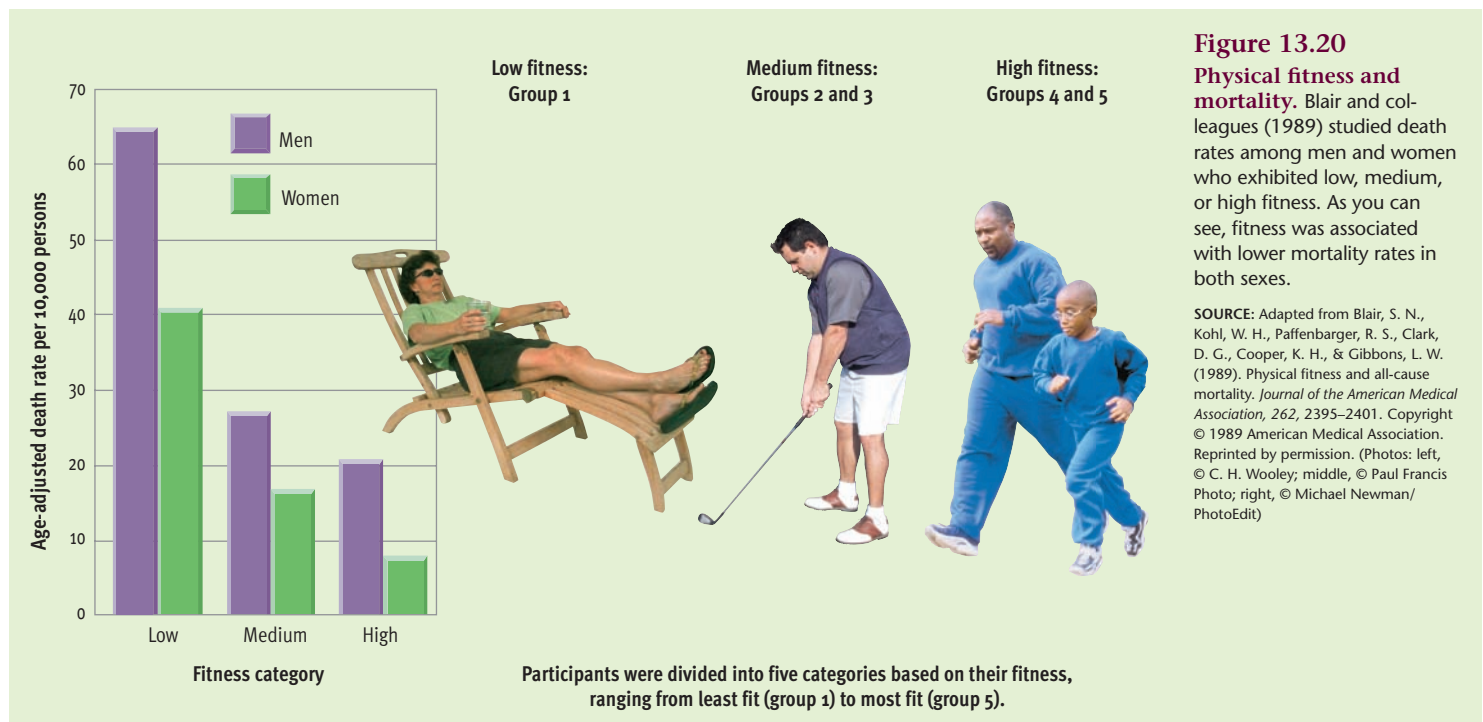
Benson’s relaxation procedure. Herbert Benson’s relaxation procedure is described here. According to Benson, his simple relaxation response can yield benefits similar to meditation. To experience these benefits, you should practice the procedure daily.

SOURCE: Benson, H., & Klipper, M. Z. (1975, 1988). *The relaxation response*. New York: Morrow. Copyright © 1975 by William Morrow & Co. Reprinted by permission of HarperCollins Publishers.

- 1 Sit quietly in a comfortable position.
- 2 Close your eyes.
- 3 Deeply relax all your muscles, beginning at your feet and progressing up to your face. Keep them relaxed.
- 4 Breathe through your nose. Become aware of your breathing. As you breathe out, say the word “one” silently to yourself. For example, breath in . . . out, “one”; in . . . out, “one”; and so forth. Breathe easily and naturally.
- 5 Continue for 10 to 20 minutes. You may open your eyes to check the time, but do not use an alarm. When you finish, sit quietly for several minutes, at first with your eyes closed and later with your eyes opened. Do not stand up for a few minutes.
- 6 Do not worry about whether you are successful in achieving a deep level of relaxation. Maintain a passive attitude and permit relaxation to occur at its own pace. When distracting thoughts occur, try to ignore them by not dwelling on them, and return to repeating “one.” With practice, the response should come with little effort. Practice the technique once or twice daily but not within two hours after any meal, since digestive processes seem to interfere with the elicitation of the relaxation response.



© Paul Francis Photo



keep your body in relatively sound shape. It's a good idea to consume a nutritionally balanced diet, get adequate sleep, and engage in at least a moderate amount of exercise. It's also a good idea to learn how to control overeating and the use of tobacco, alcohol, and other drugs. Good health habits will not make you immune to the ravages of stress. However, poor health habits generally will increase your vulnerability to stress-related diseases. We've discussed sleep patterns, drug use, and eating habits in other chapters, so the coverage here will focus exclusively on exercise.

The potential benefits of regular exercise are substantial. Fortunately, evidence indicates that you don't have to be a dedicated athlete to benefit from exercise. Even a moderate amount of exercise—such as taking a brisk, half-hour walk each day—can reduce your risk of disease (Richardson et al., 2004; see **Figure 13.20**). Successful participation

in an exercise program can also lead to improvements in your mood and ability to deal with stress (Hays, 1999; Plante, 1999b).

Embarking on an exercise program is difficult for many people. Exercise is time-consuming, and if you're out of shape, your initial attempts may be discouraging. People who do not get enough exercise cite lack of time, lack of convenience, and lack of enjoyment as their reasons (Jackicic & Gallagher, 2002). To circumvent these problems, it is wise to heed the following advice (Greenberg, 2002; Jackicic & Gallagher, 2002; Phillips et al., 2001):

1. Select an activity that you find enjoyable.
2. Increase your participation gradually.
3. Exercise regularly without overdoing it.
4. Reinforce yourself for your efforts.

If you choose a competitive sport (such as tennis), try to avoid falling into the compe-

tition trap. If you become obsessed with winning, you'll put yourself under pressure and *add* to the stress in your life.

➤ REVIEW OF KEY POINTS

- Action-oriented, realistic, constructive coping can be helpful in managing the stress of daily life. Ellis emphasizes the importance of reappraising stressful events to detect and dispute catastrophic thinking. According to Ellis, emotional distress is often attributable to irrational assumptions that underlie one's thinking.
- Humor may be useful in efforts to redefine stressful situations. In some cases, releasing pent-up emotions may pay off. Talking the anger out may help drain off negative emotions and foster better health. Stress can also be reduced by learning to manage one's hostile feelings more effectively and by learning to be more forgiving toward others.
- Relaxation techniques, such as Benson's relaxation response, can reduce the wear and tear of stress. Physical vulnerability may also be reduced by following a regular exercise regimen.

CRITICAL THINKING *Application*

Thinking Rationally About Health Statistics and Decisions

With so many conflicting claims about the best ways to prevent or treat diseases, how can anyone ever decide what to do? It seems that every day a report in the media claims that yesterday's health news was wrong. The inconsistency of health news is only part of the problem. We are also overwhelmed by health-related statistics. As mathematics pundit John Allen Paulos (1995, p. 133) puts it, "Health statistics may be bad for our mental health. Inundated by too many of them, we tend to ignore them completely, to accept them blithely, to disbelieve them close-mindedly, or simply to misinterpret their significance."

Making personal decisions about health-related issues may not be easy, but it is particularly important to try to think rationally and systematically about such issues. In this Application, we will discuss a few insights that can help you to think critically about statistics on health risks, then we'll briefly outline a systematic approach to thinking through health decisions.

Evaluating Statistics on Health Risks

News reports seem to suggest that there are links between virtually everything people do, touch, and consume and some type of physical illness. For example, media have reported that coffee consumption is related to hypertension, that sleep loss is related to mortality, and that a high-fat diet is related to heart disease. It's enough to send even the most subdued person into a panic. Fortunately, your evaluation of data on health risks can become more sophisticated by considering the following.

Correlation Is No Assurance of Causation. It is not easy to conduct experiments on health risks, so the vast majority of studies linking lifestyle and demographic factors

to diseases are correlational studies. Hence, it pays to remember that no causal link may exist between two variables that happen to be correlated. Thus, when you hear that a factor is related to some disease, try to dig a little deeper and find out *why* scientists think this factor is associated with the disease. The suspected causal factor may be something very different from what was measured.

Statistical Significance Is Not Equivalent to Practical Significance. Reports on health statistics often emphasize that the investigators uncovered "statistically significant" findings. Statistically significant findings are results that are not likely to be due to chance fluctuations (see Chapter 2). Statistical significance is a useful concept, but it can sometimes be misleading (Matthey, 1998). Medical studies are often based on rather large samples, because such samples tend to yield more reliable conclusions than small samples. However, when a large sam-

ple is used, weak relationships and small differences between groups can turn out to be statistically significant, and these small differences may not have much practical importance. For example, in one study of sodium (salt) intake and cardiovascular disease, which used a sample of over 14,000 participants, He et al. (1999) found a statistically significant link between high sodium intake and the prevalence of hypertension among normal-weight subjects. However, this statistically significant difference was not particularly large. The prevalence of hypertension among subjects with the lowest sodium intake was 19.1% compared to 21.8% for subjects with the highest sodium intake—not exactly a difference worthy of panic.

Base Rates Should Be Considered in Evaluating Probabilities. In evaluating whether a possible risk factor is associated with some disease, people often fail to consider the base rates of these events and draw far-reaching conclusions based on what may

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be a matter of sheer coincidence. For example, Paulos (1995) discusses how a handful of cases in which cellular phone users developed brain cancer led to unfounded allegations that cell phones cause brain cancer. Brain cancer is a rare disease, striking only about 6 out of 100,000 Americans per year. But given that many millions of Americans use cell phones, one would expect to find thousands upon thousands of new cases of brain cancer annually among cell phone users. Given the small number of reported cases, Paulos playfully concludes that cellular phones must prevent brain cancer.

It is also useful to consider base rates in evaluating percentage increases in diseases. If the base rate of a disease is relatively low, a small increase can sound quite large if it is reported as a percentage. For example, in the He et al. (1999) study, the prevalence of diabetes among subjects with the lowest sodium intake was 2.1% compared to 3.8% for subjects with the highest sodium intake. Based on this small but statistically significant difference, one could say (the investigators did not) that high sodium intake was associated with a 81% increase $[(3.8 - 2.1) \div 2.1]$ in the prevalence of diabetes.

Thinking Systematically About Health Decisions

Health decisions are oriented toward the future, which means that there are always uncertainties. And such decisions usually involve weighing potential risks and benefits. None of these variables is unique to health decisions—uncertainty, risks, and benefits play prominent roles in economic and political decisions as well as in personal decisions. Let’s apply some basic principles of quantitative reasoning to a treatment decision involving whether to prescribe Ritalin for a boy who has been diagnosed with attention deficit disorder (ADD). Keep in mind that the general principles applied in this example can be used for a wide variety of decisions.

Seek Information to Reduce Uncertainty. Gather information and check it carefully for accuracy, completeness, and the pres-

ence or absence of conflicting information. For example, is the diagnosis of ADD correct? Look for conflicting information that does not fit with this diagnosis. For example, if the child can sit and read for a long period of time, maybe the problem is an undetected hearing loss that makes him appear to be hyperactive in some situations. As you consider the additional information, begin quantifying the degree of uncertainty or its “flip side,” your degree of confidence that the diagnosis is correct. If you decide that you are not confident about the diagnosis, you may be trying to solve the wrong problem.

Make Risk-Benefit Assessments. What are the risks and benefits of Ritalin? How likely is this child to benefit from Ritalin, and just how much improvement can be expected? If the child is 8 years old and unable to read and is miserable in school and at home, any treatment that could reduce his problems deserves serious consideration. As in the first step, the quantification is at an approximate level.

List Alternative Courses of Action. What are the alternatives to Ritalin? How well do they work? What are the risks associated with

the alternatives, including the risk of falling further behind in school? Consider the pros and cons of each alternative. A special diet that sometimes works might be a good first step, along with the decision to start drug therapy if the child does not show improvement over some time period. What are the relative success rates for various types of treatment for children like the one being considered? To answer these questions, you will need to use probability estimates in your decision making.

As you can see from this example, many parts of the problem have been quantified (confidence in the diagnosis, likelihood of improvement, probability of negative outcomes, and so forth). Precise probability values were not used because the actual numbers often are not known. Some of the quantified values reflect value judgments, others reflect likelihoods, and others assess the degree of uncertainty. If you are thinking that the quantification of many unknowns in decision making is a lot of work, you are right. But, it is work worth doing. Whenever important decisions must be made about health, the ability to think with numbers will help you reach a better decision. And yes, that assertion is a virtual certainty.

Table 13.5 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding the limitations of correlational evidence	The critical thinker understands that a correlation between two variables does not demonstrate that there is a causal link between the variables.
Understanding the limitations of statistical significance	The critical thinker understands that weak relationships can be statistically significant when large samples are used in research.
Utilizing base rates in making predictions and evaluating probabilities	The critical thinker appreciates that the initial proportion of some group or event needs to be considered in weighing probabilities.
Seeking information to reduce uncertainty	The critical thinker understands that gathering more information can often decrease uncertainty, and reduced uncertainty can facilitate better decisions.
Making risk-benefit assessments	The critical thinker is aware that most decisions have risks and benefits that need to be weighed carefully.
Generating and evaluating alternative courses of action	In problem solving and decision making, the critical thinker knows the value of generating as many alternatives as possible and assessing their advantages and disadvantages.

CHAPTER 13 *Recap*

Key Ideas

The Nature of Stress

- Stress is a common, everyday event, and even seemingly minor stressors or hassles can be problematic. To a large degree, stress lies in the eye of the beholder, as appraisals of stress are highly subjective.
- Major types of stress include frustration, conflict, change, and pressure. Frustration occurs when an obstacle prevents one from attaining some goal. The three principal types of conflict are approach-approach, avoidance-avoidance, and approach-avoidance.
- A large number of studies with the SRRS suggest that change is stressful. Although this may be true, it is now clear that the SRRS is a measure of general stress rather than just change-related stress. Two kinds of pressure (to perform and conform) also appear to be stressful.

Responding to Stress

- Emotional reactions to stress typically include anger, fear, and sadness, although positive emotions may also occur and may promote resilience. Emotional arousal may interfere with coping. The optimal level of arousal on a task depends on the complexity of the task.
- Physiological arousal in response to stress was originally called the fight-or-flight response by Cannon. The fight-or-flight response may be less applicable to women than men. Selye's general adaptation syndrome describes three stages in physiological reactions to stress: alarm, resistance, and exhaustion.
- There are two major pathways along which the brain sends signals to the endocrine system in response to stress. Actions along these paths release two sets of hormones, catecholamines and corticosteroids, into the bloodstream.
- Some coping responses are less than optimal. Among these are giving up, blaming oneself, and striking out at others with acts of aggression. Indulging oneself is another coping pattern that tends to be of limited value. Defense mechanisms protect against emotional distress through self-deception. Small positive illusions about oneself may sometimes be adaptive.

The Effects of Stress on Psychological Functioning

- Common negative effects of stress in terms of psychological functioning include impaired task performance, burnout, and a variety of other psychological problems and disorders. Stress may also have positive effects, stimulating personal growth and the acquisition of new strengths.

The Effects of Stress on Physical Health

- The Type A personality has been implicated as a contributing cause of coronary heart disease, but hostility may be the toxic element of the Type A syndrome. Transient emotional reactions to stressful events and depression have also been identified as cardiovascular risk factors.
- Stress may play a role in a variety of diseases because it can temporarily suppress the effectiveness of the immune system. Although there's little doubt that stress can contribute to the development of physical illness, the link between stress and illness is modest.

Factors Moderating the Impact of Stress

- Social support is a key moderator of the relationship between stress and illness, and it is associated with better mental and physical health. Optimism may lead to more effective coping strategies, and conscientiousness may promote better health habits.

Health-Impairing Behavior

- People display many forms of health-impairing behavior. Smokers have much higher mortality rates than nonsmokers because they are more vulnerable to a host of diseases.
- Poor nutritional habits have been linked to heart disease, hypertension, and cancer, among other things. Lack of exercise elevates one's risk for cardiovascular diseases. Alcohol and drug use carry the immediate risk of overdose and elevate the long-term risk of many diseases.

- Aspects of behavior also influence one's risk of AIDS. Misconceptions about AIDS are common, and the people who hold these misconceptions tend to fall into polarized camps, either overestimating or underestimating their risk of infection. Health-impairing habits tend to develop gradually and often involve pleasant activities.

Reactions to Illness

- Ignoring physical symptoms may result in the delay of needed medical treatment. There are many barriers to effective communication between patients and health care providers. Noncompliance with medical advice is a major problem.

Reflecting on the Chapter's Themes

- Two of our integrative themes were prominent in this chapter. First, we saw that behavior and health are influenced by multiple causes. Second, we saw that experience is highly subjective, as stress lies in the eye of the beholder.

PERSONAL APPLICATION • Improving Coping and Stress Management

- Action-oriented, realistic, constructive coping can be helpful in managing the stress of daily life. Ellis emphasizes the importance of reappraising stressful events to detect and dispute catastrophic thinking. Humor may be useful in efforts to redefine stressful situations.
- In some cases, it may pay to release pent-up emotions by expressing them. Managing hostility and forgiving others' transgressions can also reduce stress. Relaxation techniques, such as Benson's relaxation response, can be helpful in stress management. Regular exercise can help make one less vulnerable to the ravages of stress.

CRITICAL THINKING APPLICATION • Thinking Rationally About Health Statistics and Decisions

- Evaluations of statistics on health risks can be enhanced by remembering that correlation is no assurance of causation, that statistical significance is not equivalent to practical significance, and that base rates need to be considered in assessing probabilities. In trying to think systematically about health decisions, one should seek information to reduce uncertainty, make risk-benefit assessments, and consider alternative courses of action.

Key Terms

Acquired immune deficiency syndrome (AIDS) (p. 536)
Acute stressors (p. 513)
Aggression (p. 521)
Approach-approach conflict (p. 513)
Approach-avoidance conflict (p. 514)
Avoidance-avoidance conflict (p. 514)
Biopsychosocial model (p. 511)
Burnout (p. 526)
Catastrophic thinking (p. 542)
Catharsis (p. 522)
Chronic stressors (p. 513)
Conflict (p. 513)
Constructive coping (p. 524)
Coping (p. 520)
Defense mechanisms (p. 523)
Fight-or-flight response (p. 519)
Frustration (p. 513)
General adaptation syndrome (p. 520)
Health psychology (p. 512)

Immune response (p. 531)
Internet addiction (p. 522)
Learned helplessness (p. 521)
Life changes (p. 514)
Optimism (p. 533)
Pressure (p. 515)
Psychosomatic diseases (p. 527)
Social support (p. 533)
Stress (p. 512)
Type A personality (p. 528)
Type B personality (p. 528)

Key People

Walter Cannon (p. 519)
Robin DiMatteo (pp. 539–540)
Albert Ellis (pp. 521, 542)
Meyer Friedman and Ray Rosenman (p. 528)
Thomas Holmes and Richard Rahe (pp. 514–515)
Janice Kiecolt-Glaser (p. 532)
Richard Lazarus (p. 512)
Hans Selye (pp. 519–520)
Shelley Taylor (pp. 519, 524)

CHAPTER 13 *Practice Test*

- It is the weekend before a major psychology exam on Monday, and Janine is experiencing total panic even though she is thoroughly prepared and aced the previous two psychology exams. Janine's panic illustrates that:
 - high arousal is optimal on complex tasks.
 - the appraisal of stress is quite objective.
 - the appraisal of stress is highly subjective.
 - her adrenal cortex is malfunctioning.
- The four principal types of stress are:
 - frustration, conflict, pressure, and anxiety.
 - frustration, anger, pressure, and change.
 - anger, anxiety, depression, and annoyance.
 - frustration, conflict, pressure, and change.
- When your boss tells you that a complicated report that you have not yet begun to write must be on her desk by this afternoon, you may experience:
 - burnout.
 - pressure.
 - a double bind.
 - catharsis.
- You want to ask someone for a date, but you are afraid to risk rejection. You are experiencing:
 - an approach-avoidance conflict.
 - an avoidance-avoidance conflict.
 - frustration.
 - pressure.
- Research suggests that a high level of arousal may be most optimal for the performance of a task when:
 - the task is complex.
 - the task is simple.
 - the rewards are high.
 - an audience is present.
- The alarm stage of Hans Selye's general adaptation syndrome is essentially the same as:
 - the fight-or-flight response.
 - constructive coping.
 - catharsis.
 - secondary appraisal.
- The brain structure responsible for initiating action along the two major pathways through which the brain sends signals to the endocrine system is the:
 - hypothalamus.
 - thalamus.
 - corpus callosum.
 - medulla.
- You have been doing poorly in your psychology class and are in danger of flunking. Which of the following qualifies as a defense mechanism in response to this situation?
 - You seek the aid of a tutor.
 - You decide to withdraw from the class and take it another time.
 - You deny the reality that you are hopelessly behind in the class, convinced that you will somehow ace the final without seeking help.
 - You consult with the instructor to see what you can do to pass the class.
- Physical and emotional exhaustion, cynicism, and lowered self-efficacy attributable to chronic work-related stress is referred to as:
 - learned helplessness.
 - burnout.
 - fallout.
 - posttraumatic stress disorder.
- Which personality trait seems to be most strongly related to increased coronary risk?
 - Type B personality
 - perfectionism
 - competitiveness
 - hostility
- Many students develop colds and other minor ailments during final exams. This probably happens because:
 - stress is associated with the release of corticosteroid hormones.
 - stress is associated with the release of catecholamine hormones.
 - burnout causes colds.
 - stress can suppress immune functioning.
- Research has found that optimists are more likely than pessimists to:
 - take their time in confronting problems.
 - identify the negatives before they identify the positives.
 - engage in action-oriented, problem-focused coping.
 - blame others for their personal problems.
- Which of the following has *not* been found to be a mode of transmission for the HIV virus?
 - sexual contact among homosexual men
 - the sharing of needles by intravenous drug users
 - sexual contact among heterosexuals
 - sharing food
- According to Albert Ellis, problematic emotional reactions are caused by:
 - the fight-or-flight response.
 - catharsis.
 - catastrophic thinking.
 - excessive reliance on defense mechanisms.
- In evaluating health statistics, it is useful to:
 - remember that statistical significance is equivalent to practical significance.
 - remember that correlation is a reliable indicator of causation.
 - consider base rates in thinking about probabilities.
 - do all of the above.

1 C p. 512
2 D pp. 513-515
3 B pp. 515-516
4 A pp. 513-516
5 B pp. 518-519
6 A p. 520
7 A pp. 520-521
8 C p. 523
9 B p. 526
10 D p. 529
11 C p. 542
12 C p. 546-547
13 D p. 537
14 C p. 533
15 D pp. 531-532

Answers

PsykJTrek

Go to the PsykJTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykJTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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Companion Website

http://psychology.wadsworth.com/weiten_themes7e/

Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



Psychological Disorders



Abnormal Behavior: Myths, Realities, and Controversies

The Medical Model Applied to Abnormal Behavior
Criteria of Abnormal Behavior
Stereotypes of Psychological Disorders
Psychodiagnosis: The Classification of Disorders
The Prevalence of Psychological Disorders

Anxiety Disorders

Generalized Anxiety Disorder
Phobic Disorder
Panic Disorder and Agoraphobia
Obsessive-Compulsive Disorder
Posttraumatic Stress Disorder
Etiology of Anxiety Disorders

Somatoform Disorders

Somatization Disorder
Conversion Disorder
Hypochondriasis
Etiology of Somatoform Disorders

Dissociative Disorders

Dissociative Amnesia and Fugue
Dissociative Identity Disorder
Etiology of Dissociative Disorders

Mood Disorders

Major Depressive Disorder
Bipolar Disorder
Etiology of Mood Disorders

FEATURED STUDY • Does Negative Thinking Cause Depression?

Schizophrenic Disorders

General Symptoms
Subtypes, Course, and Outcome
Etiology of Schizophrenia

Personality Disorders

Diagnostic Problems
Antisocial Personality Disorder

Illustrated Overview of Three Categories of Psychological Disorders

Psychological Disorders and the Law

Insanity
Involuntary Commitment

Culture and Pathology

Are Equivalent Disorders Found Around the World?
Are Symptom Patterns Culturally Invariant?

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Understanding Eating Disorders

Description
History and Prevalence
Etiology of Eating Disorders

CRITICAL THINKING APPLICATION • Working with Probabilities in Thinking About Mental Illness

Recap

Practice Test

The government of the United States was overthrown more than a year ago! I'm the president of the United States of America and Bob Dylan is vice president!" So said Ed, the author of a prominent book on journalism, who was speaking to a college journalism class, as a guest lecturer. Ed also informed the class that he had killed both John and Robert Kennedy, as well as Charles de Gaulle, the former president of France. He went on to tell the class that all rock music songs were written about him, that he was the greatest karate expert in the universe, and that he had been fighting "space wars" for 2000 years. The students in the class were mystified by Ed's bizarre, disjointed "lecture," but they assumed that he was putting on a show that would eventually lead to a sensible conclusion. However, their perplexed but expectant calm was shattered when Ed pulled a hatchet from the props he had brought with him and hurled the hatchet at the class! Fortunately, he didn't hit anyone, as the hatchet sailed over the students' heads. At that point,

the professor for the class realized that Ed's irrational behavior was not a pretense. The professor evacuated the class quickly while Ed continued to rant and rave about his presidential administration, space wars, vampires, his romances with female rock stars, and his personal harem of 38 "chicks." (Adapted from Pearce, 1974)

Clearly Ed's behavior was abnormal. Even he recognized that when he agreed later to be admitted to a mental hospital, signing himself in as the "President of the United States of America." What causes such abnormal behavior? Does Ed have a mental illness, or does he just behave strangely? What is the basis for judging behavior as normal versus abnormal? Are people who have psychological disorders dangerous? How common are such disorders? Can they be cured? These are just a few of the questions that we will address in this chapter as we discuss psychological disorders and their complex causes.

> Abnormal Behavior: Myths, Realities, and Controversies

Misconceptions about abnormal behavior are common. We therefore need to clear up some preliminary issues before we describe the various types of disorders. In this section, we will discuss (1) the medical model of abnormal behavior, (2) the criteria of abnormal behavior, (3) stereotypes regarding psychological disorders, (4) the classification of psychological disorders, and (5) the prevalence of such disorders.

The Medical Model Applied to Abnormal Behavior

In Ed's case, there's no question that his behavior was abnormal. But does it make sense to view his unusual and irrational behavior as an illness? This is a controversial question. **The medical model proposes that it is useful to think of abnormal behavior as a disease.** This point of view is the basis for many of the terms used to refer to abnormal behavior, including *mental illness*, *psychological disorder*, and *psychopathology* (*pathology* refers to manifestations of disease). The medical model gradually became the dominant way of thinking about abnormal behavior during the 18th and 19th centuries, and its influence remains strong today.

The medical model clearly represented progress over earlier models of abnormal behavior. Prior to the

18th century, most conceptions of abnormal behavior were based on superstition. People who behaved strangely were thought to be possessed by demons, to be witches in league with the devil, or to be victims of God's punishment. Their disorders were "treated" with chants, rituals, exorcisms, and such. If the people's behavior was seen as threatening, they were candidates for chains, dungeons, torture, and death (see **Figure 14.1** on the next page).

The rise of the medical model brought improvements in the treatment of those who exhibited abnormal behavior. As victims of an illness, they were viewed with more sympathy and less hatred and fear. Although living conditions in early asylums were deplorable, gradual progress was made toward more humane care of the mentally ill. It took time, but ineffectual approaches to treatment eventually gave way to scientific investigation of the causes and cures of psychological disorders.

However, in recent decades, some critics have suggested that the medical model may have outlived its usefulness (Kiesler, 1999). A particularly vocal critic has been Thomas Szasz (1974, 1990). He asserts that "strictly speaking, disease or illness can affect only the body; hence there can be no mental illness. . . . Minds can be 'sick' only in the sense that jokes are 'sick' or economies are 'sick'" (1974, p. 267). He fur-

PREVIEW QUESTIONS

- What is the medical model?
- What criteria are used to judge abnormality?
- How easy is it to distinguish normality from abnormality?
- What classification system is used to diagnose psychological disorders?
- How common are mental disorders?

Figure 14.1

Historical conceptions of mental illness.

In the Middle Ages people who behaved strangely were sometimes thought to be in league with the devil. The top drawing depicts some of the cruel methods used to extract confessions from suspected witches and warlocks. Some psychological disorders were also thought to be caused by demonic possession. The bottom illustration depicts an exorcism.

Source: (Right) Culver Pictures Inc. (Below) *St. Catherine of Siena Exorcising a Possessed Woman*, c. 1500–1510. Girolamo Di Benvenuto. Denver Art Museum Collection, Gift of Samuel H. Kress Foundation Collection, 1961.171 © Denver Art Museum 2003. All rights reserved.



ther argues that abnormal behavior usually involves a deviation from social norms rather than an illness. He contends that such deviations are “problems in living” rather than medical problems. According to Szasz, the medical model’s disease analogy converts moral and social questions about what is acceptable behavior into medical questions.

Although Szasz’s criticism of the medical model has some merit, we’ll take the position that the disease analogy continues to be useful, although one should remember that it is *only* an analogy. Medical concepts such as *diagnosis*, *etiology*, and *prognosis* have proven valuable in the treatment and study of abnormality. **Diagnosis involves distinguishing one illness from another. Etiology refers to the apparent causation and developmental history of an illness. A prognosis is a forecast about the probable course of an illness.** These medically based concepts have widely

shared meanings that permit clinicians, researchers, and the public to communicate more effectively in their discussions of abnormal behavior.

Criteria of Abnormal Behavior

If your next-door neighbor scrubs his front porch twice a day and spends virtually all his time cleaning and recleaning his house, is he normal? If your sister-in-law goes to one physician after another seeking treatment for physical ailments that appear imaginary, is she psychologically healthy? How are we to judge what’s normal and what’s abnormal? More important, who’s to do the judging?

These are complex questions. In a sense, *all* people make judgments about normality in that they all express opinions about others’ (and perhaps their own) mental health. Of course, formal diagnoses of psychological disorders are made by mental health professionals. In making these diagnoses, clinicians rely on a variety of criteria, the foremost of which are the following:

1. **Deviance.** As Szasz has pointed out, people are often said to have a disorder because their behavior deviates from what their society considers acceptable. What constitutes normality varies somewhat from one culture to another, but all cultures have such norms. When people violate these standards and expectations, they may be labeled mentally ill. For example, *transvestic fetishism* is a sexual disorder in which a man achieves sexual arousal by dressing in women’s clothing. This behavior is regarded as disordered because a man who wears a dress, brassiere, and nylons is deviating from our culture’s norms.

2. **Maladaptive behavior.** In many cases, people are judged to have a psychological disorder because their everyday adaptive behavior is impaired. This is the key criterion in the diagnosis of substance use (drug) disorders. In and of itself, alcohol and drug use is not unusual or deviant. However, when the use of cocaine, for instance, begins to interfere with a person’s social or occupational functioning, a substance use disorder exists. In such cases, it is the maladaptive quality of the behavior that makes it disordered.

3. **Personal distress.** Frequently, the diagnosis of a psychological disorder is based on an individual’s report of great personal distress. This is usually the criterion met by people who are troubled by depression or anxiety disorders. Depressed people, for instance, may or may not exhibit deviant or maladaptive behavior. Such people are usually labeled as having a disorder when they describe their subjective pain



THOMAS SZASZ

“Minds can be ‘sick’ only in the sense that jokes are ‘sick’ or economies are ‘sick.’”



This man clearly exhibits a certain type of deviance, but does that mean that he has a psychological disorder? The criteria of mental illness are more subjective and complicated than most people realize, and to some extent, judgments of mental health represent value judgments.

and suffering to friends, relatives, and mental health professionals.

Although two or three criteria may apply in a particular case, people are often viewed as disordered when only one criterion is met. As you may have already noticed, diagnoses of psychological disorders involve *value judgments* about what represents normal or abnormal behavior (Widiger & Sankis, 2000). The criteria of mental illness are not nearly as value-free as the criteria of physical illness. In evaluating physical diseases, people can usually agree that a malfunctioning heart or kidney is pathological, regardless of their personal values. However, judgments about mental illness reflect prevailing cultural values, social trends, and political forces, as well as scientific knowledge (Kutchins & Kirk, 1997; Mechanic, 1999).

These realities are readily apparent if you consider how psychiatric views of homosexuality have changed over time. Homosexuality used to be listed as a sexual disorder in the American Psychiatric Association’s diagnostic system (which we will discuss shortly). Because homosexuality was viewed as pathological, many gays were coaxed or coerced into therapeutic treatments for their “disorder,” which often proved demeaning or harmful (Smith, Bartlett, & King, 2004). However, in 1973 a committee appointed by the

American Psychiatric Association voted to delete homosexuality from the official list of psychological disorders. This action occurred for several reasons (Bayer, 1987; Forstein, 2004; Rothblum, Solomon, & Albee, 1986). First, attitudes toward homosexuality in our society had become more tolerant. Second, gay rights activists had become more politically active and campaigned vigorously for the change. Third, research showed that gays and heterosexuals were indistinguishable on measures of psychological health. Although this long overdue decision was informed by scientific findings, it was also influenced by political lobbying and shifts in social values.

Antonyms such as *normal* versus *abnormal* and *mental health* versus *mental illness* imply that people can be divided neatly into two distinct groups: those who are normal and those who are not. In reality, it is often difficult to draw a line that clearly separates normality from abnormality. On occasion, everybody acts in deviant ways, everyone displays some maladaptive behavior, and everyone experiences personal distress. People are judged to have psychological dis-

Web Link 14.1

Mental Health Net
This is arguably the premier site to explore all aspects of mental health, including psychological disorders and treatment, professional issues, and information for consumers. It is a great starting point, with links to more than 8000 resources.

concept check 14.1

Applying the Criteria of Abnormal Behavior

Check your understanding of the criteria of abnormal behavior by identifying the criteria met by each of the examples below and checking them off in the table provided. Keep in mind that a specific behavior may meet more than one criterion. The answers are in Appendix A.

Behavioral examples

- Alan’s performance at work has suffered because he has been drinking alcohol to excess. Several co-workers have suggested that he seek help for his problem, but he thinks that they’re getting alarmed over nothing. “I just enjoy a good time once in a while,” he says.
- Monica has gone away to college and feels lonely, sad, and dejected. Her grades are fine, and she gets along okay with the other students in the dormitory, but inside she’s choked with gloom, hopelessness, and despair.
- Boris believes that he’s Napoleon reborn. He believes that he is destined to lead the U.S. military forces into a great battle to recover California from space aliens.
- Natasha panics with anxiety whenever she leaves her home. Her problem escalated gradually until she was absent from work so often that she was fired. She hasn’t been out of her house in nine months and is deeply troubled by her problem.

Criteria met by each example

	Maladaptive behavior	Deviance	Personal distress
1. Alan	_____	_____	_____
2. Monica	_____	_____	_____
3. Boris	_____	_____	_____
4. Natasha	_____	_____	_____



Figure 14.2

Normality and abnormality as a continuum. No sharp boundary exists between normal and abnormal behavior. Behavior is normal or abnormal in degree, depending on the extent to which one's behavior is deviant, personally distressing, or maladaptive.

Web Link 14.2



National Alliance for the Mentally Ill (NAMI)
NAMI describes itself as "a grassroots, self-help support and advocacy organization of families and friends of people with serious mental illness, and those persons themselves." Its online site responds to their needs with extensive and current information about schizophrenia, bipolar disorder, and other severe disorders.

orders only when their behavior becomes *extremely* deviant, maladaptive, or distressing. Thus, normality and abnormality exist on a continuum. It's a matter of degree, not an either-or proposition (see **Figure 14.2**).

Stereotypes of Psychological Disorders

We've seen that mental illnesses are not diseases in a strict sense and that judgments of mental health are not value-free. However, still other myths about abnormal behavior need to be exposed as such. Let's examine three stereotypes about psychological disorders that are largely inaccurate:

1. *Psychological disorders are incurable.* Admittedly, there are mentally ill people for whom treatment is largely a failure. However, they are greatly outnumbered by people who do get better, either spontaneously or through formal treatment (Lambert & Ogles, 2004). The vast majority of people who are diagnosed as mentally ill eventually improve and lead normal, productive lives. Even the most severe psychological disorders can be treated successfully.

2. *People with psychological disorders are often violent and dangerous.* Only a modest association has been found between mental illness and violence-prone tendencies (Monahan, 1997; Tardiff, 1999). This stereotype exists because incidents of violence involving the mentally ill tend to command media attention. For example, our opening case history, which described Ed's breakdown and the episode with the hatchet, was written up in a national news magazine. People such as John Hinckley, Jr., whose mental illness led him to attempt an assassination of President Ronald Reagan (and wounding of press secretary James Brady), receive extensive publicity. However, these individuals are not representative of the large

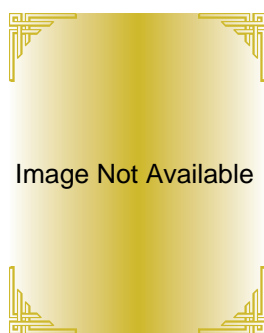
number of people who have struggled with psychological disorders.

3. *People with psychological disorders behave in bizarre ways and are very different from normal people.* This is true only in a small minority of cases, usually involving relatively severe disorders. As noted earlier, the line between normal and abnormal behavior can be difficult to draw. At first glance, people with psychological disorders usually are indistinguishable from those without disorders. A classic study by David Rosenhan (1973) showed that even mental health professionals may have difficulty distinguishing normality from abnormality. To study diagnostic accuracy, Rosenhan arranged for a number of normal people to seek admission to mental hospitals. These "pseudopatients" arrived at the hospitals complaining of one false symptom—hearing voices. Except for this single symptom, they acted as they normally would and gave accurate information when interviewed about their personal histories. *All* the pseudopatients were admitted, and the average length of their hospitalization was 19 days! As you might imagine, Rosenhan's study evoked quite a controversy about our diagnostic system for mental illness. Let's take a look at how this diagnostic system has evolved.

Psychodiagnosis: The Classification of Disorders

Obviously, we cannot lump all psychological disorders together without giving up all hope of understanding them better. A sound taxonomy of mental disorders can facilitate empirical research and enhance communication among scientists and clinicians (Williams, 1999). Thus, a great deal of effort has been invested in devising an elaborate system for classifying psychological disorders (see **Figure 14.3**).

Guidelines for psychodiagnosis were extremely vague and informal prior to 1952 when the American Psychiatric Association unveiled its *Diagnostic and Statistical Manual of Mental Disorders* (Grob, 1991). This classification scheme described about 100 disorders. Revisions intended to improve the system were incorporated into the second edition (DSM-II) published in 1968, but the diagnostic guidelines were still pretty sketchy. However, the third edition (DSM-III), published in 1980, represented a major advance, as the diagnostic criteria were made much more explicit, concrete, and detailed to facilitate more consistent diagnoses across clinicians (Blacker & Tsuang, 1999). The current, fourth edition (DSM-IV), which was released in 1994, and revised slightly in 2000, made use of intervening research to refine the criteria introduced in DSM-III. Each revision of the DSM system has expanded the list of disorders covered. The cur-



DAVID ROSENHAN

"How many people, one wonders, are sane but not recognized as such in our psychiatric institutions?"

rent version describes about three times as many types of psychological disorders as DSM-I (Houts, 2002).

The publication of DSM-III in 1980 introduced a new multi-axial system of classification, which asks for judgments about individuals on five separate dimensions, or “axes.” **Figure 14.3** provides an over-

view of the five axes. The diagnoses of disorders are made on Axes I and II. Clinicians record most types of disorders on Axis I. They use Axis II to list long-running personality disorders or mental retardation. People may receive diagnoses on both Axes I and II. The remaining axes are used to record supplemental

Figure 14.3

Overview of the DSM diagnostic system. Published by the American Psychiatric Association, the *Diagnostic and Statistical Manual of Mental Disorders* is the formal classification system used in the diagnosis of psychological disorders. It is a *multi-axial* system, which means that information is recorded on the five axes described here. (Based on American Psychiatric Association, 1994, 2000)

Source: Adapted with permission from the *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM-TR). Copyright © 2000 American Psychiatric Association.



Figure 14.4
Example of a multiaxial evaluation. A multiaxial evaluation for a depressed man with a cocaine problem might look like this.

A DSM multiaxial evaluation (patient 49-year-old male)	
Axis I	Major depressive disorder Cocaine abuse
Axis II	Borderline personality disorder (provisional, rule out dependent personality disorder)
Axis III	Hypertension
Axis IV	Psychosocial stressors: recent divorce, permitted to see his children only infrequently, job is in jeopardy
Axis V	Current global assessment of functioning (GAF): 46

information. A patient's physical disorders are listed on Axis III (General Medical Conditions). On Axis IV (Psychosocial and Environmental Problems), the clinician makes notations regarding the types of stress experienced by the individual in the past year. On Axis V (Global Assessment of Functioning), estimates are made of the individual's current level of adaptive functioning (in social and occupational behavior, viewed as a whole) and of the individual's highest level of functioning in the past year. **Figure 14.4** shows an example of a multiaxial evaluation. Most theorists agree that the multiaxial system is a step in the right direction because it recognizes the importance of information besides a traditional diagnostic label.

The Prevalence of Psychological Disorders

How common are psychological disorders? What percentage of the population is afflicted with mental illness? Is it 10%? Perhaps 25%? Could the figure range as high as 40% or 50%?

Such estimates fall in the domain of *epidemiology*—the study of the distribution of mental or physical disorders in a population. The 1980s and 1990s brought major advances in psychiatric epidemiology, as a host of large-scale investigations provided a huge, new database on the distribution of mental disorders (Murphy, Tohen, & Tsuang, 1999). In epidemiology, *prevalence refers to the percentage of a population that exhibits a disorder during a specified time period*. In the case of mental disorders, the most interesting data are the estimates of *lifetime prevalence*, the percentage of people who endure a specific disorder at any time in their lives.

Estimates of lifetime prevalence suggest that psychological disorders are more common than most people realize. Prior to the advent of DSM-III, studies suggested that about *one-fifth* of the population exhibited clear signs of mental illness at some point in their lives (Neugebauer, Dohrenwend, & Dohrenwend,

1980). However, the older studies did not assess alcohol and drug-related disorders very effectively, because these disorders were vaguely described in DSM-I and DSM-II. Studies published in the 1980s and early 1990s, using the explicit criteria for substance use disorders in DSM-III, found psychological disorders in roughly *one-third* of the population (Regier & Kaelber, 1995; Robins, Locke, & Regier, 1991). Subsequent research, which focused on a somewhat younger sample (ages 18–54 instead of over age 18), suggested that about 44% of the adult population will struggle with some sort of psychological disorder at some point in their lives (Kessler & Zhao, 1999; Regier & Burke, 2000). The most recent large-scale epidemiological study estimated the lifetime risk of a psychiatric disorder to be 51% (Kessler et al., 2005a). Obviously, all these figures are *estimates* that depend to some extent on the sampling methods and assessment techniques used (Wakefield, 1999b).

The progressively higher estimates in recent years have begun to generate some controversy in the field. Some experts believe that recent estimates are implausibly high and that they may trivialize psychiatric diagnoses (Wakefield & Spitzer, 2002). Characterizing someone as mentally ill doesn't mean much if the label is applicable to half of the population. The debate centers on where to draw the line between normal difficulties in functioning and full-fledged mental illness—that is, when symptoms qualify as a disease (Regier, Narrow, & Rae, 2004). Critics of the recent high estimates argue that they include many people whose problems have little clinical significance; in other words, their problems don't require treatment (Narrow et al., 2002). Those who defend the recent research argue that it makes sense to count people with mild disorders because such disorders often progress into more severe disorders and this progression might be prevented by early diagnosis and intervention (Kessler et al., 2003a). The outcome of this debate is difficult to predict, as both points of view have merit.

In any event, whether one goes with conservative or liberal estimates, the prevalence of psychological disorders is quite a bit higher than most people assume. The data that yielded the 44% estimate of total lifetime prevalence are summarized in **Figure 14.5**, which shows prevalence estimates for the most common classes of disorders. As you can see, the most common types of psychological disorders are (1) substance (alcohol and drugs) use disorders, (2) anxiety disorders, and (3) mood disorders.

We are now ready to start examining the specific types of psychological disorders. Obviously, we cannot cover all of the disorders listed in DSM-IV. How-

Web Link 14.3



Mental Health: A Report of the Surgeon General In late 1999, the Surgeon General issued the first comprehensive survey of the state of mental health in the United States. This report has provided a crucial foundation of statistics and other information for understanding the needs for mental health care in the first decade of the 21st century.

ever, we will introduce most of the major categories of disorders to give you an overview of the many forms abnormal behavior takes (see Chapter 5 for a discussion of substance abuse). In discussing each set of disorders, we will begin with brief descriptions of the specific syndromes or subtypes that fall in the category. Then we'll focus on the *etiology* of the disorders in that category.

➤ REVIEW OF KEY POINTS

- The medical model assumes that it is useful to view abnormal behavior as a disease. This view has been criticized on the grounds that it turns questions about deviance into medical questions. Nonetheless, the medical model has proven useful, although one should remember that it is only an analogy.
- Three criteria are used in deciding whether people suffer from psychological disorders: deviance, personal distress, and maladaptive behavior. Judgments about abnormality reflect cultural values. Often it is difficult to clearly draw a line between normality and abnormality. Contrary to popular stereotypes, people with psychological disorders are not particularly bizarre or dangerous, and even the most severe disorders are treatable.
- Research by David Rosenhan showed that pseudopatients were routinely admitted to mental hospitals, which were unable to detect the patients' normalcy. His study showed that the distinction between normality and abnormality is not clear-cut.
- DSM-IV is the official psychodiagnostic classification system in the United States. This system asks for information about patients on five axes, or dimensions. It is difficult

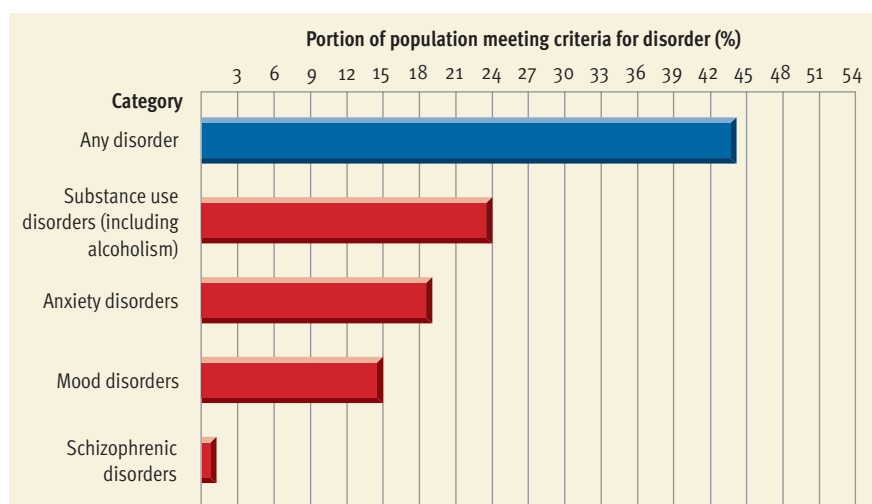


Figure 14.5

Lifetime prevalence of psychological disorders. The estimated percentage of people who have, at any time in their life, suffered from one of four types of psychological disorders or from a disorder of any kind (top bar) is shown here. Prevalence estimates vary somewhat from one study to the next, depending on the exact methods used in sampling and assessment. The estimates shown here are based on pooling data from Wave 1 and 2 of the Epidemiological Catchment Area studies and the National Comorbidity Study, as summarized by Regier and Burke (2000) and Dew, Bromet, and Switzer (2000). These studies, which collectively evaluated over 28,000 subjects, provide the best data to date on the prevalence of mental illness in the United States.

to obtain good data on the prevalence of psychological disorders. Nonetheless, it is clear that they are more common than widely believed.

➤ Anxiety Disorders



Everyone experiences anxiety from time to time. It is a natural and common reaction to many of life's difficulties. For some people, however, anxiety becomes a chronic problem. These people experience high levels of anxiety with disturbing regularity. **Anxiety disorders are a class of disorders marked by feelings of excessive apprehension and anxiety.** There are five principal types of anxiety disorders: generalized anxiety disorder, phobic disorder, panic disorder, obsessive-compulsive disorder, and posttraumatic stress disorder. Studies suggest that anxiety disorders are quite common, occurring in roughly 19% of the population (Dew, Bromet, & Switzer, 2000; Regier & Burke, 2000).

Generalized Anxiety Disorder



The generalized anxiety disorder is marked by a chronic, high level of anxiety that is not tied to any specific threat. People with this disorder worry con-

stantly about yesterday's mistakes and tomorrow's problems. They worry about minor matters related to family, finances, work, and personal illness. In particular, they worry about how much they worry (Barlow et al., 2003). They often dread decisions and brood over them endlessly. Their anxiety is commonly accompanied by physical symptoms, such as trembling, muscle tension, diarrhea, dizziness, faintness, sweating, and heart palpitations. Generalized anxiety disorder tends to have a gradual onset and is seen more frequently in females than males (Brown, 1999). The lifetime prevalence of generalized anxiety disorder appears to be around 5% (Barlow et al., 2003).

Phobic Disorder



In a phobic disorder, an individual's troublesome anxiety has a specific focus. **A phobic disorder is marked by a persistent and irrational fear of an object or situation that presents no realistic danger.** Although

PREVIEW QUESTIONS

- What are the five major anxiety disorders, and what are their chief symptoms?
- Which biological factors have been implicated in anxiety disorders?
- How do conditioning and learning contribute to anxiety disorders?
- How do cognition and stress contribute to anxiety disorders?

Web Link 14.4



National Institute of Mental Health: For the Public

A wealth of information on psychological disorders is available at this subpage of the National Institute of Mental Health's massive website. Visitors will find detailed online booklets on generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, depression, bipolar disorder, and other psychological disorders. Brief fact sheets, dense technical reports, and many other resources can also be found here.

mild phobias are extremely common, people are said to have a phobic disorder only when their fears seriously interfere with their everyday behavior. Phobic reactions tend to be accompanied by physical symptoms of anxiety, such as trembling and palpitations (Rapee & Barlow, 2001). The following case provides an example of a phobic disorder:

Hilda is 32 years of age and has a rather unusual fear. She is terrified of snow. She cannot go outside in the snow. She cannot even stand to see snow or hear about it on the weather report. Her phobia severely constricts her day-to-day behavior. Probing in therapy revealed that her phobia was caused by a traumatic experience at age 11. Playing at a ski lodge, she was buried briefly by a small avalanche of snow. She had no recollection of this experience until it was recovered in therapy. (Adapted from Laughlin, 1967, p. 227)

As Hilda's unusual snow phobia illustrates, people can develop phobic responses to virtually anything. Nonetheless, certain types of phobias are more common than others. Particularly common are acrophobia (fear of heights), claustrophobia (fear of small, enclosed places), brontophobia (fear of storms), hydrophobia (fear of water), and various animal and insect phobias (Antony & McCabe, 2003). People troubled by phobias typically realize that their fears are irrational, but they still are unable to calm themselves when con-

fronted by a phobic object. Among many of them, even *imagining* a phobic object or situation can trigger great anxiety (Thorpe & Salkovskis, 1995).

Panic Disorder and Agoraphobia



A panic disorder is characterized by recurrent attacks of overwhelming anxiety that usually occur suddenly and unexpectedly. These paralyzing panic attacks are accompanied by physical symptoms of anxiety. After a number of panic attacks, victims often become apprehensive, wondering when their next panic will occur. Their concern about exhibiting panic in public may escalate to the point where they are afraid to leave home. This creates a condition called *agoraphobia*, which is a common complication of panic disorders.

Agoraphobia is a fear of going out to public places (its literal meaning is "fear of the marketplace or open places"). Because of this fear, some people become prisoners confined to their homes, although many will venture out if accompanied by a trusted companion (Hollander & Simeon, 2003). As its name suggests, agoraphobia has traditionally been viewed as a phobic disorder. However, more recent evidence suggests that agoraphobia is mainly a complication of panic disorder. About two-thirds of people who suffer from panic disorder are female (Horwath & Weissman, 2000). The onset of panic disorder typically occurs during late adolescence or early adulthood (Pine, 2000).

Obsessive-Compulsive Disorder



Obsessions are *thoughts* that repeatedly intrude on one's consciousness in a distressing way. Compulsions are *actions* that one feels forced to carry out. Thus, **an obsessive-compulsive disorder (OCD) is marked by persistent, uncontrollable intrusions of unwanted thoughts (obsessions) and urges to engage in senseless rituals (compulsions).** To illustrate, let's examine the bizarre behavior of a man once reputed to be the wealthiest person in the world:

The famous industrialist Howard Hughes was obsessed with the possibility of being contaminated by germs. This led him to devise extraordinary rituals to minimize the possibility of such contamination. He would spend hours methodically cleaning a single telephone. He once wrote a three-page memo instructing assistants on exactly how to open cans of fruit for him. The following is just a small portion of the instructions that Hughes provided for a driver who delivered films to his bungalow. "Get out of the

Image Not Available

car on the traffic side. Do not at any time be on the side of the car between the car and the curb. . . . Carry only one can of film at a time. Step over the gutter opposite the place where the sidewalk dead-ends into the curb from a point as far out into the center of the road as possible. Do not ever walk on the grass at all, also do not step into the gutter at all. Walk to the bungalow keeping as near to the center of the sidewalk as possible.” (Adapted from Bartlett & Steele, 1979, pp. 227–237)

Obsessions often center on inflicting harm on others, personal failures, suicide, or sexual acts. People troubled by obsessions may feel that they have lost control of their mind. Compulsions usually involve stereotyped rituals that temporarily relieve anxiety. Common examples include constant handwashing; repetitive cleaning of things that are already clean; endless rechecking of locks, faucets, and such; and excessive arranging, counting, and hoarding of things (Pato, Eisen, & Phillips, 2003). Specific types of obsessions tend to be associated with specific types of compulsions. For example, obsessions about contamination tend to be paired with cleaning compulsions, and obsessions about symmetry tend to be paired with ordering and arranging compulsions (Leckman et al., 1997).

Although many of us can be compulsive at times, full-fledged obsessive-compulsive disorders occur in roughly 2.5% of the population (Turner et al., 2001). The typical age of onset for OCD is late adolescence, with most cases (75%) emerging before the age of 30 (Kessler et al., 2005a).

Posttraumatic Stress Disorder

Posttraumatic stress disorder (PTSD) involves enduring psychological disturbance attributed to the experience of a major traumatic event. PTSD is often seen after a rape or assault, a severe automobile accident, a harrowing war experience, a natural disaster, or the witnessing of someone’s death (Koren, Arnon, & Klein, 1999; Stein et al., 1997; Vernberg et al., 1996). Unfortunately, traumatic experiences such as these appear to be much more common than widely assumed. In some instances, PTSD does not surface until many months or years after a person’s exposure to severe stress (Holen, 2000). Common symptoms include reexperiencing the traumatic event in the form of nightmares and flashbacks, emotional numbing, alienation, problems in social relations, an increased sense of vulnerability, and elevated arousal, anxiety, anger, and guilt (Flannery, 1999; Shalev, 2001).

Research suggests that a variety of factors are predictors of individuals’ risk for PTSD (McNally, 1999;



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© AP/Wide World Photos

As a young man (shown in the photo), Howard Hughes was a handsome, dashing daredevil pilot and movie producer who appeared to be reasonably well adjusted. However, as the years went by, his behavior gradually became more and more maladaptive, as obsessions and compulsions came to dominate his life. In his later years (shown in the drawing), he spent most of his time in darkened rooms, naked, unkempt, and dirty, following bizarre rituals to alleviate his anxieties. (The drawing was done by an NBC artist and was based on descriptions from men who had seen Hughes.)

Norris et al., 2001; Ursano, Fullerton, & Norwood, 2001). As you might expect, increased vulnerability is associated with greater personal injuries and losses, greater intensity of exposure to the traumatic event, and more exposure to the grotesque aftermath of the event. One key predictor of vulnerability that emerged in a recent review of the relevant research is the *intensity of one’s reaction at the time of the traumatic event* (Ozer et al., 2003). Individuals who have especially intense emotional reactions during or immediately after the traumatic event go on to show elevated vulnerability to PTSD. Vulnerability seems to be greatest among people whose reactions are so intense that they report dissociative experiences (a sense that things are not real, that time is stretching out, that one is watching oneself in a movie).

Etiology of Anxiety Disorders



Like most psychological disorders, anxiety disorders develop out of complicated interactions among a variety of biological and psychological factors.

Web Link 14.5



National Center for PTSD
This site offers numerous resources devoted to post-traumatic stress disorder (PTSD). Browsers also have access to the PILOTS database, a free searchable guide to the worldwide literature on traumatic stress.

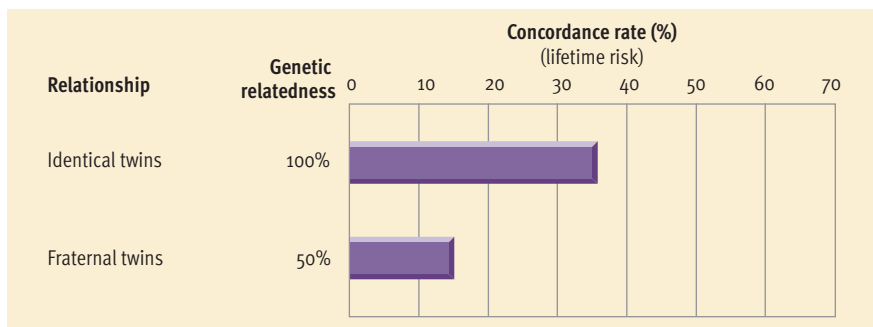


Figure 14.6

Twin studies of anxiety disorders. The concordance rate for anxiety disorders in identical twins is higher than that for fraternal twins, who share less genetic overlap. These results suggest that there is a genetic predisposition to anxiety disorders. (Data based on Noyes et al., 1987; Slater & Shields, 1969; Torgersen, 1979, 1983)

Biological Factors

In studies that assess the impact of heredity on psychological disorders, investigators look at *concordance rates*. A **concordance rate** indicates the percentage of twin pairs or other pairs of relatives who exhibit the same disorder. If relatives who share more genetic similarity show higher concordance rates than relatives who share less genetic overlap, this finding supports the genetic hypothesis. The results of both twin studies (see Figure 14.6) and family studies (see Chapter 3 for discussions of both methods) suggest that there is a moderate genetic predisposition to anxiety disorders (Fyer, 2000; Hettema, Neale, & Kendler, 2001).

Another line of research suggests that *anxiety sensitivity* may make people vulnerable to anxiety disorders (Reiss, 1991; Weems et al., 2002). According to this notion, some people are highly sensitive to the internal physiological symptoms of anxiety and are prone to overreact with fear when they experience these symptoms. Anxiety sensitivity may fuel an inflationary spiral in which anxiety breeds more anxiety, which eventually spins out of control in the form of an anxiety disorder.

Recent evidence suggests that a link may exist between anxiety disorders and neurochemical activity in the brain. As you learned in Chapter 3, *neurotransmitters* are chemicals that carry signals from one neuron to another. Therapeutic drugs (such as Valium) that reduce excessive anxiety appear to alter neurotransmitter activity at GABA synapses. This finding and other lines of evidence suggest that disturbances in the neural circuits using GABA may play a role in some types of anxiety disorders (Skolnick, 2003). Abnormalities in neural circuits using serotonin have recently been implicated in panic and obsessive-compulsive disorders (Sullivan & Coplan, 2000). Thus, scientists are beginning to unravel the neurochemical bases for anxiety disorders.

Conditioning and Learning

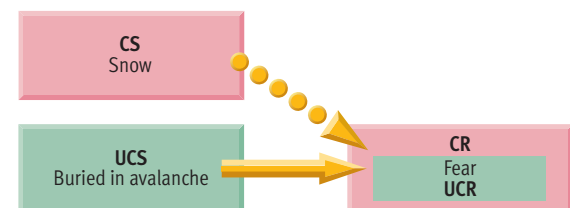
Many anxiety responses may be acquired through classical conditioning and maintained through operant conditioning (see Chapter 6). According to Mowrer (1947), an originally neutral stimulus (the snow in Hilda's case, for instance) may be paired with a frightening event (the avalanche) so that it becomes a conditioned stimulus eliciting anxiety (see Figure 14.7a). Once a fear is acquired through classical conditioning, the person may start avoiding the anxiety-producing stimulus. The avoidance response is negatively reinforced because it is followed by a reduction in anxiety. This process involves operant conditioning (see Figure 14.7b). Thus, separate conditioning processes may create and then sustain specific anxiety responses (Levis, 1989). Consistent with this view, studies find that a substantial portion of people suffering from phobias can identify a traumatic conditioning experience that probably contributed to their anxiety disorder (Antony & McCabe, 2003; King, Eleonora, & Ollendick, 1998).

The tendency to develop phobias of certain types of objects and situations may be explained by Martin Seligman's (1971) concept of *preparedness*. Like many theorists, Seligman believes that classical conditioning creates most phobic responses. However, he suggests that people are biologically prepared by their evolutionary history to acquire some fears much more easily than others. His theory would explain why people develop phobias of ancient sources of threat (such as snakes and spiders) much more readily than modern sources of threat (such as electrical outlets or hot irons). Some laboratory studies of conditioned fears have yielded evidence that supports Seligman's theory, but the evidence is inconsistent (Ohman & Mineka, 2003; Rapee & Barlow, 2001).

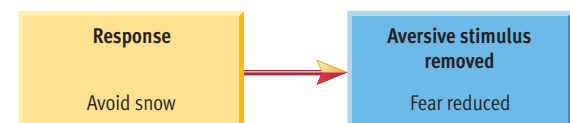
Figure 14.7

Conditioning as an explanation for phobias. (a) Many phobias appear to be acquired through classical conditioning when a neutral stimulus is paired with an anxiety-arousing stimulus. **(b)** Once acquired, a phobia may be maintained through operant conditioning. Avoidance of the phobic stimulus reduces anxiety, resulting in negative reinforcement.

(a) Classical conditioning: Acquisition of phobic fear



(b) Operant conditioning: Maintenance of phobic fear (negative reinforcement)



Critics note a number of problems with conditioning models of phobias (Rachman, 1990). For instance, many people with phobias cannot recall or identify a traumatic conditioning experience that led to their phobia. Conversely, many people endure extremely traumatic experiences that should create a phobia but do not. To provide better explanations for these complexities, conditioning models of anxiety disorders are currently being revised to include a larger role for cognitive factors (de Jong & Merckelbach, 2000), much like conditioning theories in general, as we saw in Chapter 6.

One of these revisions is an increased emphasis on how observational learning can lead to the development of conditioned fears. *Observational learning* occurs when a new response is acquired through watching the behavior of another (consult Chapter 6). Studies suggest that conditioned fears can be created through observational learning (Fredrikson, Annas, & Wik, 1997; Rachman, 1990). In particular, parents frequently pass on their anxieties to their children. Thus, if a father cowers in a corner whenever a thunderstorm hits, his children may acquire their father's fear of storms.

Cognitive Factors

Cognitive theorists maintain that certain styles of thinking make some people particularly vulnerable to anxiety disorders. According to these theorists, some people are more likely to suffer from problems with anxiety because they tend to (a) misinterpret harmless situations as threatening, (b) focus excessive attention on perceived threats, and (c) selectively recall information that seems threatening (Beck, 1997; McNally, 1994, 1996). In one intriguing test of the cognitive view, anxious and nonanxious subjects were asked to read 32 sentences that could be interpreted in either a threatening or a nonthreatening manner (Eysenck et al., 1991). For instance, one such sentence was "The doctor examined little Emma's growth," which could mean that the doctor checked her height or the growth of a tumor. As **Figure 14.8** shows, the anxious participants interpreted the sentences in a threatening way more often than the nonanxious participants did. Thus, consistent with our theme that human experience is highly subjective, the cognitive view holds that some people are prone to anxiety disorders because they see threat in every corner of their lives (Aikens & Craske, 2001; Riskind, 2005).

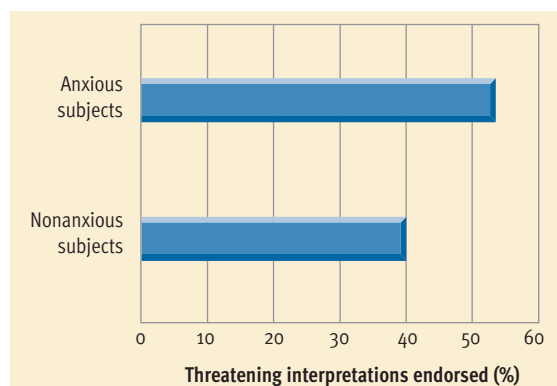


Figure 14.8

Cognitive factors in anxiety disorders. Eysenck and his colleagues (1991) compared how subjects with anxiety problems and nonanxious subjects tended to interpret sentences that could be viewed as threatening or nonthreatening. Consistent with cognitive models of anxiety disorders, anxious subjects were more likely to interpret the sentences in a threatening light.

din et al., 2004; Venturello et al., 2002). For instance, Faravelli and Pallanti (1989) found that patients with panic disorder had experienced a dramatic increase in stress in the month prior to the onset of their disorder (see **Figure 14.9**). In another study, Brown et al. (1998) found an association between stress and the

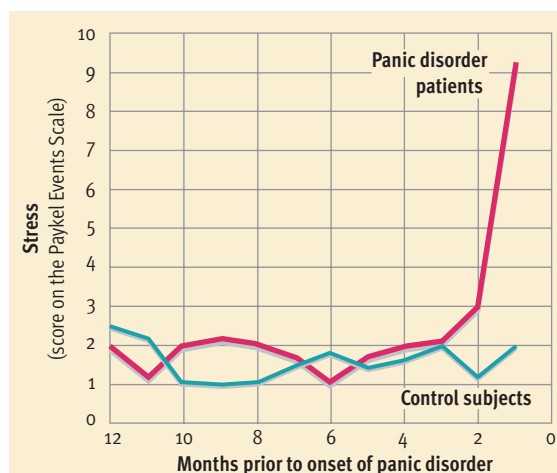


Figure 14.9

Stress and panic disorder. Faravelli and Pallanti (1989) assessed the amount of stress experienced during the 12 months before the onset of panic disorder in a group of 64 patients with this disorder and in a control group drawn from hospital employees and their friends. As you can see, a dramatic increase occurred in stress in the month prior to the onset of the patients' panic disorders. These data suggest that stress may contribute to the development of panic disorders.

Source: Adapted from Faravelli, C., & Pallanti, S. (1989). Recent life events and panic disorders. *American Journal of Psychiatry*, 146, 622–626. Copyright © 1989 by the American Psychiatric Association. Adapted by permission.

Stress

Finally, studies have supported the long-held suspicion that anxiety disorders can be stress related (San-

development of social phobia. Thus, there is reason to believe that high stress often helps to precipitate the onset of anxiety disorders.

➤ REVIEW OF KEY POINTS

- The anxiety disorders include generalized anxiety disorder, phobic disorder, panic disorder, obsessive-compulsive disorder, and posttraumatic stress disorder. Anxiety disorders are quite common.
- Twin studies suggest that there is a weak genetic predisposition to anxiety disorders. These disorders may be more likely in people who are especially sensitive to the physiological symptoms of anxiety. Abnormalities in neurotransmitter activity at GABA synapses or serotonin synapses may also play a role in anxiety disorders.
- Many anxiety responses, especially phobias, may be caused by classical conditioning and maintained by operant conditioning. Parents who model anxiety may promote these disorders through observational learning.
- Cognitive theorists maintain that certain styles of thinking—especially a tendency to overinterpret harmless situations as threatening—make some people more vulnerable to anxiety disorders. Stress may also predispose people to anxiety disorders.

➤ Somatoform Disorders

PREVIEW QUESTIONS

- How do psychosomatic diseases and somatoform disorders differ?
- What are the three major somatoform disorders, and what are their chief symptoms?
- What factors have been implicated in the etiology of somatoform disorders?

Chances are, you have met people who always seem to be complaining about aches, pains, and physical maladies of doubtful authenticity. You may have thought to yourself, “It’s all in his head” and concluded that the person exhibited a “psychosomatic” condition. However, as we discussed in Chapter 13, the term *psychosomatic* has been widely misused. *Psychosomatic diseases* involve *genuine* physical ailments caused in part by psychological factors, especially reactions to stress. These diseases, which include maladies such as ulcers, asthma, and high blood pressure, are not imagined ailments. They are recorded on the DSM axis for physical problems (Axis III). When physical illness appears *largely* psychological in origin, we are dealing with somatoform disorders, which are recorded on Axis I. **Somatoform disorders are physical ailments that cannot be fully explained by organic conditions and are largely due to psychological factors.** Although their symptoms are more imaginary than real, victims of somatoform disorders are *not* simply faking illness. Deliberate feigning of illness for personal gain is another matter altogether, called *malingering*.

People with somatoform disorders typically seek treatment from physicians practicing neurology, internal medicine, or family medicine, instead of from psychologists or psychiatrists. Making accurate diagnoses of somatoform disorders can be difficult, because the causes of physical ailments are sometimes hard to identify. In some cases, somatoform disorders are misdiagnosed when a genuine organic cause for a person’s physical symptoms goes undetected in spite of extensive medical examinations and tests (Yutzy, 2003).

We will discuss three specific types of somatoform disorders: somatization disorder, conversion disorder, and hypochondriasis. Diagnostic difficulties make it hard to obtain sound data on the prevalence of somatoform disorders (Bouman, Eifert, & Lejuez, 1999).

Somatization Disorder

Individuals with somatization disorder are often said to “cling to ill health.” **A somatization disorder is marked by a history of diverse physical complaints that appear to be psychological in origin.** Somatization disorder occurs mostly in women (Guggenheim, 2000) and often coexists with depression and anxiety disorders (Gureje et al., 1997). Victims report an endless succession of minor physical ailments that seem to wax and wane in response to the stress in their lives (Servan-Schreiber, Kolb, & Tabas, 1999). They usually have a long and complicated history of medical treatment from many doctors. The distinguishing feature of this disorder is the diversity of the victims’ physical complaints. Over the years, they report a mixed bag of cardiovascular, gastrointestinal, pulmonary, neurological, and genitourinary symptoms. The unlikely nature of such a variety of symptoms occurring together often alerts a physician to the possible psychological basis for the patient’s problems.

Conversion Disorder

Conversion disorder is characterized by a significant loss of physical function (with no apparent organic basis), usually in a single organ system. Common symptoms include partial or complete loss of vision, partial or complete loss of hearing, partial paralysis, severe laryngitis or mutism, and loss of feeling or function in limbs, such as that seen in the following case:

Mildred was a rancher’s daughter who lost the use of both of her legs during adolescence. Mildred was at home alone one afternoon when a male relative attempted to assault her. She screamed for help, and her legs gave way as she slipped to the floor. She was found on the floor a few min-

utes later when her mother returned home. She could not get up, so she was carried to her bed. Her legs buckled when she made subsequent attempts to walk on her own. Due to her illness, she was waited on hand and foot by her family and friends. Neighbors brought her homemade things to eat or to wear. She became the center of attention in the household. (Adapted from Cameron, 1963, pp. 312–313)

People with conversion disorder are usually troubled by more severe ailments than people with somatization disorder. In some cases of conversion disorder, telltale clues reveal the psychological origins of the illness because the patient's symptoms are not consistent with medical knowledge about their apparent disease. For instance, the loss of feeling in one hand that is seen in "glove anesthesia" is inconsistent with the known facts of neurological organization (see Figure 14.10).

Hypochondriasis

Hypochondriacs constantly monitor their physical condition, looking for signs of illness. Any tiny alteration from their physical norm leads them to conclude that they have contracted a disease. **Hypochondriasis (more widely known as hypochondria) is characterized by excessive preoccupation with health concerns and incessant worry about developing physical illnesses.** The following case illustrates the nature of hypochondria:

Jeff is a middle-aged man who works as a clerk in a drug store. He spends long hours describing his health problems to anyone who will listen. Jeff is an avid reader of popular magazine articles on medicine. He can tell you all about the latest medical discoveries. He takes all sorts of pills and vitamins to ward off possible illnesses. He's the first

to try every new product on the market. Jeff is constantly afflicted by new symptoms of illness. His most recent problems were poor digestion and a heartbeat that he thought was irregular. He frequently goes to physicians who can find nothing wrong with him physically. They tell him that he is healthy. He thinks they use "backward techniques." He suspects that his illness is too rare to be diagnosed successfully. (Adapted from Suinn, 1984, p. 236)

When hypochondriacs are assured by their physician that they do not have any real illness, they often are skeptical and disbelieving (Starcevic, 2001). As in Jeff's case, they frequently assume that the physician must be incompetent, and they go shopping for another doctor. Hypochondriacs don't subjectively suffer from physical distress as much as they *overinterpret* every conceivable sign of illness. Hypochondria frequently appears alongside other psychological disorders, especially anxiety disorders and depression (Iezzi, Duckworth, & Adams, 2001). For example, Howard Hughes's obsessive-compulsive disorder was coupled with profound hypochondria.

Etiology of Somatoform Disorders

Inherited aspects of physiological functioning, such as a highly reactive autonomic nervous system, may predispose some people to somatoform disorders (Weiner, 1992). However, available evidence suggests that these disorders are largely a function of personality and cognitive factors. Let's look at personality factors first.

Personality Factors

People with certain types of personality traits seem to develop somatoform disorders more readily than others. The prime candidates appear to be people with *histrionic* personality characteristics (Nemiah, 1985; Slavney, 1990). The histrionic personality tends to be self-centered, suggestible, excitable, highly emotional, and overly dramatic. Such people thrive on the attention that they get when they become ill. The personality trait of *neuroticism* also seems to elevate individuals' susceptibility to somatoform disorders (Noyes et al., 2005). In addition, research suggests that the pathological care-seeking behavior seen in these disorders may be caused by *insecure attachment styles* (see Chapter 11) that are rooted in early experiences with caregivers (Noyes et al., 2003).

Cognitive Factors

In recent years, theorists have devoted increased attention to how cognitive peculiarities might contribute to somatoform disorders. For example, Barsky (2001) asserts that some people focus excessive at-



Figure 14.10
Glove anesthesia. In conversion disorders, the physical complaints are sometimes inconsistent with the known facts of physiology. For instance, given the patterns of nerve distribution in the arm shown in (a), it is impossible that a loss of feeling in the hand exclusively, as shown in (b), has a physical cause, indicating that the patient's problem is psychological in origin.

Image Not Available



Distinguishing Anxiety and Somatoform Disorders

Check your understanding of the nature of anxiety and somatoform disorders by making preliminary diagnoses for the cases described below. Read each case summary and write your tentative diagnosis in the space provided. The answers are in Appendix A.

1. Malcolm religiously follows an exact schedule every day. His showering and grooming ritual takes two hours. He follows the same path in walking to his classes every day, and he always sits in the same seat in each class. He can't study until his apartment is arranged perfectly. Although he tries not to, he thinks constantly about flunking out of school. Both his grades and his social life are suffering from his rigid routines.

Preliminary diagnosis: _____

2. Jane has been unemployed for the last eight years because of poor health. She has suffered through a bizarre series of illnesses of mysterious origin. Troubles with devastating headaches were followed by months of chronic back pain. Then she developed respiratory problems, frequently gasping for breath. Her current problem is stomach pain. Physicians have been unable to find any physical basis for her maladies.

Preliminary diagnosis: _____

3. Nathan owns a small restaurant that's in deep financial trouble. He dreads facing the possibility that his restaurant will fail. One day, he suddenly loses all feeling in his right arm and the ability to control the arm. He's hospitalized for his condition, but physicians can't find any organic cause for his arm trouble.

Preliminary diagnosis: _____

tention on their internal physiological processes and amplify normal bodily sensations into symptoms of distress, which lead them to pursue unnecessary medical treatment. Recent evidence suggests that people with somatoform disorders tend to draw catastrophic

conclusions about minor bodily complaints (Salkovskis & Warwick, 2001). They also seem to apply a faulty standard of good health, equating health with a complete absence of symptoms and discomfort, which is unrealistic (Barsky et al., 1993; Reif, Hiller, & Margraf, 1998).

The Sick Role

Another consideration is that some people grow fond of the role associated with being sick (Hotopf, 2004; Pilowsky, 1993). Their complaints of physical symptoms may be reinforced by indirect benefits derived from their illness (Schwartz, Slater, & Birchler, 1994). What benefits might be derived from physical illness? One payoff is that becoming ill is a superb way to avoid having to confront life's challenges. Many people with somatoform disorders are avoiding facing up to marital problems, career frustrations, family responsibilities, and the like. After all, when you're sick, others cannot place great demands on you. Another benefit is that physical problems can provide a convenient excuse when people fail, or worry about failing, in endeavors that are critical to their self-esteem (Organista & Miranda, 1991). Attention from others is another payoff that may reinforce complaints of physical illness. When people become ill, they command the attention of family, friends, co-workers, neighbors, and doctors. The sympathy that illness often brings may strengthen the person's tendency to feel ill. This clearly occurred in Mildred's case of conversion disorder. Her illness paid handsome dividends in terms of attention, consolation, and kindhearted assistance from others.



Dissociative Disorders

PREVIEW QUESTIONS

- What are the principal types of dissociative disorders, and what are their chief symptoms?
- Why is dissociative identity disorder controversial?
- What factors have been implicated in the etiology of dissociative disorders?

Dissociative disorders are among the more unusual syndromes that we will discuss. **Dissociative disorders are a class of disorders in which people lose contact with portions of their consciousness or memory, resulting in disruptions in their sense of identity.** We'll describe three dissociative syndromes—dissociative amnesia, dissociative fugue, and dissociative identity disorder—all of which are relatively uncommon.

Dissociative Amnesia and Fugue

Dissociative amnesia and fugue are overlapping disorders characterized by serious memory deficits. **Dissociative amnesia is a sudden loss of memory for**

important personal information that is too extensive to be due to normal forgetting. Memory losses may occur for a single traumatic event (such as an automobile accident or home fire) or for an extended period of time surrounding the event. Cases of amnesia have been observed after people have experienced disasters, accidents, combat stress, physical abuse, and rape, or after they have witnessed the violent death of a parent, among other things (Arrigo & Pezdek, 1997; Loewenstein, 1996). **In dissociative fugue, people lose their memory for their entire lives along with their sense of personal identity.** These people forget their name, their family, where they live, and where they work! Despite this wholesale forgetting, they remember matters unrelated to

their identity, such as how to drive a car and how to do math.

Dissociative Identity Disorder

Dissociative identity disorder (DID) involves the co-existence in one person of two or more largely complete, and usually very different, personalities. The name for this disorder used to be *multiple personality disorder*, which still enjoys informal use. In dissociative identity disorder, the divergences in behavior go far beyond those that people normally display in adapting to different roles in life. People with “multiple personalities” feel that they have more than one identity. Each personality has his or her own name, memories, traits, and physical mannerisms. Although rare, this “Dr. Jekyll and Mr. Hyde” syndrome is frequently portrayed in novels, television shows, and movies, such as *Three Faces of Eve*, a 1957 film starring Joanne Woodward. In popular media portrayals, the syndrome is often mistakenly called *schizophrenia*. As you will see later, schizophrenic disorders are entirely different.

In dissociative identity disorder, the various personalities generally report that they are unaware of each other (Eich et al., 1997), although doubts have been raised about the accuracy of this assertion (Allen & Iacono, 2001). The alternate personalities commonly display traits that are quite foreign to the original personality. For instance, a shy, inhibited person might develop a flamboyant, extraverted alternate personality. Transitions between identities often occur suddenly. The disparities between identities can be bizarre, as different personalities may assert that they are different in age, race, gender, and sexual orientation (Kluft, 1996). Dissociative identity disorder rarely occurs in isolation. Most DID patients also have a history of anxiety, mood, or personality disorders (Ross, 1999).

Starting in the 1970s, a dramatic increase was seen in the diagnosis of multiple-personality disorder (Kihlstrom, 2001). Only 79 well-documented cases had accumulated up through 1970, but by the late-1990s about 40,000 cases were estimated to have been reported (Lilienfeld & Lynn, 2003). Some theorists believe that these disorders used to be underdiagnosed—that is, they often went undetected (Maldonado & Spiegel, 2003). However, other theorists argue that a handful of clinicians have begun overdiagnosing the condition and that some clinicians even *encourage and contribute* to the emergence of DID (McHugh, 1995; Powell & Gee, 1999). Consistent with this view, a survey of all the psychiatrists in Switzerland found

that 90% of them had never seen a case of dissociative identity disorder, whereas three of the psychiatrists had each seen more than 20 DID patients (Modestin, 1992). The data from this study suggest that 6 psychiatrists (out of 655 surveyed) accounted for two-thirds of the dissociative identity disorder diagnoses in Switzerland.

Etiology of Dissociative Disorders

Psychogenic amnesia and fugue are usually attributed to excessive stress. However, relatively little is known about why this extreme reaction to stress occurs in a tiny minority of people but not in the vast majority who are subjected to similar stress. Some theorists speculate that certain personality traits—fantasy proneness and a tendency to become intensely absorbed in personal experiences—may make some people more susceptible to dissociative disorders, but adequate evidence is lacking on this line of thought (Kihlstrom, Glisky, & Angiulo, 1994).

The causes of dissociative identity disorders are particularly obscure. Some skeptical theorists, such as Nicholas Spanos (1994, 1996) and others (Gee, Allen, & Powell, 2003; Lilienfeld et al., 1999) believe that people with multiple personalities are engaging in intentional role playing to use mental illness as a face-saving excuse for their personal failings. Spanos also argues that a small minority of therapists help create multiple personalities in their patients by subtly encouraging the emergence of alternate personalities. According to Spanos, dissociative identity disorder is a creation of modern North American culture, much as demonic possession was a creation of early Christianity. To bolster his argument, he discusses how multiple-personality patients’ symptom presentations seem to have been influenced by popular media. For example, the typical patient with dissociative identity disorder used to report having two or three personalities, but since the publication of *Sybil* (Schreiber, 1973) and other books describing patients with many personalities, the average number of alternate personalities has climbed to about 15. In a similar vein, there has been a dramatic upsurge in the number of dissociative patients reporting that they were victims of ritual satanic abuse during childhood that dates back to the publication of *Michelle Remembers* (Smith & Pazder, 1980), a book about a multiple-personality patient who purportedly was tortured by a satanic cult.

Despite these concerns, some clinicians are convinced that DID is an authentic disorder (Gleaves, May, & Cardena, 2001). They argue that there is no incentive for either patients or therapists to manufac-

ture cases of multiple personalities, which are often greeted with skepticism and outright hostility. They maintain that most cases of dissociative identity disorder are rooted in severe emotional trauma that occurred during childhood (Draijer & Langeland, 1999). A substantial majority of people with dissociative identity disorder report a childhood history of rejection from parents and physical and sexual abuse (Lewis et al., 1997; Scropo et al., 1998). However, this abuse typically has not been independently verified (Lilienfeld & Lynn, 2003). Moreover, this link would not be unique to DID, as a history of child abuse elevates the likelihood of *many* disorders, especially among females (MacMillan et al., 2001). In the final analysis, very little is known about the causes of dissociative identity disorder, which remains a controversial diagnosis (Barry-Walsh, 2005). In one survey of American psychiatrists, only one-quarter of the respondents indicated that they felt there was solid evidence for the scientific validity of the DID diagnosis (Pope et al., 1999).

➤ REVIEW OF KEY POINTS

- Somatoform disorders are physical ailments that cannot be fully explained by organic conditions. They are different from psychosomatic diseases, which are genuine physical ailments caused in part by psychological factors.
- Somatoform disorders include somatization disorder, conversion disorder, and hypochondriasis. These disorders often emerge in people with highly suggestible, histrionic personalities and in people who focus excess attention on their internal physiological processes. Somatoform disorders may be a learned avoidance strategy reinforced by attention and sympathy.
- Dissociative disorders include dissociative amnesia, fugue, and dissociative identity disorder (multiple-personality disorder). These disorders are uncommon and their causes are not well understood.
- Some theorists believe that people with dissociative identity disorder are engaging in intentional role playing to use an exotic mental illness as a face-saving excuse for their personal failings. These disorders may be rooted in emotional trauma that occurred during childhood.

➤ Mood Disorders



PREVIEW QUESTIONS

- What are the principal mood disorders, and what are their chief symptoms?
- Which biological factors have been implicated in mood disorders?
- How do cognitive processes contribute to depressive disorders?
- How do social skills and stress contribute to depressive disorders?

What did Abraham Lincoln, Leo Tolstoy, Marilyn Monroe, Vincent Van Gogh, Ernest Hemingway, Winston Churchill, Virginia Wolff, Janis Joplin, Irving Berlin, Kurt Cobain, Francis Ford Coppola, Carrie Fisher, Ted Turner, Sting, Mike Wallace, Larry Flynt, Jane Pauley, and Ben Stiller have in common? Yes, they all achieved great prominence, albeit in different ways at different times. But, more pertinent to our interest, they all suffered from severe mood disorders. Although mood disorders can be terribly debilitating, people with mood disorders may still achieve greatness, because such disorders tend to be *episodic*. In other words, mood disturbances often come and go, interspersed among periods of normality.

Emotional fluctuations are natural, but some people are subject to extreme and sustained distortions of mood. **Mood disorders are a class of disorders marked by emotional disturbances of varied kinds that may spill over to disrupt physical, perceptual, social, and thought processes.** There are two basic types of mood disorders: unipolar and bipolar (see **Figure 14.11**). People with *unipolar disorder* experience emotional extremes at just one end of the mood continuum, as they are troubled only by *depression*. People with *bipolar disorder* are vulnerable to emotional extremes at both ends of the mood continuum, going through periods of both *depression* and *mania* (excitement and elation).

Major Depressive Disorder



The line between normal dejection and unhappiness and abnormal depression can be difficult to draw (Kendler & Gardner, 1998). Ultimately, it requires a subjective judgment. Crucial considerations in this judgment include the duration of the depression and its disruptive effects. When a depression significantly impairs everyday adaptive behavior for more than a few weeks, there is reason for concern.

In major depressive disorder people show persistent feelings of sadness and despair and a loss of interest in previous sources of pleasure. Negative emotions form the heart of the depressive syndrome, but many other symptoms may also appear. The most common symptoms of major depression are summarized and compared with the symptoms of mania in **Table 14.1**. Depressed people often give up activities that they used to find enjoyable. For example, a depressed person might quit going bowling or might give up a favorite hobby such as photography. Alterations in appetite and sleep patterns are common. People with depression often lack energy. They tend to move sluggishly and talk slowly. Anxiety, irritability, and brooding are commonly observed. Self-esteem tends to sink as the depressed person begins to feel worthless. Depression plunges people into feelings of hopelessness, dejection, and boundless guilt.

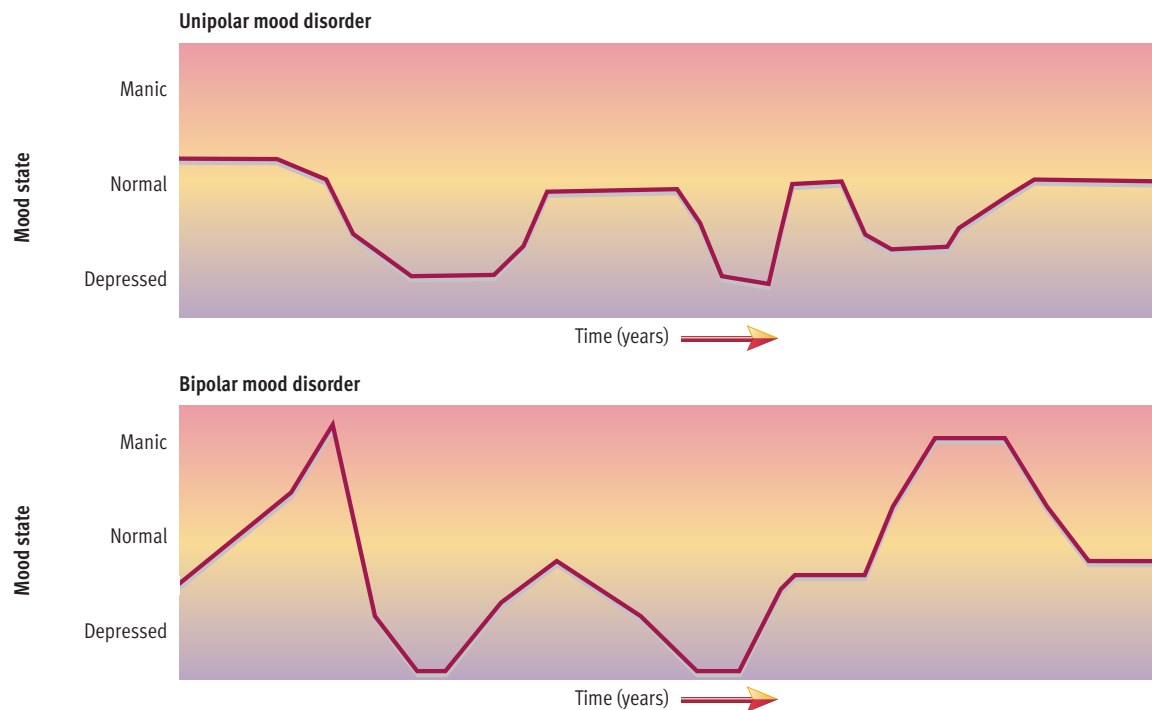


Figure 14.11
Episodic patterns in mood disorders. Time-limited episodes of emotional disturbance come and go unpredictably in mood disorders. People with unipolar disorders suffer from bouts of depression only, whereas people with bipolar disorders experience both manic and depressive episodes. The time between episodes of disturbance varies greatly with the individual and the type of disorder.

To make matters worse, people who suffer from depression often exhibit other disorders as well. Coexisting anxiety disorders and substance use disorders are particularly frequent (Boland & Keller, 2002).

The onset of depression can occur at any point in the life span, but a substantial majority of cases emerge before age 40 (Hammen, 2003). Depression occurs in children as well as adolescents and adults (Gruenberg & Goldstein, 2003). The median duration of depressive episodes is 5 months (Solomon et al., 1997). The vast majority (75%–95%) of people who suffer from depression experience more than one episode over the course of their lifetime (Dubovsky, Davies, & Dubovsky, 2003). In one longitudinal study, after recovery from a first episode of depression, the cumulative probability of recurrence was 25% after 1 year, 42% after two years, and 60% after 5 years (Solomon et al., 2000). The severity of depressive disorders varies considerably. When people display relatively mild symptoms of depression, they're given a diagnosis of *dysthymic disorder, which consists of chronic depression that is insufficient in severity to justify diagnosis of a major depressive episode.*

How common are depressive disorders? Very common. Research suggests that about 7% to 18% of Americans endure a depressive disorder at some time in their lives (Blazer, 2000; Regier & Burke, 2000). Estimates of the prevalence of depression vary quite a bit because of the previously mentioned difficulty in drawing a line between normal dejection and abnormal depression. Thus, different researchers using different procedures and cutoff points obtain varied es-

timates. Moreover, evidence suggests that the prevalence of depression is increasing, as it is higher in more recent age cohorts (Rehm, Wagner, & Ivens-Tyndal, 2001). In particular, age cohorts born since World War II appear to have an elevated risk for depression (Kessler, 2002). The factors underlying this rise in depression are not readily apparent, and researchers are scrambling to collect data that might shed light on this unanticipated trend.

Researchers also find that the prevalence of depression is about twice as high in women as it is in men (Nolen-Hoeksema, 2002). This gender gap in depression opens up during mid to late adolescence (Hankin et al., 1998). The many possible explanations for this gender gap are the subject of considerable debate. Susan Nolen-Hoeksema (2001) argues that women experience more depression than men be-

Table 14.1 Comparisons of Common Symptoms in Manic and Depressive Episodes

Characteristics	Manic Episode	Depressive Episode
Emotional	Elated, euphoric, very sociable, impatient at any hindrance	Gloomy, hopeless, socially withdrawn, irritable
Cognitive	Characterized by racing thoughts, flight of ideas, desire for action, and impulsive behavior; talkative, self-confident; experiencing delusions of grandeur	Characterized by slowness of thought processes, obsessive worrying, inability to make decisions, negative self-image, self-blame and delusions of guilt and disease
Motor	Hyperactive, tireless, requiring less sleep than usual, showing increased sex drive and fluctuating appetite	Less active, tired, experiencing difficulty in sleeping, showing decreased sex drive and decreased appetite

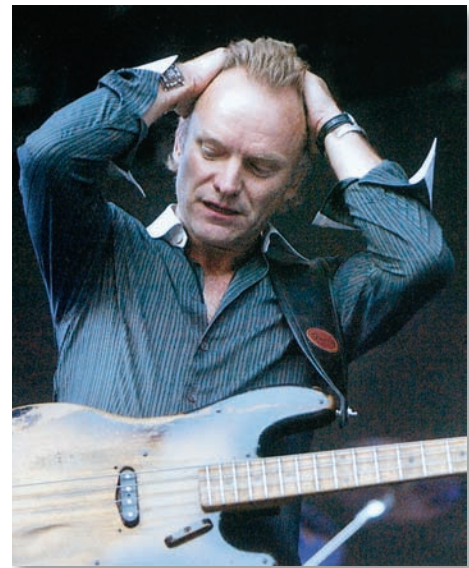
Source: Sarason, I. G., & Sarason, B. G. (1987). *Abnormal psychology: The problem of maladaptive behavior*. Upper Saddle River, NJ: Prentice-Hall. © 1987 Prentice-Hall, Inc. Reprinted by permission.



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Mood disorders are common and have afflicted many successful, well-known people, such as Jane Pauley, Ben Stiller, and Sting.

cause they are far more likely to be victims of sexual abuse and somewhat more likely to endure poverty, harassment, and role constraints. In other words, she attributes the higher prevalence of depression among women to their experience of greater stress and adversity. Nolen-Hoeksema also believes that women have a greater tendency than men to *ruminate* about setbacks and problems. Evidence suggests that this tendency to dwell on one's difficulties elevates vulnerability to depression, as we will discuss momentarily.

Bipolar Disorder



Bipolar disorder (formerly known as manic-depressive disorder) is characterized by the experience of one or more manic episodes as well as periods of depression. One manic episode is sufficient to qualify for this diagnosis. The symptoms seen in manic periods generally are the opposite of those seen in depression (see **Table 14.1** for a comparison). In a manic episode, a person's mood becomes elevated to the point of euphoria. Self-esteem skyrockets as the person bubbles over with energy and extravagant plans. He or she becomes hyperactive and may go for days without sleep. The individual talks rapidly and shifts topics wildly, as his or her mind races at breakneck speed. Judgment is often impaired. Some people in manic periods gamble impulsively, spend money frantically, or become sexually reckless. Like depressive disorders, bipolar disorders vary considerably in severity. People are given a diagnosis of **cyclothymic disorder when they exhibit chronic but relatively mild symptoms of bipolar disturbance.**

You may be thinking that the euphoria in manic episodes sounds appealing. If so, you are not entirely

wrong. In their milder forms, manic states can seem attractive. The increases in energy, self-esteem, and optimism can be deceptively seductive. Because of the increase in energy, many bipolar patients report temporary surges of productivity and creativity (Goodwin & Jamison, 1990).

Although manic episodes may have some positive aspects, these periods often have a paradoxical negative undercurrent of irritability and depression (Dilsaver et al., 1999). Moreover, mild manic episodes usually escalate to higher levels that become scary and disturbing. Impaired judgment leads many victims to do things that they greatly regret later, as you'll see in the following case history:

Robert, a dentist, awoke one morning with the idea that he was the most gifted dental surgeon in his tristate area. He decided that he should try to provide services to as many people as possible, so that more people could benefit from his talents. Thus, he decided to remodel his two-chair dental office, installing 20 booths so that he could simultaneously attend to 20 patients. That same day he drew up plans for this arrangement, telephoned a number of remodelers, and invited bids for the work. Later that day, impatient to get rolling on his remodeling, he rolled up his sleeves, got himself a sledgehammer, and began to knock down the walls in his office. Annoyed when that didn't go so well, he smashed his dental tools, washbasins, and X-ray equipment. Later, Robert's wife became concerned about his behavior and summoned two of her adult daughters for assistance. The daughters responded quickly, arriving at the family home with their husbands. In the ensuing discussion, Robert—after bragging about his sexual prowess—made advances toward his daughters. He had to be subdued by their husbands. (Adapted from Kleinmuntz, 1980, p. 309)

Image Not Available

Although not rare, bipolar disorders are much less common than unipolar disorders. Bipolar disorder affects about 1%–2.5% of the population (Dubovsky et al., 2003). Unlike depressive disorder, bipolar disorder is seen equally often in males and females (Bauer, 2003). As **Figure 14.12** shows, the onset of bipolar disorder is age related, with the peak of vulnerability occurring between the ages of 20 and 29 (Goodwin & Jamison, 1990). The mood swings in bipolar disorder can be patterned in many ways. About 20% of bipolar patients exhibit a *rapid-cycling pattern*, which means they go through four or more manic or depressive episodes within a year.

Etiology of Mood Disorders



Quite a bit is known about the etiology of mood disorders, although the puzzle certainly hasn't been assembled completely. There appear to be a number of routes into these disorders, involving intricate interactions between psychological and biological factors.

Genetic Vulnerability



The evidence strongly suggests that genetic factors influence the likelihood of developing major depression or bipolar disorder (Kalidindi & McGuffin, 2003; Sullivan, Neale, & Kendler, 2000). *Twin studies* have found a sizable disparity between identical and fraternal twins in concordance rates for mood disorders (see **Figure 14.13**). This evidence suggests that heredity can create a *predisposition* to mood disorders. Environmental factors probably determine whether this predisposition is converted into an actual disorder. Research suggests that genetic vulnerability may play a larger role in women's depression than in men's (Bierut et al., 1999). The influence of genetic factors also appears to be stronger for bipolar disorders than for unipolar disorders (Kieseppa et al., 2004; Merikangas & Risch, 2003). Although genetic mapping

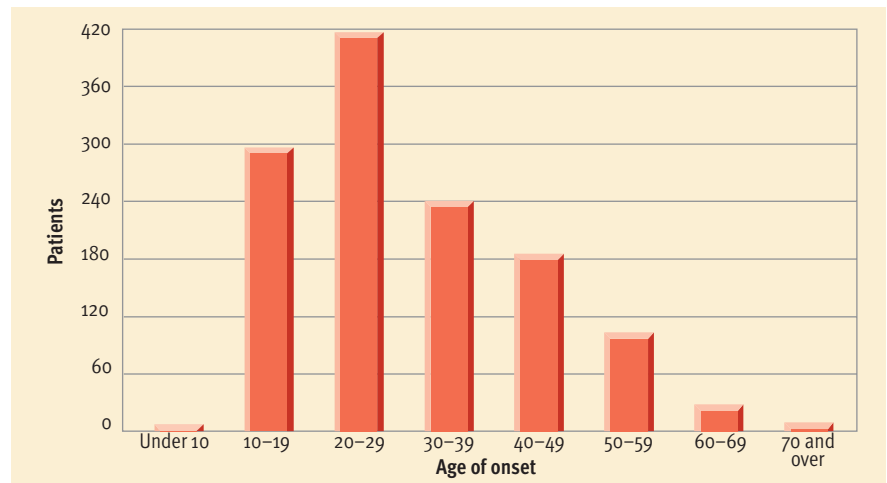


Figure 14.12

Age of onset for bipolar mood disorder. The onset of bipolar disorder typically occurs in adolescence or early adulthood. The data graphed here, which were combined from 10 studies, show the distribution of age of onset for 1304 bipolar patients. As you can see, bipolar disorder emerges most frequently during the 20s decade.

Source: Goodwin, F. K., & Jamison, K. R. (1990). *Manic-depressive illness* (p. 132). New York: Oxford University Press. Copyright © 1990 Oxford University Press, Inc. Reprinted by permission.

technology (see Chapter 3) holds great promise for pinpointing the specific genes that shape vulnerability to mood disorders (Caspi et al., 2003), scientists do *not* appear to be on the verge of unraveling the genetic code for mood disorders, which probably depend on subtle variations in constellations of many genes (Kendler, 2005; Merikangas & Risch, 2003).

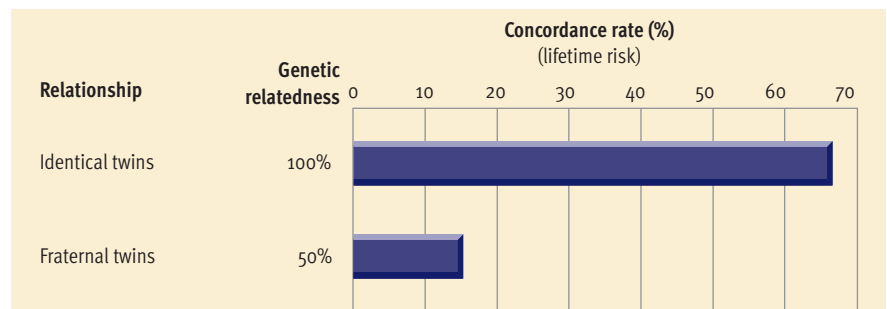
Neurochemical and Neuroanatomical Factors



Heredity may influence susceptibility to mood disorders by creating a predisposition toward certain types of neurochemical abnormalities in the brain. Correlations have been found between mood disorders and abnormal levels of two neurotransmitters in the brain: norepinephrine and serotonin (Sher & Mann, 2003), although other neurotransmitter disturbances may also contribute (Thase, Jindal, & Howland, 2002). The details remain elusive, but low levels of serotonin appear to be a crucial factor underlying most forms of depression (Flores et al., 2004). A variety of drug thera-

Figure 14.13

Twin studies of mood disorders. The concordance rate for mood disorders in identical twins is much higher than that for fraternal twins, who share less genetic overlap. These results suggest that there must be a genetic predisposition to mood disorders. (Data from Gershon, Berrettini, & Goldin, 1989)



Web Link 14.6



Dr. Ivan's Depression Central
Some might suggest psychiatrist Ivan Goldberg's site would be better titled "Everything You Ever Wanted to Know About Depression." He offers a great depth of resources regarding mood disorders.

pies are fairly effective in the treatment of severe mood disorders. Most of these drugs are known to affect the availability (in the brain) of the neurotransmitters that have been related to mood disorders (Dubovsky et al., 2003). Since this effect is unlikely to be a coincidence, it bolsters the plausibility of the idea that neurochemical changes produce mood disturbances.

Studies have also found some interesting correlations between mood disorders and a variety of structural abnormalities in the brain (Flores et al., 2004). Perhaps the best documented correlation is the association between depression and *reduced hippocampal volume* (Campbell et al., 2004). The *hippocampus*, which is known to play a major role in memory consolidation (see Chapter 7), tends to be about 8%–10% smaller in depressed subjects than in normal subjects (Videbech & Ravnkilde, 2004). A fascinating new theory of the biological bases of depression may be able to account for this finding. The springboard for this theory is the recent discovery that the human brain continues to generate new neurons in adulthood, especially in the hippocampal formation (Gage, 2002; see Chapter 3). This process is called *neurogenesis*. Jacobs (2004) has theorized that depression occurs when major life stress causes neurochemical reactions that suppress neurogenesis, resulting in reduced hippocampal volume. According to this view, the suppression of neurogenesis is the central cause of depression. Consistent with this view, Jacobs maintains that antidepressant drugs that elevate serotonin levels relieve depression because serotonin promotes neurogenesis. A great deal of additional research will be required to fully test this new model of the biological bases of depressive disorders.

Cognitive Factors



A variety of theories emphasize how cognitive factors contribute to depressive disorders (Abramson et al., 2002). We will discuss Aaron Beck's (1976, 1987) influential cognitive theory of depression in Chapter 15, where his approach to therapy is described. In this section, we'll examine Martin Seligman's *learned helplessness model* of depression. Based largely on animal research, Seligman (1974) proposed that depression is caused by *learned helplessness*—passive "giving up" behavior produced by exposure to unavoidable aversive events (such as uncontrollable shock in the laboratory). He originally considered learned helplessness to be a product of conditioning but eventually revised his theory, giving it a cognitive slant. The reformulated theory of learned helplessness postulates that the roots of depression lie in how people explain the setbacks and other negative events that they experience (Abramson, Seligman, & Teasdale, 1978).

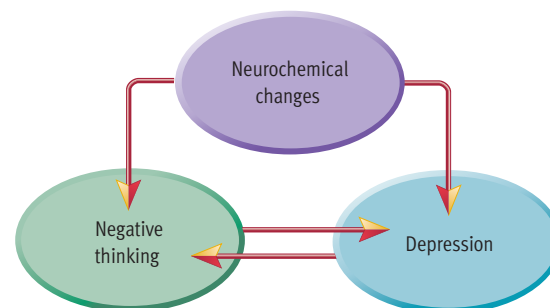
According to Seligman (1990), people who exhibit a *pessimistic explanatory style* are especially vulnerable to depression. These people tend to attribute their setbacks to their personal flaws instead of situational factors, and they tend to draw global, far-reaching conclusions about their personal inadequacies based on these setbacks.

In accord with this line of thinking, Susan Nolen-Hoeksema (1991, 2000) has found that depressed people who *ruminate* about their depression remain depressed longer than those who try to distract themselves. People who respond to depression with rumination repetitively focus their attention on their depressing feelings, thinking constantly about how sad, lethargic, and unmotivated they are. According to Nolen-Hoeksema (1995), excessive rumination tends to extend and amplify individuals' episodes of depression. As we noted earlier, she believes that women are more likely to ruminate than men and that this disparity may be one of the primary reasons why depression is more prevalent in women.

In sum, cognitive models of depression maintain that negative thinking is what leads to depression in many people. The principal problem with cognitive theories is their difficulty in separating cause from effect (Rehm, Wagner, & Ivens-Tyndal, 2001). Does negative thinking cause depression? Or does depression cause negative thinking (see **Figure 14.14**)? A clear demonstration of a causal link between negative thinking and depression is not possible because it would require manipulating people's cognitive style (which is not easy to change) in sufficient degree to produce full-fledged depressive disorders (which would not be ethical). However, the research reported in our Featured Study provided impressive evidence consistent with a causal link between negative thinking and vulnerability to depression.

Figure 14.14

Interpreting the correlation between negative thinking and depression. Cognitive theories of depression assume that consistent patterns of negative thinking cause depression. Although these theories are highly plausible, depression could cause negative thoughts, or both could be caused by a third factor, such as neurochemical changes in the brain.



SUSAN NOLEN-HOEKSEMA

"By adolescence, girls appear to be more likely than boys to respond to stress and distress with rumination—focusing inward on feelings of distress and personal concerns rather than taking action to relieve their distress."

Does Negative Thinking Cause Depression?

FEATURED Study

This article describes a series of studies conducted at Temple University and at the University of Wisconsin, collectively referred to as the Temple-Wisconsin Cognitive Vulnerability to Depression Project. Although the article provides a preliminary report on many facets of the project, we will focus on the study intended to test the hypothesis that a negative cognitive style is predictive of elevated vulnerability to depression.

Method

Participants. Over 5,000 first-year students at the two universities responded to two measures of negative thinking. Students who scored in the highest quartile on both measures were characterized as having a *high risk* for depression, while those who scored in the lowest quartile on both measures were characterized as having a *low risk* for depression. Randomly selected subsets of these two groups were invited for additional screening to eliminate anyone who was *currently* depressed or suffering from any other major psychological disorder. People who had *previously* suffered from depression or other disorders were not eliminated. The final sample consisted of 173 students in the high-risk group and 176 students in the low-risk group.

Follow-up assessments. Self-report measures and structured interviews were used to evaluate the mental health of the participants every 6 weeks for the first two years and then every 16 weeks for an additional three years. The assessments were conducted by interviewers who were blind regarding the subjects' risk group status. The present report summarized the followup data for the first two and one-half years of the study. The results were reported separately for those who did and did not have a prior history of depression.

Results

The data for students who had no prior history of depression showed dramatic differences between the high-risk and low-risk groups in vulnerability to depression. During the relatively brief 2.5-year period, a major depressive disorder emerged in 17% of the high-risk students in comparison to only 1% of the low-risk students. The high-risk subjects also displayed a much greater incidence of minor depressive episodes, as you can see in the left panel of **Figure 14.15**. The right panel of **Figure 14.15** shows the comparisons for participants who had a prior history of depression (but were not depressed or suffering from any other disorder at the beginning of the study). The data show that high-risk subjects were more vulnerable to a recurrence of both major and minor depression during the 2.5-year follow-up.

Discussion

The high-risk participants, who exhibited a negative cognitive style, were consistently found to have an elevated likelihood of developing depressive disorders. Hence, the authors conclude that their results provide strong support for the cognitive vulnerability hypothesis, which asserts that negative thinking makes people more vulnerable to depression.

Comment

Previous studies of the correlation between negative thinking and depression used *retrospective designs*, which look backward in time from known outcomes. For example, investigators might compare depressed subjects versus nondepressed subjects on some measure of negative thinking. What makes the design retrospective is

Source: Alloy, L. B., Abramson, L. Y., Whitehouse, W. G., Hogan, M. E., Tashman, N. A., Steinberg, D. L., Rose, D. T., & Donovan, P. (1999). Depressogenic cognitive styles: Predictive validity, information processing and personality characteristics, and developmental origins. *Behavioral Research and Therapy*, 37, 503–531.

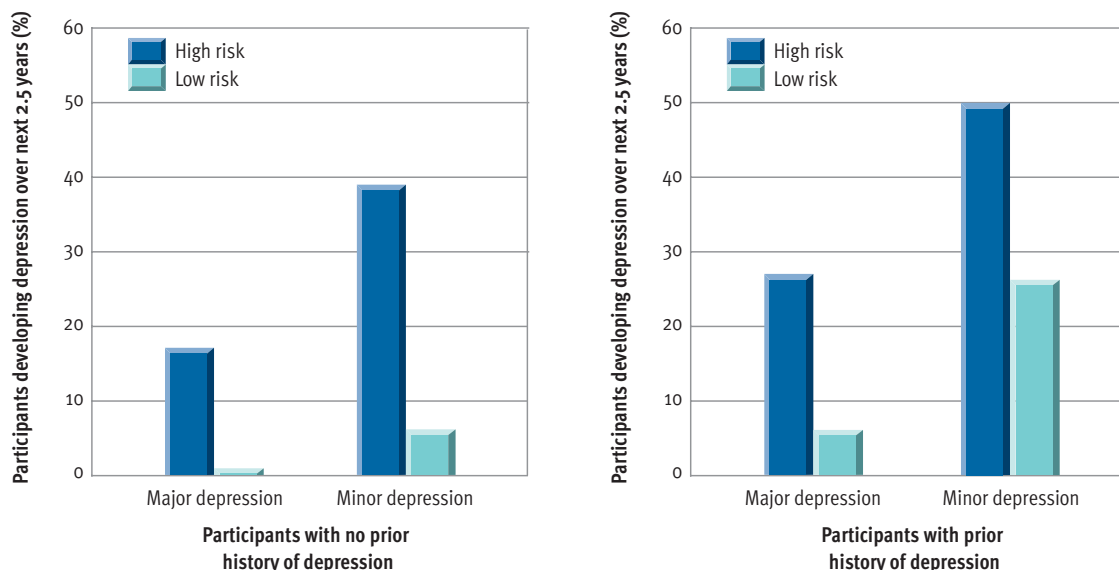


Figure 14.15
Negative thinking and prediction of depression. Alloy and colleagues (1999) measured the cognitive styles of first-year college students and characterized the students as high risk or low risk for depression. These graphs show the percentage of these students who experienced major or minor episodes of depression over the next 2.5 years. As you can see, the high-risk students who exhibited a negative thinking style proved to be much more vulnerable to depression. (Data from Alloy et al., 1999)

that the researchers already know which people experienced the outcome of depression. Retrospective designs can yield useful information, but they don't provide much insight about causation. Why? Because if you find an association between depression and negative thinking you can't determine whether the negative thinking preceded the depression or the depression preceded the negative thinking. The present study used a *prospective design*, which moves forward in time, testing hypotheses about future outcomes. Prospective studies are much more difficult and time-consuming to con-

duct, but they can provide more insight about causation because they can show that one event (in this instance, the development of a negative cognitive style) preceded another (the occurrence of depression). The data are still correlational, so they cannot definitively establish a causal link, but they provide much stronger evidence in favor of causation than retrospective data. Thus, the research by Alloy and her colleagues provides the best evidence to date in support of the hypothesis that negative thinking contributes to the causation of depressive disorders.

Interpersonal Roots



Behavioral approaches to understanding depression emphasize how inadequate social skills put people on the road to depressive disorders (see Figure 14.16; Coyne, 1999). According to this notion, depression-prone people lack the social finesse needed to acquire many important kinds of reinforcers, such as good friends, top jobs, and desirable spouses. This paucity of reinforcers could understandably lead to negative emotions and depression. Consistent with this theory, researchers have found correlations between poor social skills and depression (Ingram, Scott, & Siegle, 1999).

Another interpersonal factor is that depressed people tend to be depressing (Joiner & Katz, 1999). Individuals suffering from depression often are irritable and pessimistic. They complain a lot and aren't particularly enjoyable companions. As a consequence, depressed people tend to court rejection from those around them (Joiner & Metalsky, 1995). Depressed people thus have fewer sources of social support than nondepressed people, which may aggravate and deepen their depression (Potthoff, Holahan, & Joiner, 1995). Moreover, recent evidence suggests that lack

of social support may make a larger contribution to depression in women than in men (Kendler, Myers, & Prescott, 2005). To compound these problems, evidence indicates that depressed people may gravitate to partners who view them unfavorably and hence reinforce their negative views of themselves (Joiner, 2002).

Precipitating Stress

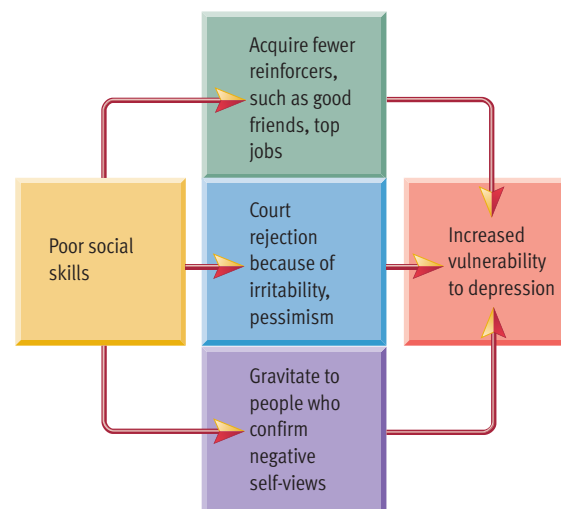


Mood disorders sometimes appear mysteriously in people who are leading benign, nonstressful lives. For this reason, experts used to believe that mood disorders are not influenced much by stress. However, advances in the measurement of personal stress have altered this picture. The evidence available today suggests a moderately strong link between stress and the onset of mood disorders (Kendler, Kuhn, & Prescott, 2004; Kessler, 1997). Stress also appears to affect how people with mood disorders respond to treatment and whether they experience a relapse of their disorder (Monroe & Hadjiyannakis, 2002).

Of course, many people endure great stress without getting depressed. The impact of stress varies, in part, because people vary in their degree of *vulnerability* to mood disorders (Lewinsohn, Joiner, & Rohde, 2001). Similar interactions between stress and vulnerability probably influence the development of many kinds of disorders, including those that are next on our agenda—the schizophrenic disorders.

Figure 14.16

Interpersonal factors in depression. Behavioral theories about the etiology of depression emphasize how inadequate social skills may contribute to the development of the disorder through several mechanisms, as diagrammed here.



REVIEW OF KEY POINTS

- The principal mood disorders are depressive disorder, dysthymic disorder, bipolar disorder, and cyclothymic disorder. Mood disorders are episodic.
- Major depressive disorder is marked by profound sadness, slowed thought processes, low self-esteem, and loss of interest in previous sources of pleasure. Unipolar depression is more common than bipolar disorder, and it appears to be increasing in prevalence.
- Bipolar disorder is marked by the experience of both depressed and manic episodes. Manic episodes are characterized by inflated self-esteem, high energy, grandiose plans, and racing thoughts.

- Evidence indicates that people vary in their genetic vulnerability to mood disorders. These disorders are accompanied by changes in neurochemical activity in the brain. Abnormalities at norepinephrine and serotonin synapses appear particularly critical. Reduced hippocampal volume and suppressed neurogenesis are also associated with depression.
- Cognitive models posit that negative thinking contributes to depression. A pessimistic explanatory style has been implicated, as has a tendency to ruminate about one's

problems. Our Featured Study reported impressive evidence in support of the cognitive vulnerability hypothesis of depression.

- Interpersonal inadequacies may contribute to depressive disorders. Poor social skills may lead to a paucity of life's reinforcers and frequent rejection. The development of mood disorders is also affected by personal stress.

> Schizophrenic Disorders



Literally, *schizophrenia* means “split mind.” However, when Eugen Bleuler coined the term in 1911 he was referring to the fragmentation of thought processes seen in the disorder—not to a “split personality.” Unfortunately, writers in the popular media often assume that the split-mind notion, and thus schizophrenia, refers to the rare syndrome in which a person manifests two or more personalities. As you have already learned, this syndrome is actually called *dissociative identity disorder* or *multiple-personality disorder*. Schizophrenia is a much more common, and altogether different, type of disorder.

Schizophrenic disorders are a class of disorders marked by delusions, hallucinations, disorganized speech, and deterioration of adaptive behavior. People with schizophrenic disorders often display some of the same symptoms seen in people with severe mood disorders; however, disturbed *thought* lies at the core of schizophrenic disorders, whereas disturbed *emotion* lies at the core of mood disorders.

How common is schizophrenia? Prevalence estimates suggest that about 1% of the population may suffer from schizophrenic disorders (Jablensky, 1999). That may not sound like much, but it means that in the United States alone there may be several million people troubled by schizophrenic disturbances. Moreover, schizophrenia is an extremely costly illness for society, because it is a severe, debilitating disorder that tends to have an early onset and often requires lengthy hospital care (Buchanan & Carpenter, 2000).

General Symptoms



There are a number of distinct schizophrenic syndromes, but they share some general characteristics that we will examine before looking at the subtypes. Many of these characteristics are apparent in the following case history (adapted from Sheehan, 1982).

Sylvia was first given a diagnosis of schizophrenia at age 15. She has been in and out of many types of

psychiatric facilities since then. She has never been able to hold a job for any length of time. During severe flare-ups of her disorder, her personal hygiene deteriorates. She rarely washes, she wears clothes that neither fit nor match, she smears makeup on heavily but randomly, and she slops food all over herself. Sylvia occasionally hears voices talking to her. She tends to be argumentative, aggressive, and emotionally volatile. Over the years, she has been involved in innumerable fights with fellow patients, psychiatric staff members, and strangers. Her thoughts can be highly irrational, as is apparent from the following quote, which was recorded while she was a patient in a psychiatric facility called Creedmoor:

“Mick Jagger wants to marry me. If I have Mick Jagger, I don't have to covet Geraldo Rivera. Mick Jagger is St. Nicholas and the Maharishi is Santa Claus. I want to form a gospel rock group called the Thorn Oil, but Geraldo wants me to be the music critic on Eyewitness News, so what can I do? Got to listen to my boyfriend. Teddy Kennedy cured me of my ugliness. I'm pregnant with the son of God. I'm going to marry David Berkowitz and get it over with. Creedmoor is the headquarters of the American Nazi Party. They're eating the patients here. Archie Bunker wants me to play his niece on his TV show. I work for Epic Records. I'm Joan of Arc. I'm Florence Nightingale. The door between the ward and the porch is the dividing line between New York and California. Divorce isn't a piece of paper, it's a feeling. Forget about Zip Codes. I need shock treatments. The body is run by electricity. My wiring is all faulty.” (Sheehan, 1982, pp. 104–105)

Sylvia's case clearly shows that schizophrenic thinking can be bizarre and that schizophrenia can be a severe and debilitating disorder. Although no single symptom is inevitably present, the following symptoms are commonly seen in schizophrenia (Cancro & Lehmann, 2000; Ho, Black, & Andreasen, 2003).

PREVIEW QUESTIONS

- What are the general symptoms of schizophrenia?
- What are the four subtypes of schizophrenic disorders, and what are their chief symptoms?
- What is known about the course and outcome of schizophrenia?
- Which biological factors have been implicated in schizophrenic disorders?
- What is the neurodevelopmental hypothesis of schizophrenia?
- How do family dynamics and stress contribute to schizophrenic disorders?

Delusions and Irrational Thought

Cognitive deficits and disturbed thought processes are the central, defining feature of schizophrenic disorders (Barch, 2003; Heinrichs, 2005). Various kinds of delusions are common. **Delusions are false beliefs that are maintained even though they clearly are out of touch with reality.** For example, one patient's delusion that he is a tiger (with a deformed body) persisted for more than 15 years (Kulick, Pope, & Keck, 1990). More typically, affected persons believe that their private thoughts are being broadcast to other people, that thoughts are being injected into their mind against their will, or that their thoughts are being controlled by some external force (Maher, 2001). In *delusions of grandeur*, people maintain that they are famous or important. Sylvia expressed an endless array of grandiose delusions, such as thinking that Mick Jagger wanted to marry her, that she had dictated the hobbit stories to J. R. R. Tolkien, and that she was going to win the Nobel prize for medicine.

Another characteristic of schizophrenia is that the person's train of thought deteriorates. Thinking becomes chaotic rather than logical and linear. The person experiences a "loosening of associations," as he or she shifts topics in disjointed ways. The quotation from Sylvia illustrates this symptom dramatically. The entire quote involves a wild flight of ideas, but at one point (beginning with the sentence "Creedmoor is the headquarters . . .") she rattles off ten consecutive sentences that have no apparent connection to each other.

Deterioration of Adaptive Behavior

Schizophrenia usually involves a noticeable deterioration in the quality of the person's routine functioning in work, social relations, and personal care. Friends will often make remarks such as "Hal just isn't himself anymore." This deterioration is readily apparent in Sylvia's inability to get along with others or to function in the work world. It's also apparent in her neglect of personal hygiene.

Hallucinations

A variety of perceptual distortions may occur with schizophrenia, the most common being auditory hallucinations. **Hallucinations are sensory perceptions that occur in the absence of a real, external stimulus or are gross distortions of perceptual input.** People with schizophrenia frequently report that they hear voices of nonexistent or absent people talking to them. Sylvia, for instance, said she heard messages from Paul McCartney. These voices often provide an insulting, running commentary on the

person's behavior ("You're an idiot for shaking his hand"). They may be argumentative ("You don't need a bath"), and they may issue commands ("Prepare your home for visitors from outer space").

Disturbed Emotion

Normal emotional tone can be disrupted in schizophrenia in a variety of ways. Although it may not be an accurate indicator of their underlying emotional experience (Kring, 1999), some victims show little emotional responsiveness, a symptom referred to as "blunted or flat affect." Others show inappropriate emotional responses that don't jibe with the situation or with what they are saying. For instance, a schizophrenic patient might cry over a silly cartoon and then laugh about a news story describing a child's tragic death. People with schizophrenia may also become emotionally volatile. This pattern was displayed by Sylvia, who often overreacted emotionally in erratic, unpredictable ways.

Subtypes, Course, and Outcome



Four subtypes of schizophrenic disorders are recognized, including a category for people who don't fit neatly into any of the first three categories. The major symptoms of each subtype are as follows (Ho et al., 2003).

Paranoid Type

As its name implies, **paranoid schizophrenia is dominated by delusions of persecution, along with delusions of grandeur.** In this common form of schizophrenia, people come to believe that they have many enemies who want to harass and oppress them. They may become suspicious of friends and relatives, or they may attribute the persecution to mysterious, unknown persons. They are convinced that they are being watched and manipulated in malicious ways. To make sense of this persecution, they often develop delusions of grandeur. They believe that they must be enormously important people, frequently seeing themselves as great inventors or as famous religious or political leaders. For example, in the case described at the beginning of the chapter, Ed's belief that he was president of the United States was a delusion of grandeur.

Catatonic Type

Catatonic schizophrenia is marked by striking motor disturbances, ranging from muscular rigidity to random motor activity. Some patients go into an extreme form of withdrawal known as a catatonic

Web Link 14.7



Doctor's Guide to the Internet: Schizophrenia
Produced by a communications and medical education consulting company, the free Doctor's Guide site is updated frequently to provide a current overview of the state of research on schizophrenic disorders. A more detailed set of resources for physicians parallels this site, which is intended primarily for patients and their families.

stupor. They may remain virtually motionless and seem oblivious to the environment around them for long periods of time. Others go into a state of catatonic excitement. They become hyperactive and incoherent. Some alternate between these dramatic extremes. The catatonic subtype is not particularly common, and its prevalence seems to be declining.

Disorganized Type

In *disorganized schizophrenia*, a particularly severe deterioration of adaptive behavior is seen. Prominent symptoms include emotional indifference, frequent incoherence, and virtually complete social withdrawal. Aimless babbling and giggling are common. Delusions often center on bodily functions (“My brain is melting out my ears”).

Undifferentiated Type

People who are clearly schizophrenic but who cannot be placed into any of the three previous categories are said to have ***undifferentiated schizophrenia, which is marked by idiosyncratic mixtures of schizophrenic symptoms.*** The undifferentiated subtype is fairly common.

Positive Versus Negative Symptoms

Many theorists have raised doubts about the value of dividing schizophrenic disorders into the four subtypes just described (Sanislow & Carson, 2001). Critics note that the catatonic subtype is disappearing and that undifferentiated cases aren’t so much a subtype as a hodgepodge of “leftovers.” Critics also point out that there aren’t meaningful differences between the subtypes in etiology, prognosis, or response to treatment. The absence of such differences casts doubt on the value of the current classification scheme.

Because of such problems, Nancy Andreasen (1990) and others (Carpenter, 1992; McGlashan & Fenton, 1992) have proposed an alternative approach to subtyping. This new scheme divides schizophrenic disorders into just two categories based on the predominance of negative versus positive symptoms. ***Negative symptoms involve behavioral deficits, such as flattened emotions, social withdrawal, apathy, impaired attention, and poverty of speech. Positive symptoms involve behavioral excesses or peculiarities, such as hallucinations, delusions, bizarre behavior, and wild flights of ideas.***

Theorists advocating this scheme hoped to find consistent differences between the two subtypes in etiology, prognosis, and response to treatment, and some progress along these lines *has* been made. For example, a predominance of positive symptoms is

associated with better adjustment prior to the onset of schizophrenia and greater responsiveness to treatment (Fenton & McGlashan, 1994; Galderisi et al., 2002). However, the assumption that patients can be placed into discrete categories based on this scheme now seems untenable. Most patients exhibit both types of symptoms and vary only in the *degree* to which positive or negative symptoms dominate (Black & Andreasen, 1999). Although it seems fair to say that the distinction between positive and negative symptoms is enhancing our understanding of schizophrenia, it has not yielded a classification scheme that can replace the traditional subtypes of schizophrenia.

Course and Outcome

Schizophrenic disorders usually emerge during adolescence or early adulthood and only infrequently after age 45 (Howard et al., 1993). Those who develop schizophrenia usually have a long history of peculiar behavior and of cognitive and social deficits, although most do not manifest a full-fledged psychological disorder during childhood (Walker et al., 2004). The emergence of schizophrenia may be sudden or gradual. Once it clearly emerges, the course of schizophrenia is variable (Norman & Malla, 1995), but patients tend to fall into three broad groups. Some patients, presumably those with milder disorders, are treated successfully and enjoy a full recovery. Other patients experience a partial recovery, but they have frequent relapses and are in and out of treatment facilities for much of the remainder of their lives. Finally, a third group of patients endures chronic illness that sometimes results in permanent hospitalization. Estimates of the percentage of patients falling in each category vary. Overall, it appears that about 15%–20% of schizophrenic patients enjoy a full recovery, although some long-term studies have yielded higher estimates (Modestin et al., 2003; Robinson et al., 2004).

A number of factors are related to the likelihood of recovery from schizophrenic disorders (Cancro & Lehmann, 2000; Liberman et al., 2002). A patient has a relatively *favorable prognosis* when (1) the onset of the disorder has been sudden rather than gradual, (2) the onset has occurred at a later age, (3) the patient’s social and work adjustment were relatively good prior to the onset of the disorder, (4) the proportion of negative symptoms is relatively low, (5) the patient’s cognitive functioning is relatively preserved, (6) the patient shows good adherence to treatment interventions, and (7) the patient has a relatively healthy, supportive family situation to return to. Many of these predictors are concerned with the etiology of schizophrenic illness, which is the matter we turn to next.



NANCY ANDREASEN
“Schizophrenia disfigures the emotional and cognitive faculties of its victims, and sometimes nearly destroys them.”



Distinguishing Schizophrenic and Mood Disorders

Check your understanding of the nature of schizophrenic and mood disorders by making preliminary diagnoses for the cases described below. Read each case summary and write your tentative diagnosis in the space provided. The answers are in Appendix A.

1. Max hasn't slept in four days. He's determined to write the "great American novel" before his class reunion, which is a few months away. He expounds eloquently on his novel to anyone who will listen, talking at such a rapid pace that no one can get a word in edgewise. He feels like he's wired with energy and is supremely confident about the novel, even though he's only written 10 to 20 pages. Last week, he charged \$5000 worth of new computer equipment and software, which is supposed to help him write his book.

Preliminary diagnosis: _____

2. Eduardo maintains that he invented the atomic bomb, even though he was born after its invention. He says he invented it to punish homosexuals, Nazis, and short people. It's short people that he's really afraid of. He's sure that all the short people on TV are talking about him. He thinks that short people are conspiring to make him look like a Republican. Eduardo frequently gets in arguments with people and is emotionally volatile. His grooming is poor, but he says it's okay because he's the secretary of state.

Preliminary diagnosis: _____

3. Margaret has hardly gotten out of bed for weeks, although she's troubled by insomnia. She doesn't feel like eating and has absolutely no energy. She feels dejected, discouraged, spiritless, and apathetic. Friends stop by to try to cheer her up, but she tells them not to waste their time on "pond scum."

Preliminary diagnosis: _____



© Reuters/Corbis

John Nash, the Nobel prize-winning mathematician whose story was told in the film *A Beautiful Mind*, has struggled with paranoid schizophrenia since 1959.

For instance, in twin studies, concordance rates average around 48% for identical twins, in comparison to about 17% for fraternal twins (Gottesman, 1991, 2001). Studies also indicate that a child born to two schizophrenic parents has about a 46% probability of developing a schizophrenic disorder (as compared to the probability in the general population of about 1%). These and other findings that demonstrate the genetic roots of schizophrenia are summarized in **Figure 14.17**. Overall, the picture is similar to that seen for mood disorders. Several converging lines of evidence indicate that some people inherit a polygenically transmitted *vulnerability* to schizophrenia (Schneider & Deldin, 2001). Although some theorists suspect that genetic factors may account for as much as two-thirds of the variability in susceptibility to schizophrenia, genetic mapping studies have made little progress in identifying the specific genes at work (Owen & O'Donovan, 2003).

Neurochemical Factors

Like mood disorders, schizophrenic disorders appear to be accompanied by changes in the activity of one or more neurotransmitters in the brain (Patel, Pinals, & Breier, 2003). The *dopamine hypothesis* asserts that excess dopamine activity is the neurochemical basis for schizophrenia, as discussed in **Figure 14.18**. This

Etiology of Schizophrenia



You can probably identify, at least to some extent, with people who suffer from mood disorders, somatoform disorders, and anxiety disorders. You can probably imagine events that could unfold that might leave you struggling with depression, grappling with anxiety, or worrying about your physical health. But what could possibly have led Ed to believe that he had been fighting space wars and vampires? What could account for Sylvia's thinking that she was Joan of Arc or that she had dictated the hobbit novels to Tolkien? As mystifying as these delusions may seem, you'll see that the etiology of schizophrenic disorders is not all that different from the etiology of other psychological disorders. We'll begin our discussion by examining the matter of genetic vulnerability.

Genetic Vulnerability



Evidence is plentiful that hereditary factors play a role in the development of schizophrenic disorders (Kendler, 2000; Tsuang, Glatt, & Faraone, 2003).



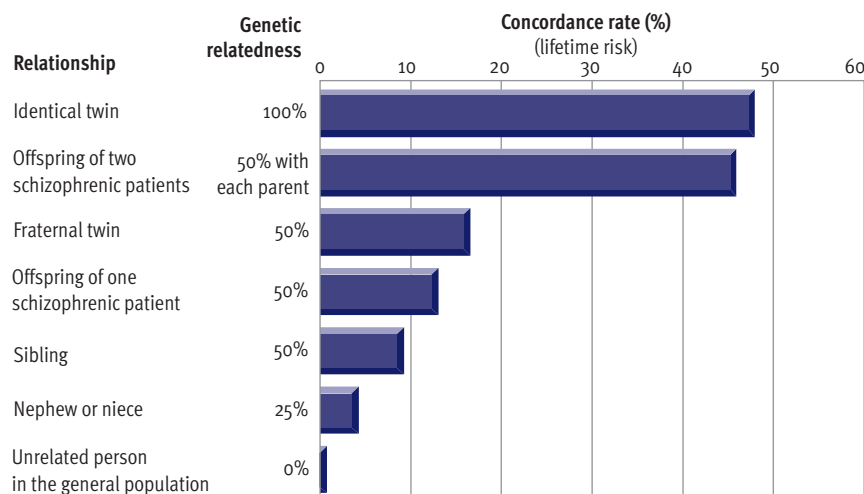


Figure 14.17

Genetic vulnerability to schizophrenic disorders.

Relatives of schizophrenic patients have an elevated risk for schizophrenia. This risk is greater among closer relatives. Although environment also plays a role in the etiology of schizophrenia, the concordance rates shown here suggest that there must be a genetic vulnerability to the disorder. These concordance estimates are based on pooled data from 40 studies conducted between 1920 and 1987. (Data from Gottesman, 1991)

hypothesis makes sense because most of the drugs that are useful in the treatment of schizophrenia are known to dampen dopamine activity in the brain (Tamminga & Carlsson, 2003). However, the evidence linking schizophrenia to high dopamine levels is riddled with inconsistencies, complexities, and inter-

pretive problems (Abi-Dargham, 2004; Egan & Hyde, 2000). Researchers are currently exploring how interactions between the dopamine and serotonin neurotransmitter systems may contribute to schizophrenia (Patel et al., 2003). Recent research has also suggested that abnormalities in neural circuits using *glutamate*

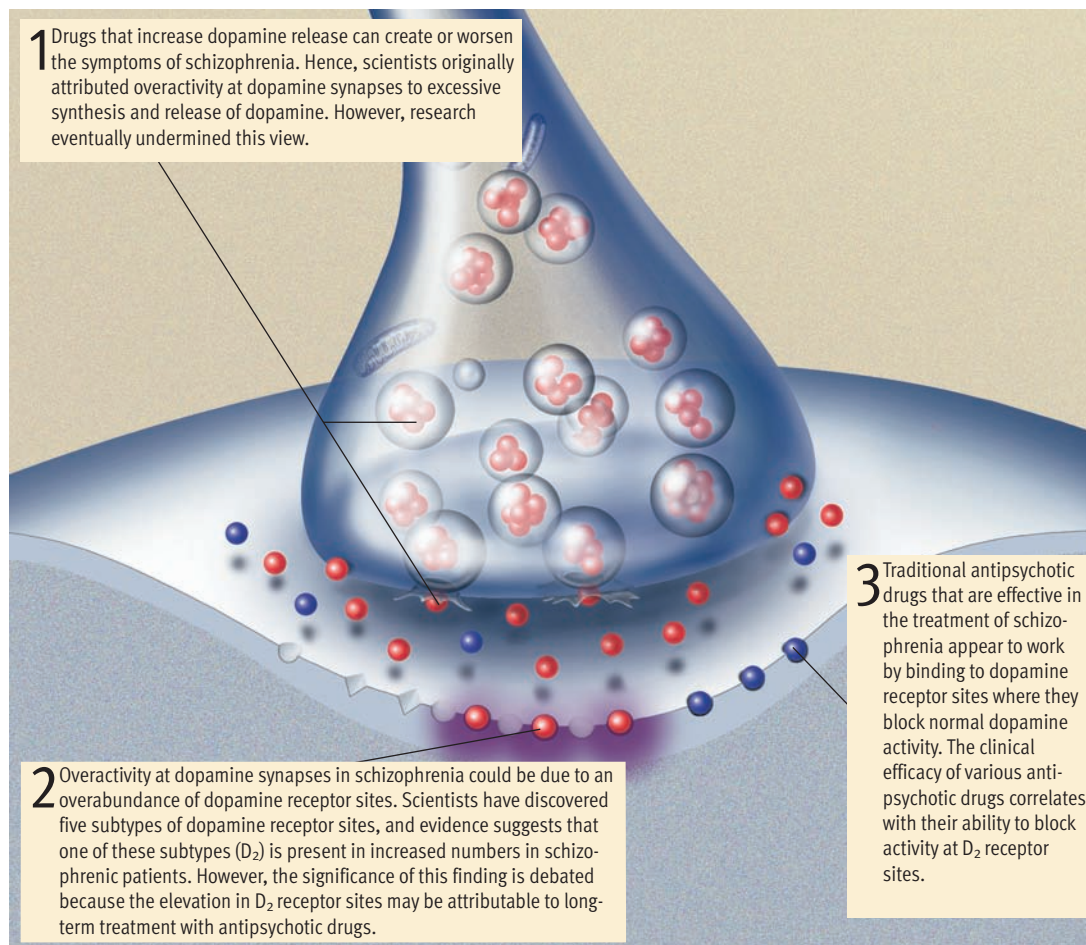


Figure 14.18

The dopamine hypothesis as an explanation for schizophrenia.

Decades of research have implicated overactivity at dopamine synapses as a key cause of schizophrenic disorders. However, the evidence on the exact mechanisms underlying this overactivity, which is summarized in this graphic, is complex and open to debate. Recent hypotheses about the neurochemical bases of schizophrenia go beyond the simple assumption that dopamine activity is increased. For example, one theory posits that schizophrenia may be accompanied by decreased dopamine activity in one area of the brain (the prefrontal cortex) and increased activity or dysregulation in other areas of the brain (Egan & Hyde, 2000). Moreover, abnormalities in other neurotransmitter systems may also contribute to schizophrenia.

as a neurotransmitter may play a role in schizophrenic disturbance (Tibbo et al., 2004). Thus, investigators are gradually making progress in their search for the neurochemical bases of schizophrenia.

Structural Abnormalities in the Brain



For decades, studies have suggested that individuals with schizophrenia exhibit a variety of deficits in attention, perception, and information processing (Bellack, Gearon, & Blanchard, 2000). Impairments in working (short-term) memory are especially prominent (Silver et al., 2003). These cognitive deficits suggest that schizophrenic disorders may be caused by neurological defects. Until recent decades this theory was based more on speculation than on actual research. Now, however, advances in brain-imaging technology have yielded mountains of intriguing data. The most reliable finding is that CT scans and MRI scans (see Chapter 3) suggest an association between enlarged brain ventricles (the hollow, fluid-filled cavities in the brain depicted in **Figure 14.19**) and schizophrenic disturbance (Egan & Hyde, 2000). Enlarged ventricles are assumed to reflect the degeneration of nearby brain tissue. The significance of enlarged ventricles is hotly debated, however. This structural deterioration (or failure to develop) could be a *consequence* of schizophrenia, or it could be a contributing *cause* of the illness.

Brain-imaging studies have also uncovered structural and metabolic abnormalities in the frontal lobes of individuals with schizophrenia. Although the research results are not entirely consistent, schizophrenia appears to be associated with smaller size and reduced metabolic activity in areas of the prefrontal cortex (Fowles, 2003). Scientists are also intrigued by

the fact that a major dopamine pathway runs through the area in the prefrontal cortex where metabolic abnormalities have been found. A connection may exist between the abnormal dopamine activity implicated in schizophrenia and the dysfunctional metabolic activity seen in this area of the prefrontal cortex (Conklin & Iacono, 2002). Although the research on the prefrontal cortex is intriguing, Ho, Black, and Andreasen (2003) caution that the neural correlates of schizophrenia are complex and that the disease is not likely to be caused by “a single abnormality in a single region of the brain” (p. 408).

The Neurodevelopmental Hypothesis

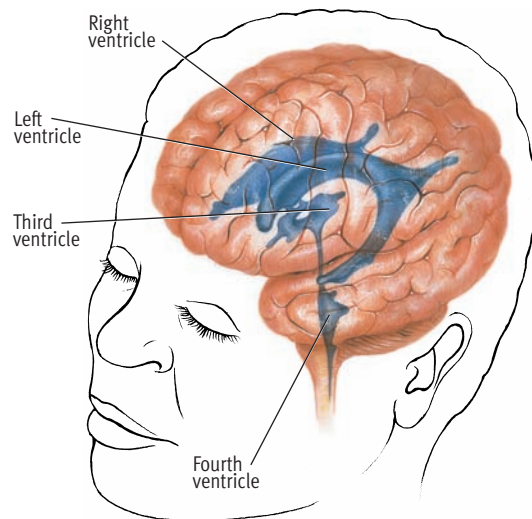


In recent years, several new lines of evidence have led to the emergence of the *neurodevelopmental hypothesis* of schizophrenia, which posits that schizophrenia is caused in part by various disruptions in the normal maturational processes of the brain before or at birth (Brown, 1999). According to this hypothesis, insults to the brain during sensitive phases of prenatal development or during birth can cause subtle neurological damage that elevates individuals' vulnerability to schizophrenia years later in adolescence and early adulthood (see **Figure 14.20**). What are the sources of these early insults to the brain? Thus far, research has focused on viral infections or malnutrition during prenatal development and obstetrical complications during the birth process.

The evidence on viral infections has been building since Sarnoff Mednick and his colleagues (1988) discovered an elevated incidence of schizophrenia among individuals who were in their second trimester of prenatal development during a 1957 influenza epidemic in Finland. Several subsequent studies in other locations have also found a link between exposure to influenza during the second trimester and increased prevalence of schizophrenia (Brown et al., 2004). Another study, which investigated the possible impact of prenatal malnutrition, found an elevated incidence of schizophrenia in a cohort of people who were prenatally exposed to a severe famine in 1944–45 due to a Nazi blockade of food deliveries in the Netherlands during World War II (Susser et al., 1996). A follow-up study of some schizophrenic patients exposed to this famine found increased brain abnormalities among the patients, as the neurodevelopmental hypothesis would predict (Hulshoff et al., 2000). Other research has shown that schizophrenic patients are more likely than control subjects to have a history of obstetrical complications (Kelly et al., 2004; Rosso et al., 2000). Finally, research suggests that minor physical anomalies (slight anatomical de-

Figure 14.19
Schizophrenia and the ventricles of the brain.

Cerebrospinal fluid (CSF) circulates around the brain and spinal cord. The hollow cavities in the brain filled with CSF are called ventricles. The four ventricles in the human brain are depicted here. Recent studies with CT scans and MRI scans suggest that an association exists between enlarged ventricles in the brain and the occurrence of schizophrenic disturbance.



fects of the head, hands, feet, and face) that would be consistent with prenatal neurological damage are more common among people with schizophrenia than among others (McNeil, Canton-Graae, & Ismail, 2000; Schiffman et al., 2002).

Expressed Emotion

Studies of expressed emotion have primarily focused on how this element of family dynamics influences the *course* of schizophrenic illness, after the onset of the disorder (Leff & Vaughn, 1985). *Expressed emotion (EE)* is the degree to which a relative of a schizophrenic patient displays highly critical or emotionally overinvolved attitudes toward the patient. Audiotaped interviews of relatives' communication are carefully evaluated for critical comments, hostility toward the patient, and excessive emotional involvement (overprotective, overconcerned attitudes) (Hooley, 2004).

Studies show that a family's expressed emotion is a good predictor of the course of a schizophrenic patient's illness (Hooley & Candela, 1999). After release from a hospital, people with schizophrenia who return to a family high in expressed emotion show relapse rates about three times that of patients who return to a family low in expressed emotion (see **Figure 14.21**; Hooley & Hiller, 1998). Part of the problem for patients returning to homes high in expressed emotion is that their families are probably sources of more *stress* than of *social support* (Cutting & Docherty, 2000). Although the effects of expressed emotion have been explored primarily with schizophrenic patients, accumulating evidence suggests that high levels of expressed emotion also foster higher relapse rates for patients suffering from mood and anxiety disorders (Hooley, 2004).

Precipitating Stress

Most theories of schizophrenia assume that stress plays a key role in triggering schizophrenic disorders (Walker et al., 2004). According to this notion, various biological and psychological factors influence individuals' *vulnerability* to schizophrenia. High stress may then serve to precipitate a schizophrenic disorder in someone who is vulnerable (McGlashan & Hoffman, 2000). Research indicates that high stress can also trigger relapses in patients who have made progress toward recovery (Ventura et al., 1989).

Schizophrenia is the last of the major, Axis I diagnostic categories that we will consider. We'll complete our overview of various types of abnormal behavior with a brief look at the personality disorders. These disorders are recorded on Axis II in the DSM classification system.

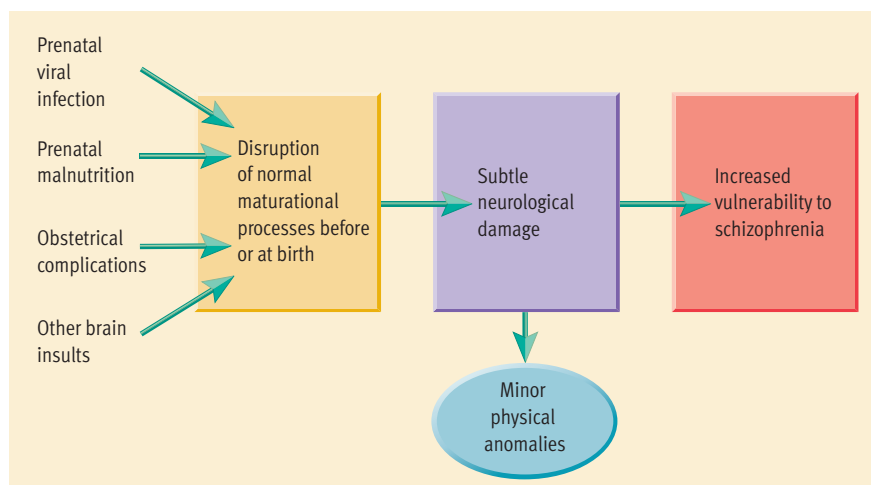


Figure 14.20

The neurodevelopmental hypothesis of schizophrenia. Recent findings have suggested that insults to the brain sustained during prenatal development or at birth may disrupt crucial maturational processes in the brain, resulting in subtle neurological damage that gradually becomes apparent as youngsters develop. This neurological damage is believed to increase both vulnerability to schizophrenia and the incidence of minor physical anomalies (slight anatomical defects of the head, face, hands, and feet).

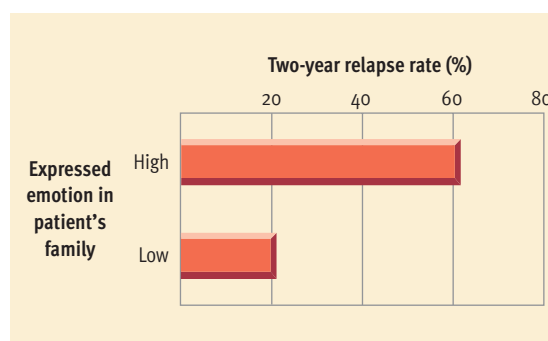


Figure 14.21

Expressed emotion and relapse rates in schizophrenia. Schizophrenic patients who return to a home that is high in expressed emotion have higher relapse rates than those who return to a home low in expressed emotion. Thus, unhealthy family dynamics can influence the course of schizophrenia. (Data adapted from Leff & Vaughn, 1981)

REVIEW OF KEY POINTS

- Schizophrenic disorders are characterized by deterioration of adaptive behavior, irrational thought, delusions, hallucinations, and disturbed mood.
- Schizophrenic disorders are classified as paranoid, catatonic, disorganized, or undifferentiated. A new classification scheme based on the predominance of positive versus negative symptoms is under study. Schizophrenic disorders usually emerge during adolescence or young adulthood.
- Research has linked schizophrenia to a genetic vulnerability and changes in neurotransmitter activity at dopamine synapses. Structural abnormalities in the brain, such as enlarged ventricles, are associated with schizophrenia, but their significance is unclear.
- The neurodevelopmental hypothesis of schizophrenia asserts that schizophrenia is attributable to disruptions in the normal maturational processes of the brain before or at birth that are caused by prenatal viral infections, obstetrical complications, and other insults to the brain.
- Precipitating stress and unhealthy family dynamics (high expressed emotion) may also contribute to the development of schizophrenia.

> Personality Disorders

PREVIEW QUESTIONS

- What are the three clusters of personality disorders?
- What is the major diagnostic challenge with personality disorders?
- What are the symptoms of antisocial personality disorder?
- What factors have been implicated in the etiology of antisocial personality disorders?

We have seen repeatedly that it is often difficult to draw that imaginary line between healthy and disordered behavior. This is especially true in the case of personality disorders, which are relatively mild disturbances in comparison to most of the Axis I disorders. **Personality disorders are a class of disorders marked by extreme, inflexible personality traits that cause subjective distress or impaired social and occupational functioning.** Essentially, people with these disorders display certain personality traits to an excessive degree and in rigid ways that undermine their adjustment. Personality disorders usually emerge during late childhood or adolescence and often continue throughout adulthood. It is difficult to estimate the prevalence of these subtle disorders, but it is clear that they are common (Mattia & Zimmerman, 2001).

DSM-IV lists ten personality disorders, which are grouped into three related clusters: anxious-fearful, odd-eccentric, and dramatic-impulsive. These disorders are described briefly in **Table 14.2**. If you examine this table, you will find a diverse collection of maladaptive personality syndromes. You may also notice that some personality disorders essentially are

mild versions of more severe Axis I disorders. Some of these disorders are more common in men and some in women, as the figures in the far right column of the table indicate.

Diagnostic Problems

Many critics have argued that the personality disorders overlap too much with Axis I disorders and with each other (Dolan-Sewell, Krueger, & Shea, 2001). The extent of this problem was documented in a study by Leslie Morey (1988). Morey reviewed the cases of 291 patients who had received a specific personality disorder diagnosis to see how many could have met the criteria for any of the other personality disorders. Morey found massive overlap among the diagnoses. For example, among patients with a diagnosis of histrionic personality disorder, 56% also qualified for a borderline disorder, 54% for a narcissistic disorder, 32% for an avoidant disorder, and 30% for a dependent disorder. Clearly, there are fundamental problems with Axis II as a classification system (Westen & Shedler, 1999). The overlap among the personality disorders makes it extremely difficult to achieve reli-

Table 14.2 Personality Disorders

Cluster	Disorder	Description	% Male/% Female
Anxious/fearful	Avoidant personality disorder	Excessively sensitive to potential rejection, humiliation, or shame; socially withdrawn in spite of desire for acceptance from others	50/50
	Dependent personality disorder	Excessively lacking in self-reliance and self-esteem; passively allowing others to make all decisions; constantly subordinating own needs to others' needs	31/69
	Obsessive-compulsive personality disorder	Preoccupied with organization, rules, schedules, lists, trivial details; extremely conventional, serious, and formal; unable to express warm emotions	50/50
Odd/eccentric	Schizoid personality disorder	Defective in capacity for forming social relationships; showing absence of warm, tender feelings for others	78/22
	Schizotypal personality disorder	Showing social deficits and oddities of thinking, perception, and communication that resemble schizophrenia	55/45
	Paranoid personality disorder	Showing pervasive and unwarranted suspiciousness and mistrust of people; overly sensitive; prone to jealousy	67/33
Dramatic/impulsive	Histrionic personality disorder	Overly dramatic; tending to exaggerated expressions of emotion; egocentric, seeking attention	15/85
	Narcissistic personality disorder	Grandiosely self-important; preoccupied with success fantasies; expecting special treatment; lacking interpersonal empathy	70/30
	Borderline personality disorder	Unstable in self-image, mood, and interpersonal relationships; impulsive and unpredictable	38/62
	Antisocial personality disorder	Chronically violating the rights of others; failing to accept social norms, to form attachments to others, or to sustain consistent work behavior; exploitive and reckless	82/18

Source: Estimated gender ratios from Millon (1981).

able diagnoses. Doubts have also been raised about the decision to place personality disorders on a separate axis, as there does not appear to be any fundamental distinction between personality disorders and Axis I disorders (Livesley, 2001).

In light of these problems, a variety of theorists have questioned the wisdom of the current *categorical approach* to describing personality disorders, which assumes (incorrectly, they argue) that people can reliably be placed in discontinuous (nonoverlapping) diagnostic categories (Trull & McCrae, 1994; Livesley, 2001). These theorists argue instead for a *dimensional approach*, which would describe personality disorders in terms of how people score on a limited number of continuous personality dimensions. The practical logistics of using a dimensional approach to describe personality disorders are formidable, and experts note that the categorical approach better reflects how clinicians think about pathology (Phillips, Yen, & Gunderson, 2003). In any event, debate about the classification of personality disorders is likely to continue, and changes in the official diagnostic scheme will surely be seen in DSM-V (Widiger, 2001).

The difficulties involved in the diagnosis of personality disorders have clearly hindered research on their etiology and prognosis. The only personality disorder that has a long history of extensive research is the antisocial personality disorder, which we examine next.

Antisocial Personality Disorder

Antisocial personality disorder has a misleading name. The antisocial designation does *not* mean that people with this disorder shun social interaction. In fact, rather than shrinking from social interaction, many are sociable, friendly, and superficially charming. People with this disorder are *antisocial* in that they choose to *reject widely accepted social norms* regarding moral principles and behavior.

Description

People with antisocial personalities chronically violate the rights of others. They often use their social charm to cultivate others' liking or loyalty for purposes of exploitation. **The antisocial personality disorder is marked by impulsive, callous, manipulative, aggressive, and irresponsible behavior that reflects a failure to accept social norms.** Since they haven't accepted the social norms they violate, people with antisocial personalities rarely feel guilty about their transgressions. Essentially, they lack an adequate conscience. The antisocial personality disorder occurs much more frequently among males than females. Studies suggest that it is a moderately common disorder,

seen in roughly 3%–6% of males and about 1% of females (Widiger & Mullins, 2003).

Many people with antisocial personalities get involved in illegal activities. Moreover, antisocial personalities tend to begin their criminal careers at an early age, to commit offenses at a relatively high rate, and to be versatile offenders who get involved in many types of criminal activity (Hart & Hare, 1997). However, many people with antisocial personalities keep their exploitive, amoral behavior channeled within the boundaries of the law. Such people may even enjoy high status in our society (Widiger & Mullins, 2003). In other words, the concept of the antisocial personality disorder can apply to cut-throat business executives, scheming politicians, unprincipled lawyers, and money-hungry evangelists, as well as to con artists, drug dealers, thugs, burglars, and petty thieves.

People with antisocial personalities exhibit quite a variety of maladaptive traits (Hare, Cooke, & Hart, 1999; Sutker & Allain, 2001). Among other things, they rarely experience genuine affection for others. However, they may be skilled at faking affection so they can exploit people. Sexually, they are predatory and promiscuous. They also tend to be irresponsible and impulsive. They can tolerate little frustration, and they pursue immediate gratification. These characteristics make them unreliable employees, unfaithful spouses, inattentive parents, and undependable friends. Many people with antisocial personalities have a checkered history of divorce, child abuse, and job instability. The picture does tend to improve as those with antisocial personalities become middle-aged. One study that followed antisocial men into their 50s found substantial improvement in 58% of the subjects (Black, 2001).

Etiology

Many theorists believe that biological factors contribute to the development of antisocial personality disorders. Various lines of evidence suggest a genetic predisposition toward these disorders (Moffitt, 2005).

A review of twin studies found an average concordance rate of 67% for identical twins in comparison to 31% for fraternal twins (Black, 2001). These findings are consistent with a fairly strong genetic vulnerability to the disorder. Many observers have noted that people with antisocial personalities lack the inhibitions that most of us have about violating moral standards. Their lack of inhibitions prompted Hans Eysenck (1982) to theorize that such people might inherit relatively sluggish autonomic nervous systems, leading to slow acquisition of inhibitions through classical conditioning. The findings relating to this hypothesis are inconsistent, but the notion that anti-



Illustrated Overview of Three Categories of Psychological Disorders

Axis I category

Anxiety disorders

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Edvard Munch's *The Scream* expresses overwhelming feelings of anxiety.

Subtypes

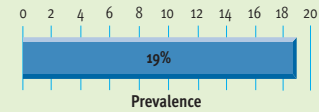
Generalized anxiety disorder: Chronic, high level of anxiety not tied to any specific threat

Phobic disorder: Persistent, irrational fear of object or situation that presents no real danger

Panic disorder: Recurrent attacks of overwhelming anxiety that occur suddenly and unexpectedly

Obsessive-compulsive disorder: Persistent, uncontrollable intrusions of unwanted thoughts and urges to engage in senseless rituals

Prevalence/well-known victim



The famous industrialist Howard Hughes suffered from obsessive-compulsive disorder.

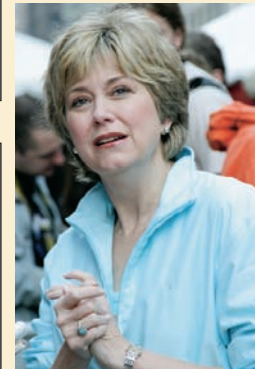
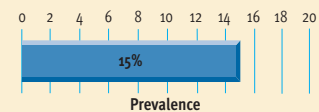
Mood disorders

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Vincent van Gogh's *Portrait of Dr. Gachet* captures the profound dejection experienced in depressive disorders.

Major depressive disorder: Two or more major depressive episodes marked by feelings of sadness, worthlessness, despair

Bipolar disorder: One or more manic episodes marked by inflated self-esteem, grandiosity, and elevated mood and energy, usually accompanied by major depressive episodes



Schizophrenic disorders

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The perceptual distortions seen in schizophrenia probably contributed to the bizarre imagery apparent in this portrait of a cat painted by Louis Wain.

Paranoid schizophrenia: Delusions of persecution and delusions of grandeur; frequent auditory hallucinations

Catatonic schizophrenia: Motor disturbances ranging from immobility to excessive, purposeless activity

Disorganized schizophrenia: Flat or inappropriate emotions; disorganized speech and adaptive behavior

Undifferentiated schizophrenia: Idiosyncratic mixtures of schizophrenic symptoms that cannot be placed into above three categories



John Nash, the Nobel Prize-winning mathematician whose story was told in the film *A Beautiful Mind*, has struggled with schizophrenia.

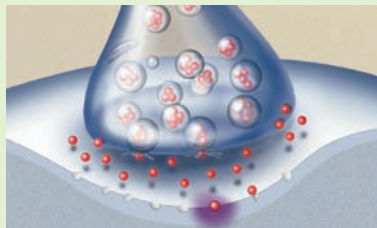
Etiology: Biological factors

Genetic vulnerability:

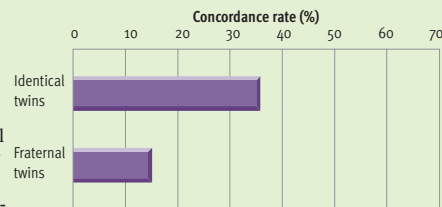
Twin studies and other evidence suggest a mild genetic predisposition to anxiety disorders.

Anxiety sensitivity:

Oversensitivity to physical symptoms of anxiety may lead to overreactions to feelings of anxiety, so anxiety breeds more anxiety.



Neurochemical bases: Disturbances in neural circuits releasing GABA may contribute to some disorders; abnormalities at serotonin synapses have been implicated in panic and obsessive-compulsive disorders.

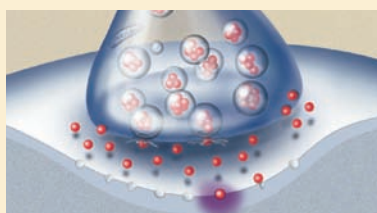


Genetic vulnerability:

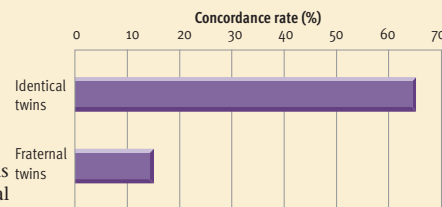
Twin studies and other evidence suggest a genetic predisposition to mood disorders.

Sleep disturbances:

Disruption of biological rhythms and sleep patterns may lead to neurochemical changes that contribute to mood disorders.

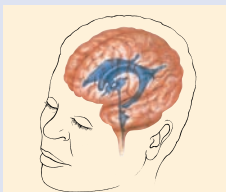
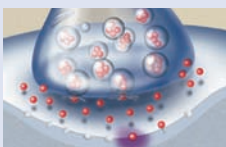


Neurochemical bases: Disturbances in neural circuits releasing norepinephrine may contribute to some mood disorders; abnormalities at serotonin synapses have also been implicated as a factor in depression.



Genetic vulnerability:

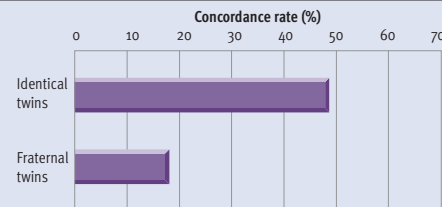
Twin studies and other evidence suggest a genetic predisposition to schizophrenic disorders.



Neurochemical bases: Overactivity in neural circuits releasing dopamine is associated with schizophrenia; but abnormalities in other neurotransmitter systems may also contribute.

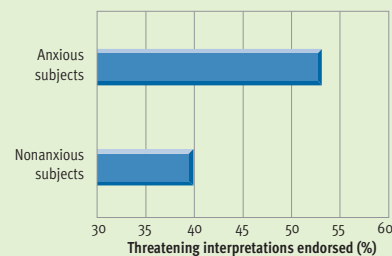
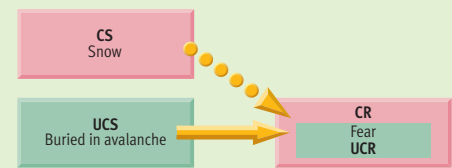
Structural abnormalities in brain:

Enlarged brain ventricles are associated with schizophrenia, but they may be an effect rather than a cause of the disorder.



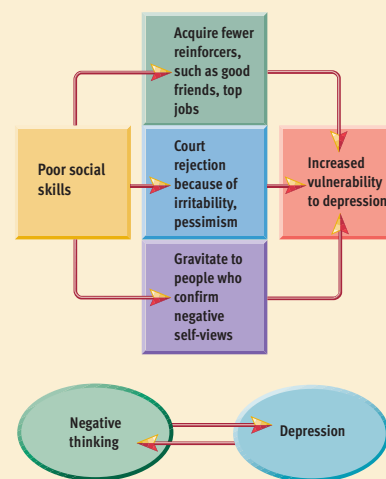
Etiology: Psychological factors

Learning: Many anxiety responses may be acquired through classical conditioning or observational learning; phobic responses may be maintained by operant reinforcement.



Stress: High stress may help to precipitate the onset of anxiety disorders.

Cognition: People who misinterpret harmless situations as threatening and who focus excessive attention on perceived threats are more vulnerable to anxiety disorders.



Interpersonal roots:

Behavioral theories emphasize how inadequate social skills can result in a paucity of reinforcers and other effects that make people vulnerable to depression.

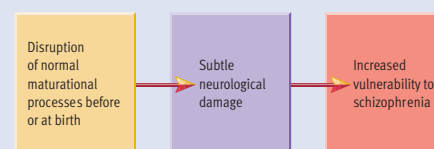
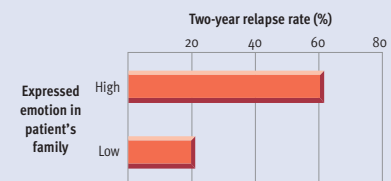
Stress: High stress can act as precipitating factor that triggers depression or bipolar disorder.

Cognition: Negative thinking can contribute to the development of depression; rumination may extend and amplify depression.

Expressed emotion:

A family's expressed emotion is a good predictor of the course of a schizophrenic patient's illness.

Stress: High stress can precipitate schizophrenic disorder in people who are vulnerable to schizophrenia.



The neurodevelopmental hypothesis: Insults to the brain sustained during prenatal development or at birth may disrupt maturational processes in the brain resulting in elevated vulnerability to schizophrenia.

social personalities exhibit underarousal has received a fair amount of support (Raine, 1997). Research also suggests that subtle neurological damage that occurs during prenatal development or the early years of childhood is associated with an increased prevalence of antisocial behavior (Brennan & Mednick, 1997).

Efforts to relate psychological factors to antisocial behavior have emphasized inadequate socialization in dysfunctional family systems (Sutker & Allain, 2001). It's easy to envision how antisocial traits could be fostered in homes where parents make haphazard or halfhearted efforts to socialize their children to be respectful, truthful, responsible, unselfish, and so forth. Consistent with this idea, studies find that individuals with antisocial personalities tend to come from homes where discipline is erratic or ineffective, and homes where they experience physical abuse and neglect (Luntz & Widom, 1994; Widom, 1997). Such people are also more likely to emerge from homes

where one or both parents exhibit antisocial traits (Black, 2001). These parents presumably model exploitive, amoral behavior, which their children acquire through observational learning.

➤ REVIEW OF KEY POINTS

- There are ten personality disorders allocated to Axis II in DSM. Personality disorders can be grouped into three clusters: anxious-fearful, odd-eccentric, and dramatic-impulsive.
- Specific personality disorders are poorly defined and there is excessive overlap among them, creating diagnostic problems. Some theorists believe that these problems could be reduced by replacing the current categorical approach to personality disorders with a dimensional approach.
- Antisocial personality disorder is characterized by manipulative, impulsive, exploitive, aggressive behavior. Research on the etiology of this disorder has implicated genetic vulnerability, autonomic reactivity, inadequate socialization, and observational learning.

➤ Psychological Disorders and the Law

PREVIEW QUESTIONS

- What is the insanity defense?
- How often is it used?
- What are the legal grounds for involuntary commitment?

Societies use laws to enforce their norms regarding appropriate behavior. Given this function, the law in our society has something to say about many issues related to abnormal behavior. In this section we examine the concepts of insanity and involuntary commitment.

Insanity

Insanity is *not* a diagnosis; it's a legal concept. **Insanity is a legal status indicating that a person cannot be held responsible for his or her actions because of mental illness.** Why is this an issue in the courtroom? Because criminal acts must be intentional. The law reasons that people who are "out of their mind" may not be able to appreciate the significance of what they're doing. The insanity defense is used in criminal trials by defendants who admit that they committed the crime but claim that they lacked intent.

No simple relationship exists between specific diagnoses of mental disorders and court findings of insanity. The vast majority of people with diagnosed psychological disorders would *not* qualify as insane. The people most likely to qualify are those troubled by severe disturbances that display delusional behavior. The courts apply various rules in making judgments about a defendant's sanity, depending on the jurisdiction (Simon, 2003). According to one widely used rule, called the *M'naghten rule*, *insanity exists when*

a mental disorder makes a person unable to distinguish right from wrong. As you can imagine, evaluating insanity as defined in the M'naghten rule can be difficult for judges and jurors, not to mention the psychologists and psychiatrists who are called into court as expert witnesses.

Although highly publicized and controversial, the insanity defense is actually used less frequently and less successfully than widely believed (see **Figure 14.22**). One study found that the general public estimates that the insanity defense is used in 37% of felony cases, when in fact it is used in less than 1% (Silver, Cirincione, & Steadman, 1994). Another study of over 60,000 indictments in Baltimore found that only 190 defendants (0.31%) pleaded insanity, and of these, only 8 were successful (Janofsky et al., 1996).

Involuntary Commitment

The issue of insanity surfaces only in *criminal* proceedings. Far more people are affected by *civil* proceedings relating to involuntary commitment. **In involuntary commitment people are hospitalized in psychiatric facilities against their will.** What are the grounds for such a dramatic action? They vary some from state to state. Generally, people are subject to involuntary commitment when mental health professionals and legal authorities believe that a mental disorder makes them (1) dangerous to themselves (usually suicidal), (2) dangerous to others (potentially violent), or (3) in

Web Link 14.8



David Willshire's Forensic Psychology and Psychiatry Links This site's webmaster, a senior psychologist at Australia's Victorian Institute of Forensic Mental Health, has brought together a large set of annotated links on all aspects of forensic matters—that is, how the law and criminal justice system interact with psychology and psychiatry.

need of treatment (applied in cases of severe disorientation). In emergency situations psychologists and psychiatrists can authorize *temporary* commitment, usually for 24 to 72 hours. Orders for long-term involuntary commitment are usually set up for renewable six-month periods and can be issued by a court only after a formal hearing. Mental health professionals provide extensive input in these hearings, but the courts make the final decisions (Simon, 2003).

Most involuntary commitments occur because people appear to be *dangerous* to themselves or others. The difficulty, however, is in predicting dangerousness. Studies suggest that clinicians' short-term predictions about which patients are likely to become violent are only moderately accurate and that their long-term predictions of violent behavior are largely inaccurate (Simon, 2003; Stone, 1999). This inaccuracy in predicting dangerousness is unfortunate, because involuntary commitment involves the *detention* of people for what they *might* do in the future.

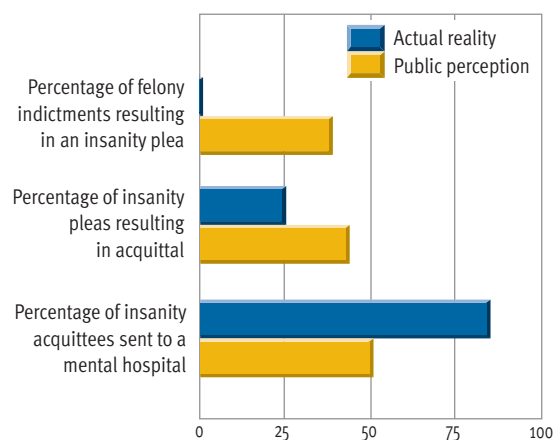


Figure 14.22
The insanity defense: Public perceptions and actual realities. Silver, Cirincione, and Steadman (1994) collected data on the general public's beliefs about the insanity defense and the realities of how often it is used and how often it is successful (based on a large-scale survey of insanity pleas in eight states). Because of highly selective media coverage, dramatic disparities are seen between public perceptions and actual realities, as the insanity defense is used less frequently and less successfully than widely assumed.

Such detention goes against the grain of the American legal principle that people are *innocent until proven guilty*. The inherent difficulty in predicting dangerousness makes involuntary commitment a complex and controversial issue.

> Culture and Pathology

The legal rules governing insanity and involuntary commitment obviously are culture-specific. And we noted earlier that judgments of normality and abnormality are influenced by cultural norms and values. In light of these realities, would it be reasonable to infer that psychological disorders are culturally variable phenomena? Social scientists are sharply divided on the answer to this question. Some embrace a *relativistic view* of psychological disorders, whereas others subscribe to a *universalistic or pancultural view* (Tanaka-Matsumi, 2001). Theorists who embrace the *relativistic view* argue that the criteria of mental illness vary greatly across cultures and that there are no universal standards of normality and abnormality. According to the relativists, the DSM diagnostic system reflects an ethnocentric, Western, white, urban, middle- and upper-class cultural orientation that has limited relevance in other cultural contexts. In contrast, those who subscribe to the *pancultural view* argue that the criteria of mental illness are much the same around the world and that basic standards of normality and abnormality are universal across cultures. Theorists who accept the pancultural view of psychopathology typically maintain that Western diagnostic concepts have validity and utility in other cultural contexts.

The debate about culture and pathology basically boils down to two specific issues: (1) Are the psychological disorders seen in Western societies found

throughout the world? (2) Are the symptom patterns of mental disorders invariant across cultures? Let's briefly examine the evidence on these questions and then reconsider the relativistic and pancultural views of psychological disorders.

Are Equivalent Disorders Found Around the World?

Most investigators agree that the principal categories of serious psychological disturbance—schizophrenia, depression, and bipolar illness—are identifiable in all cultures (Tsai et al., 2001). Most behaviors that are regarded as clearly abnormal in Western culture are also viewed as abnormal in other cultures. People who are delusional, hallucinatory, disoriented, or incoherent are thought to be disturbed in all societies, although there are cultural disparities in exactly what is considered delusional or hallucinatory.

Cultural variations are more apparent in the recognition of less severe forms of psychological disturbance (Mezzich, Lewis-Fernandez, & Ruizperez, 2003). Additional research is needed, but relatively mild types of pathology that do not disrupt behavior in obvious ways appear to go unrecognized in many societies. Thus, syndromes such as generalized anxiety disorder, hypochondria, and narcissistic personality disorder, which are firmly established as diagnostic entities in the DSM, are viewed in some cultures as “run of the

PREVIEW QUESTIONS

- Are the same psychological disorders found in all cultures?
- Are the symptoms of psychological disorders influenced by culture?

mill” difficulties and peculiarities rather than as full-fledged disorders.

Finally, researchers have discovered a small number of *culture-bound disorders* that further illustrate the diversity of abnormal behavior around the world (Griffith, Gonzalez, & Blue, 2003; Guarnaccia & Rogler, 1999). **Culture-bound disorders are abnormal syndromes found only in a few cultural groups.** For example, *koro*, an obsessive fear that one’s penis will withdraw into one’s abdomen, is seen only among Chinese males in Malaya and several other regions of southern Asia. *Windigo*, which involves an intense craving for human flesh and fear that one will turn into a cannibal, is seen only among Algonquin Indian cultures. And until fairly recently, the eating disorder *anorexia nervosa*, discussed in this chapter’s Personal Application, was largely seen only in affluent Western cultures.

Are Symptom Patterns Culturally Invariant?

Do the major types of psychological disorders manifest themselves in the same way around the world? For the most part, yes. The constellations of symptoms associated with schizophrenia and bipolar illness are largely the same across widely disparate societies (Draguns, 1980, 1990). However, cultural variations in symptom patterns are also seen (Mezzich et al., 2003). For example, delusions are a common symptom of schizophrenia in all cultures, but the specific delusions that people report are tied to their cultural heritage (Brislin, 1993). In technologically advanced societies, schizophrenic patients report that thoughts are being inserted into their minds through transmissions from electric lines, satellites, or microwave ovens. Victims of schizophrenia in less technological societies experience the same phenomenon but blame sorcerers or demons. Of the major disorders, symptom patterns are probably most variable for depression. For example, profound feelings of guilt and

self-deprecation lie at the core of depression in Western cultures but are far less central to depression in many other societies. In non-Western cultures, depression tends to be expressed in terms of somatic symptoms, such as complaints of fatigue, headaches, and backaches, more than psychological symptoms, such as dejection and low self-esteem (Tsai et al., 2001; Young, 1997). These differences presumably occur because people learn to express symptoms of psychological distress in ways that are acceptable in their culture.

So, what can we conclude about the validity of the relativistic versus pancultural views of psychological disorders? Both views appear to have some merit. As we have seen in other areas of research, psychopathology is characterized by both cultural variance and invariance. Investigators have identified some universal standards of normality and abnormality and found considerable similarity across cultures in the syndromes that are regarded as pathological and in their patterns of symptoms. However, researchers have also discovered many cultural variations in the recognition, definition, and symptoms of various psychological disorders. Given this extensive variability, the relativists’ concerns about the ethnocentric nature of the DSM diagnostic system seem well founded.

➤ REVIEW OF KEY POINTS

- Insanity is a legal concept applied to people who cannot be held responsible for their actions because of mental illness. The insanity defense is used less frequently and less successfully than widely believed. When people appear to be dangerous to themselves or others, courts may rule that they are subject to involuntary commitment in a hospital.
- The principal categories of psychological disturbance are identifiable in all cultures. However, milder disorders may go unrecognized in some societies, and culture-bound disorders further illustrate the diversity of abnormal behavior around the world. The symptoms associated with specific disorders are largely the same across different cultures, but cultural variations are seen in the details of how these symptoms are expressed.

➤ Reflecting on the Chapter’s Themes

Multifactorial
Causation



Heredity and
Environment



Sociohistorical
Context



Cultural
Heritage



Our examination of abnormal behavior and its roots has highlighted four of our organizing themes: multifactorial causation, the interplay of heredity and environment, the sociohistorical context in which psychology evolves, and the influence of culture on psychological phenomena.

We can safely assert that every disorder described in this chapter has multiple causes. The development

of mental disorders involves an interplay among a variety of psychological, biological, and social factors. We also saw that most psychological disorders depend on an interaction of genetics and experience. This interaction shows up most clearly in the *stress-vulnerability models* for mood disorders and schizophrenic disorders (see **Figure 14.23**). *Vulnerability* to these disorders seems to depend primarily on hered-

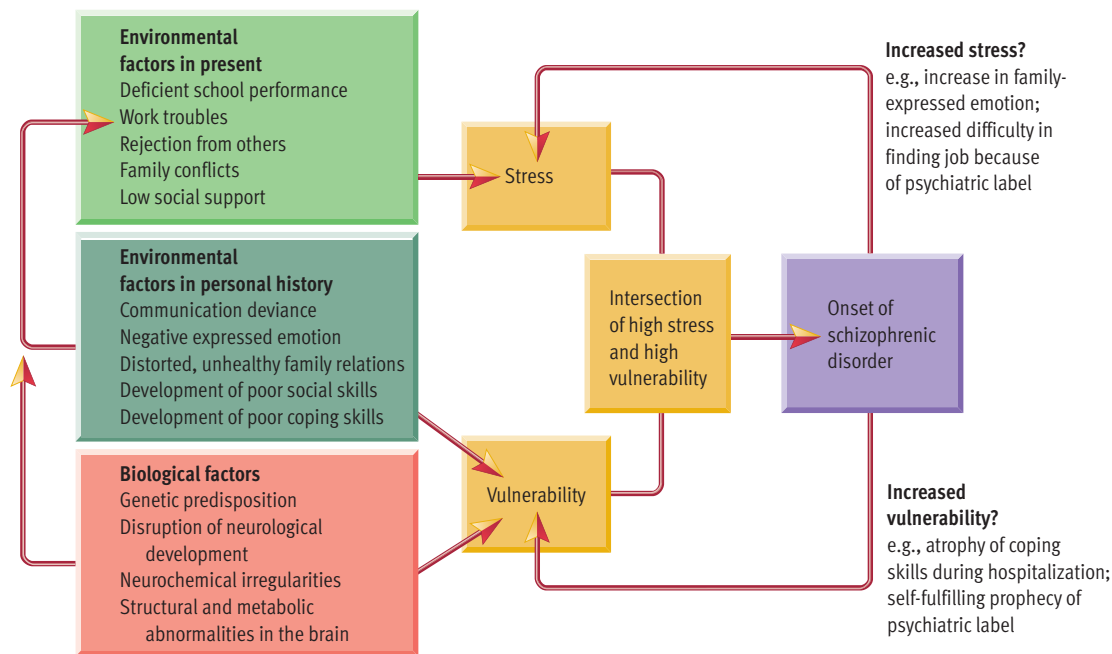


Figure 14.23
The stress-vulnerability model of schizophrenia.
 Multifactorial causation is readily apparent in current theories about the etiology of schizophrenic disorders. A variety of biological factors and personal history factors influence one's vulnerability to the disorder, which interacts with the amount of stress one experiences. Schizophrenic disorders appear to result from an intersection of high stress and high vulnerability.

ity, whereas stress is largely a function of environment. According to stress-vulnerability theories, disorders emerge when high vulnerability intersects with high stress. A high biological vulnerability may not be converted into a disorder if a person's stress is low. Similarly, high stress may not lead to a disorder if vulnerability is low. Thus, the impact of heredity depends on the environment, and the effect of environment depends on heredity.

This chapter also demonstrated that psychology evolves in a sociohistorical context. We saw that modern conceptions of normality and abnormality are

largely shaped by empirical research, but social trends, economic necessities, and political realities also play a role. Finally, our discussion of psychological disorders showed once again that psychological phenomena are shaped to some degree by cultural parameters. Although some standards of normality and abnormality transcend cultural boundaries, cultural norms influence many aspects of psychopathology. Indeed, the influence of culture will be apparent in our upcoming Personal Application on eating disorders. These disorders are largely a creation of modern, affluent, Western culture.

PERSONAL Application

Understanding Eating Disorders

Answer the following "true" or "false."

- ___ 1 Although they have only attracted attention in recent years, eating disorders have a long history and have always been fairly common.
- ___ 2 People with anorexia nervosa are much more likely to recognize that their eating behavior is pathological than people suffering from bulimia nervosa are.
- ___ 3 The prevalence of eating disorders is twice as high in women as it is in men.
- ___ 4 The binge-and-purge syndrome seen in bulimia nervosa is not common in anorexia nervosa.

All of the above statements are false, as you will see in this Personal Application. The psychological disorders that we discussed in the main body of the chapter have largely been recognized for centuries, and most of them are found in one form or another in all cultures and societies. Eating disorders present a sharp contrast to this picture; they have only been recognized relatively recently

and they have largely been confined to affluent, Westernized cultures (G. F. M. Russell, 1995; Szmukler & Patton, 1995). In spite of these fascinating differences, eating disorders have much in common with traditional forms of pathology.

Description

Eating disorders are severe disturbances in eating behavior characterized by preoccupation with one's weight and unhealthy efforts to control weight. The vast majority

of cases consist of two sometimes overlapping syndromes: *anorexia nervosa* and *bulimia nervosa*. Although most people don't seem to take eating disorders as seriously as other types of psychological disorders, you will see that they are dangerous and debilitating (Striegel-Moore & Smolak, 2001).

Anorexia nervosa involves intense fear of gaining weight, disturbed body image, refusal to maintain normal weight, and dangerous measures to lose weight. Two subtypes have been observed (Herzog & Delinsky, 2001). In *restricting type anorexia nervosa*, people drastically reduce their intake of food, sometimes literally starving themselves. In *binge-eating/purging type anorexia nervosa*, individuals attempt to lose weight by forcing themselves to vomit after meals, by misusing laxatives and diuretics, and by engaging in excessive exercise.

People with both types suffer from disturbed body image. No matter how frail and emaciated they become, they insist that they are too fat. Their morbid fear of obesity means that they are never satisfied with their weight. If they gain a pound or two, they panic. The only thing that makes them happy is to lose more weight. The common result is a relentless decline in body weight; people entering treatment for anorexia nervosa are typically 25%–30% below their normal weight (Hsu, 1990). Because of their disturbed body image, people suffering from anorexia generally do *not* appreciate the maladaptive quality of their behavior and rarely seek treatment on their own. They are typically coaxed or coerced into treatment by friends or family members who are alarmed by their appearance.

Anorexia nervosa eventually leads to a cascade of medical problems, including *amenorrhea* (a loss of menstrual cycles in women), gastrointestinal problems, low blood pressure, *osteoporosis* (a loss of bone density), and metabolic disturbances that can lead to cardiac arrest or circulatory collapse (Pomeroy & Mitchell, 2002; Walsh, 2003). Anorexia is a serious illness that leads to death in 5%–10% of patients (Steinhausen, 2002).

Bulimia nervosa involves habitually engaging in out-of-control

overeating followed by unhealthy compensatory efforts, such as self-induced vomiting, fasting, abuse of laxatives and diuretics, and excessive exercise. The eating binges are usually carried out in secret and are followed by intense guilt and concern about gaining weight. These feelings motivate ill-advised strategies to undo the effects of the overeating. However, vomiting only prevents the absorption of about half of recently consumed food, and laxatives and diuretics have negligible impact on caloric intake, so people suffering from bulimia nervosa typically maintain a reasonably normal weight (Beumont, 2002; Kaye et al., 1993). Medical problems associated with bulimia nervosa include cardiac arrhythmias, dental problems, metabolic deficiencies, and gastrointestinal problems (Halmi, 2002, 2003).

Obviously, bulimia nervosa shares many features with anorexia nervosa, such as a morbid fear of becoming obese, preoccupation with food, and rigid, maladaptive approaches to controlling weight that are grounded in naive all-or-none thinking. The close relationship between the disorders is demonstrated by the fact that many patients who initially develop one syndrome cross over to display the other syndrome (Tozzi et al., 2005). However, the two syndromes also differ in crucial ways. First and foremost,

bulimia is a much less life-threatening condition. Second, although their appearance is usually more “normal” than that seen in anorexia, people with bulimia are much more likely to recognize that their eating behavior is pathological and are more likely to cooperate with treatment (Striegel-Moore, Silberstein, & Rodin, 1993).

History and Prevalence

Historians have been able to track down descriptions of anorexia nervosa that date back centuries, so the disorder is *not* entirely new, but anorexia nervosa did not become a common affliction until the middle part of the 20th century (Vandereycken, 2002). Although bingeing and purging have a long history in some cultures, they were not part of pathological efforts to control weight, and bulimia nervosa appears to be a new syndrome that emerged gradually in the middle of the 20th century and was first recognized in the 1970s (G. F. M. Russell, 1997; Vandereycken, 2002).

Both disorders are a product of modern, affluent, Western culture, where food is generally plentiful and the desirability of being thin is widely endorsed. Until recently, these disorders were not seen outside of Western cultures (Hoek, 2002). However, in recent years, advances in communication have exported Western culture to far-flung corners of the globe, and eating disorders have started showing up in many non-Western societies, especially affluent Asian countries (Lee & Katzman, 2002).

A huge gender gap is seen in the likelihood of developing eating disorders. About 90%–95% of individuals with eating disorders are female (Thompson & Kinder, 2003). This staggering discrepancy appears to be a result of cultural pressures rather than biological factors (Smolak & Murnen, 2001). Western standards of attractiveness emphasize slenderness more for females than for males, and women generally experience greater pressure to be physically attractive than men do (Sobal, 1995). Eating disorders mostly afflict young women. The typical age of onset for anorexia is



Eating disorders have become common and have been seen in many prominent women, such as Jane Fonda and Sally Field.

© AP/Wide World Photos

14 to 18 and for bulimia it is 15 to 21 (see **Figure 14.24**).

How common are eating disorders in Western societies? The prevalence of these disorders has increased substantially in recent decades, although this escalation may be leveling off (Steiger & Seguin, 1999). Studies of young women suggest that about 0.5%–1.5% develop anorexia nervosa (Thompson, 2004), and about 2%–3% develop bulimia nervosa (Romano & Quinn, 2001). These figures may seem small, but they mean that millions of young women wrestle with serious eating problems.

Etiology of Eating Disorders

Like other types of psychological disorders, eating disorders are caused by multiple determinants that work interactively. Let's take a brief look at some of the factors that contribute to the development of anorexia nervosa and bulimia nervosa.

Genetic Vulnerability

The evidence is not nearly as strong or complete as for many other types of psychopathology (such as anxiety, mood, and schizophrenic disorders), but some people may inherit a genetic vulnerability to eating disorders. Studies show that relatives of patients with eating disorders have elevated rates of anorexia nervosa and bulimia nervosa (Bulik, 2004). Twin studies suggest that a genetic predisposition may be at work (Steiger, Bruce, & Israel, 2003).

Personality Factors

Certain personality traits may increase vulnerability to eating disorders. There are innumerable exceptions, but victims of anorexia nervosa tend to be obsessive, rigid, and emotionally restrained, whereas victims of bulimia nervosa tend to be impulsive, overly sensitive, and low in self-esteem (Anderluh et al., 2003; Wonderlich, 2002). Recent research also suggests that perfectionism is a risk factor for anorexia (Bulik et al., 2003; Halmi et al., 2000).

Cultural Values

The contribution of cultural values to the increased prevalence of eating disorders can hardly be overestimated (Anderson-Fye & Becker, 2004; Stice, 2001). In Western soci-

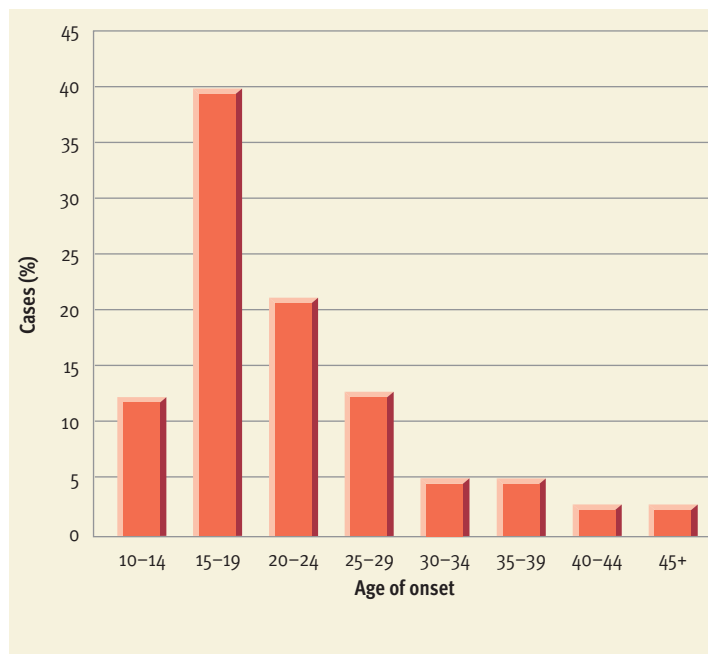


Figure 14.24
Age of onset for anorexia nervosa. Eating disorders tend to emerge during adolescence, as these data for anorexia nervosa show. This graph shows how age of onset was distributed in a sample of 166 female patients from Minnesota. As you can see, over half the patients experienced the onset of their illness before the age of 20, with vulnerability clearly peaking between the ages of 15 and 19. (Data from Lucas et al., 1991.)

ety, young women are socialized to believe that they must be attractive, and to be attractive they must be as thin as the actresses and fashion models that dominate the media (Lavine, Sweeney, & Wagner, 1999). Thanks to this cultural milieu, many young women are dissatisfied with their weight, as the societal ideals promoted by the media are unattainable for most of them (Thompson & Stice, 2001). Unfortunately, in a small portion of these women, the pressure to be thin, in combination with genetic vulnerability, family pathology, and other factors, leads to unhealthy efforts to control weight.

The Role of the Family

Quite a number of theorists emphasize how family dynamics can contribute to the development of anorexia nervosa and bulimia nervosa in young women (Haworth-Hoepfner, 2000). Some theorists suggest that parents who are overly involved in their children's lives turn the normal adolescent push for independence into an unhealthy struggle (Minuchin, Rosman, & Baker, 1978). Needing to assert their autonomy, some adolescent girls seek extreme control over their body, leading to pathological patterns of eating (Bruch, 1978). Other theorists maintain that some mothers contribute to eating disorders simply by endorsing society's message that "you can never be too thin" and by modeling unhealthy dieting behaviors of their own (Pike & Rodin, 1991).

Cognitive Factors

Many theorists emphasize the role of disturbed thinking in the etiology of eating disorders (Williamson et al., 2001). For example, anorexic patients' typical belief that they are fat when they are really wasting away is a dramatic illustration of how thinking goes awry. Patients with eating disorders display rigid, all-or-none thinking and many maladaptive beliefs, such as "I must be thin to be accepted"; "If I am not in complete control, I will lose all control"; and "If I gain one pound, I'll go on to gain enormous weight." Additional research is needed to determine whether distorted thinking is a *cause* or merely a *symptom* of eating disorders.

REVIEW OF KEY POINTS

- The principal eating disorders are anorexia nervosa and bulimia nervosa. Both disorders reflect a morbid fear of gaining weight. Anorexia and bulimia both lead to a cascade of medical problems. Both disorders appear to be largely a product of modern, affluent, Westernized culture.
- Females account for 90%–95% of eating disorders. The typical age of onset is roughly 15 to 20. There appears to be a genetic vulnerability to eating disorders. Cultural pressures on young women to be thin clearly help to foster eating disorders. Unhealthy family dynamics, certain personality traits, and disturbed thinking can also contribute to the development of eating disorders.

CRITICAL THINKING Application

Working with Probabilities in Thinking About Mental Illness

As you read about the various types of psychological disorders, did you think to yourself that you or someone you know was being described? On the one hand, there is no reason to be alarmed. The tendency to see yourself and your friends in descriptions of pathology is a common one, sometimes called the *medical students' disease* because beginning medical students often erroneously believe that they or their friends have whatever diseases they are currently learning about. On the other hand, realistically speaking, it is quite likely that you know *many* people with psychological disorders because—as you learned in the main body of the chapter—the likelihood of anyone having at least one DSM disorder is estimated to be about 44% (consult **Figure 14.5** on p. 557).

This estimate strikes most people as surprisingly high. Why is this so? One reason is that when people think about psychological disorders they tend to think of severe disorders, such as bipolar disorder or schizophrenia, which are relatively infrequent, rather than “run of the mill” disturbances, such as anxiety and depressive disorders, which are much more common. When it comes to mental illness, people tend to think of patients in straightjackets or of obviously disturbed homeless people who do not reflect the broad and diverse population of people who suffer from psychological disorders. In other words, their *prototypes* or “best examples” of mental illness consist of severe disorders that are infrequent, so they underestimate the prevalence of mental disorders. This distortion illustrates the influence of the **representativeness heuristic, which is basing the estimated probability of an event on how similar it is to the typical prototype of that event** (see Chapter 8).

Do you still find it hard to believe that the overall prevalence of psychological disorders is about 44%? Another reason this

number seems surprisingly high is that many people do not understand that the probability of having *at least one* disorder is much higher than the probability of having the most prevalent disorder by itself. For example, the probability of having a substance-use disorder, the single most common type of disorder, is approximately 24%, but the probability of having a substance-use disorder *or* an anxiety disorder *or* a mood disorder *or* a schizophrenic disorder jumps to 44%. These “or” relationships represent *cumulative probabilities*. Yet another consideration that makes the prevalence figures seem high is that many people confuse different types of *prevalence rates*. The 44% estimate is for *lifetime prevalence*, which means it is the probability of having *any* disorder *at least once* at any time in one's lifetime. The lifetime prevalence rate is another example of “or” relationships. It is

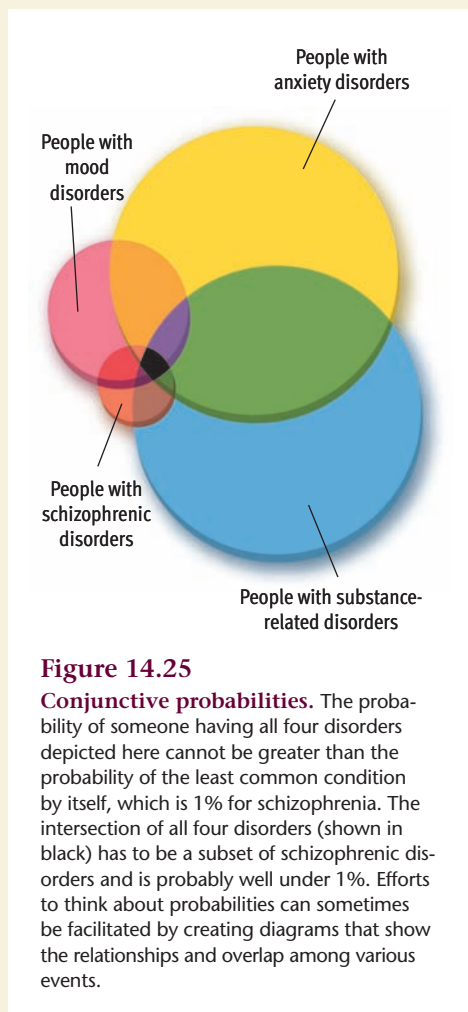
a value that takes into account the probability of having a psychological disorder in childhood *or* adolescence *or* adulthood *or* old age. *Point prevalence rates*, which estimate the percentage of people manifesting various disorders *at a particular point in time*, are much lower because many psychological disorders last only a few months to a few years.

What about “and” relationships—that is, relationships in which we want to know the probability of someone having condition A *and* condition B? For example, given the lifetime prevalence estimates (from **Figure 14.5**) for each category of disorder, which are shown in the parentheses, what is the probability of someone having a substance-use disorder (24% prevalence) *and* an anxiety disorder (19%) *and* a mood disorder (15%) *and* a schizophrenic disorder (1%) during his or her lifetime? Such “and” relationships represent *conjunctive probabilities*. Stop and think: what must be true about the probability of having all four types of disorders? Will this probability be less than 24%, between 24% and 44%, or over 44%? You may be surprised to learn that this figure is probably well under 1%. You can't have all four disorders unless you have the least frequent disorder (schizophrenia), which has a prevalence of 1%, so the answer *must* be 1% or less. Moreover, of all of the people with schizophrenia, only a tiny subset of them are likely to have all three of the other disorders, so the answer is probably well under 1% (see **Figure 14.25**). If this type of question strikes you as contrived, think again. Epidemiologists have devoted an enormous amount of research to the estimation of **comorbidity—the coexistence of two or more disorders**—because it greatly complicates treatment issues.

These are two examples of using statistical probabilities as a critical thinking tool. Let's apply this type of thinking to another

Image Not Available

Highly publicized insanity trials, such as that of John Hinckley, Jr., who tried to assassinate President Reagan, lead the public to greatly overestimate how often the insanity defense is used, illustrating the impact of the availability heuristic.



problem dealing with physical health. Here is a problem used in a study by Tversky and Kahneman (1983, p. 308) that many physicians got wrong:

A health survey was conducted in a sample of adult males in British Columbia, of all ages and occupations. Please give your best estimate of the following values:

What percentage of the men surveyed have had one or more heart attacks? _____

What percentage of the men surveyed both are over 55 years old and have had one or more heart attacks? _____

Fill in the blanks above with your best guesses. Of course, you probably have only a very general idea about the prevalence of heart attacks, but go ahead and fill in the blanks anyway.

The actual values are not as important in this example as the relative values are. Over 65% of the physicians who participated in the experiment by Tversky and Kahneman gave a higher percentage value for the second question than for the first. What is wrong with their answers? The second question is asking about the conjunctive probability of two events. Hopefully, you see why this figure *must* be less than the probability of either one of these events occurring alone. Of all of the men in the survey who had had a heart attack, only some of them are also over 55, so the second number must be smaller than the first. As we saw in Chapter 8, this common error in thinking is called the *conjunction fallacy*. **The conjunction fallacy occurs when people estimate that the odds of two uncertain events happening together are greater than the odds of either event happening alone.**

Why did so many physicians get this problem wrong? They were vulnerable to the conjunction fallacy because they were influenced by the *representativeness heuristic*, or the power of prototypes. When physicians think “heart attack,” they tend to envision a man over the age of 55. Hence, the second scenario fit so well with their prototype of a heart attack victim, they carelessly overestimated its probability.

Let’s consider some additional examples of erroneous reasoning about probabilities involving how people think about psychological disorders. Toward the beginning of

the chapter, we discussed the fact that many people tend to stereotypically assume that mentally ill people are likely to be violent. Near the end of the chapter, we noted that people tend to wildly overestimate (37-fold in one study) how often the insanity defense is used in criminal trials. These examples reflect the influence of the *availability heuristic*, which is basing the estimated probability of an event on the ease with which relevant instances come to mind. Because of the availability heuristic, people tend to overestimate the probability of dramatic events that receive heavy media coverage, even when these events are rare, because examples of the events are easy to retrieve from memory. Violent acts by former psychiatric patients tend to get lots of attention in the press. And because of the *hindsight bias*, journalists tend to question why authorities couldn’t foresee and prevent the violence (see the Critical Thinking Application for Chapter 12), so the mental illness angle tends to be emphasized. In a similar vein, press coverage is usually intense when a defendant in a murder trial mounts an insanity defense.

In sum, the various types of statistics that come up in thinking about psychological disorders demonstrate that we are constantly working with probabilities, even though we may not realize it. Critical thinking requires a good understanding of the laws of probability because there are very few certainties in life.

Table 14.3 Critical Thinking Skills Discussed in This Application

Skill	Description
Understanding the limitations of the representativeness heuristic	The critical thinker understands that focusing on prototypes can lead to inaccurate probability estimates.
Understanding cumulative probabilities	The critical thinker understands that the probability of at least one of several events occurring is additive, and increases with time and the number of events.
Understanding conjunctive probabilities	The critical thinker appreciates that the probability of two uncertain events happening together is less than the probability of either event happening alone.
Understanding the limitations of the availability heuristic	The critical thinker understands that the ease with which examples come to mind may not be an accurate guide to the probability of an event.

CHAPTER 14 *Recap*

Key Ideas

Abnormal Behavior: Myths, Realities, and Controversies

- The medical model assumes that it is useful to view abnormal behavior as a disease. This view has been criticized on the grounds that it turns ethical questions about deviance into medical questions.
- Three criteria are used in deciding whether people suffer from psychological disorders: deviance, personal distress, and maladaptive behavior. People with psychological disorders are not particularly bizarre or dangerous, and even the most severe disorders are potentially curable.
- DSM-IV is the official psychodiagnostic classification system in the United States. This system asks for information about patients on five axes, or dimensions. Psychological disorders are more common than widely believed.

Anxiety Disorders

- The anxiety disorders include generalized anxiety disorder, phobic disorder, panic disorder, obsessive-compulsive disorder, and posttraumatic stress disorder. Heredity, oversensitivity to the physiological symptoms of anxiety, and abnormalities in GABA or serotonin activity may contribute to these disorders.
- Many anxiety responses, especially phobias, may be caused by classical conditioning and then maintained by operant conditioning. Cognitive theorists hold that a tendency to overinterpret harmless situations as threatening may make some people vulnerable to anxiety disorders. Stress may also trigger anxiety disorders.

Somatoform Disorders

- Somatoform disorders include somatization disorder, conversion disorder, and hypochondriasis. These disorders often emerge in people with histrionic personalities and in people who focus excess attention on their internal physiological processes.

Dissociative Disorders

- Dissociative disorders include dissociative amnesia and fugue and dissociative identity disorder (DID). These disorders are uncommon and their causes are not well understood. Dissociative identity disorder is a controversial diagnosis.

Mood Disorders

- The principal mood disorders are major depressive disorder and bipolar disorder. Mood disorders are episodic. Depression is more common in females than males.
- Evidence indicates that people vary in their genetic vulnerability to mood disorders. These disorders are accompanied by changes in neurochemical activity in the brain. Depression is associated with reduced hippocampal volume and suppressed neurogenesis. Cognitive models posit that negative thinking contributes to depression. Depression is often rooted in interpersonal inadequacies and stress.

Schizophrenic Disorders

- Schizophrenic disorders are characterized by deterioration of adaptive behavior, delusions, hallucinations, and disturbed mood. Research has linked schizophrenia to genetic vulnerability, changes in neurotransmitter activity, and structural abnormalities in the brain.
- The neurodevelopmental hypothesis asserts that schizophrenia is attributable to disruptions in the normal maturational processes of the brain before or at birth that are caused by prenatal viral infections, obstetrical complications, and other insults to the brain. Precipitating stress and unhealthy family dynamics, including high expressed emotion, may also modulate the course of schizophrenia.

Personality Disorders

- Ten personality disorders, grouped into three clusters, are allocated to Axis II in the DSM. The antisocial personality disorder involves manipulative, impulsive, exploitive, aggressive behavior. Research on the etiology of this disorder has implicated genetic vulnerability, autonomic reactivity, inadequate socialization, and observational learning.

Psychological Disorders and the Law

- Insanity is a legal concept applied to people who cannot be held responsible for their actions because of mental illness. When people appear to be dangerous to themselves or others, courts may rule that they are subject to involuntary commitment in a hospital.

Culture and Pathology

- The principal categories of psychological disturbance are identifiable in all cultures, but milder disorders may go unrecognized in some societies. The symptoms associated with specific disorders are largely the same across different cultures, but some variability is seen.

Reflecting on the Chapter's Themes

- This chapter highlighted four of our unifying themes, showing that behavior is governed by multiple causes, that heredity and environment jointly influence mental disorders, that psychology evolves in a sociohistorical context, and that pathology is characterized by both cultural variance and invariance.

PERSONAL APPLICATION • Understanding Eating Disorders

- The principal eating disorders are anorexia nervosa and bulimia nervosa. Both disorders reflect a morbid fear of gaining weight, and both appear to be largely a product of modern, affluent, Westernized culture. Females account for 90%–95% of eating disorders.
- There appears to be a genetic vulnerability to eating disorders. Cultural pressures on young women to be thin clearly help foster eating disorders. Unhealthy family dynamics and disturbed thinking can also contribute.

CRITICAL THINKING APPLICATION • Working with Probabilities in Thinking About Mental Illness

- Probability estimates can be distorted by the representativeness heuristic and the availability heuristic. Cumulative probabilities are additive, whereas conjunctive probabilities are always less than the likelihood of any one of the events happening alone.

Key Terms

- Agoraphobia (p. 558)
- Anorexia nervosa (p. 588)
- Antisocial personality disorder (p. 581)
- Anxiety disorders (p. 557)
- Availability heuristic (p. 591)
- Bipolar disorder (p. 568)
- Bulimia nervosa (p. 588)
- Catatonic schizophrenia (p. 574)
- Comorbidity (p. 590)
- Concordance rate (p. 560)
- Conjunction fallacy (p. 591)
- Conversion disorder (p. 562)
- Culture-bound disorders (p. 586)
- Cyclothymic disorder (p. 568)
- Delusions (p. 574)
- Diagnosis (p. 552)
- Disorganized schizophrenia (p. 575)
- Dissociative amnesia (p. 564)
- Dissociative disorders (p. 564)
- Dissociative fugue (p. 564)
- Dissociative identity disorder (DID) (p. 565)
- Dysthymic disorder (p. 567)
- Eating disorders (p. 587)
- Epidemiology (p. 556)
- Etiology (p. 552)
- Generalized anxiety disorder (p. 557)
- Hallucinations (p. 574)
- Hypochondriasis (p. 563)
- Insanity (p. 584)
- Involuntary commitment (p. 584)
- Major depressive disorder (p. 566)
- Manic-depressive disorder (p. 568)
- Medical model (p. 551)
- Mood disorders (p. 566)
- Multiple-personality disorder (p. 565)
- Negative symptoms (p. 575)
- Obsessive-compulsive disorder (OCD) (p. 558)
- Panic disorder (p. 558)
- Paranoid schizophrenia (p. 574)
- Personality disorders (p. 580)
- Phobic disorder (p. 557)
- Positive symptoms (p. 575)
- Posttraumatic stress disorder (PTSD) (p. 559)
- Prevalence (p. 556)
- Prognosis (p. 552)
- Representativeness heuristic (p. 590)
- Schizophrenic disorders (p. 573)
- Somatization disorder (p. 562)
- Somatoform disorders (p. 562)
- Undifferentiated schizophrenia (p. 575)

Key People

- Nancy Andreasen (p. 575)
- Susan Nolen-Hoeksema (pp. 567–568, 570)
- David Rosenhan (p. 554)
- Martin Seligman (p. 570)
- Thomas Szasz (pp. 551–552)

CHAPTER 14 Practice Test

- According to Thomas Szasz, abnormal behavior usually involves:
 - behavior that is statistically unusual.
 - behavior that deviates from social norms.
 - a disease of the mind.
 - biological imbalance.
- Although Sue is plagued by a high level of dread, worry, and anxiety, she still manages to meet her daily responsibilities. Sue's behavior:
 - should not be considered abnormal, since her adaptive functioning is not impaired.
 - should not be considered abnormal, since everyone sometimes experiences worry and anxiety.
 - can still be considered abnormal, since she feels great personal distress.
 - involves both a and b.
- The fact that people acquire phobias of ancient sources of threat (such as snakes) much more readily than modern sources of threat (such as electrical outlets) can best be explained by:
 - classical conditioning.
 - operant conditioning.
 - observational learning.
 - preparedness.
- Which of the following statements about dissociative identity disorder is true?
 - The original personality is always aware of the alternate personalities.
 - The alternate personalities are usually unaware of the original personality.
 - The personalities are typically all quite similar to one another.
 - Starting in the 1970s, a dramatic increase occurred in the diagnosis of dissociative identity disorder.
- People with unipolar disorders experience _____; people with bipolar disorders are vulnerable to _____.
 - alternating periods of depression and mania; mania only
 - depression only; alternating periods of depression and mania
 - mania only; alternating periods of depression and mania
 - alternating periods of depression and mania; depression and mania simultaneously
- A concordance rate indicates:
 - the percentage of relatives who exhibit the same disorder.
 - the percentage of people with a given disorder who are currently receiving treatment.
 - the prevalence of a given disorder in the general population.
 - the rate of cure for a given disorder.
- People who consistently exhibit _____ thinking are more vulnerable to depression than others.
 - overly optimistic
 - negative, pessimistic
 - delusional
 - dysthymic
- Mary believes that while she sleeps at night, space creatures are attacking her and invading her uterus, where they will multiply until they are ready to take over the world. Mary was chosen for this task, she believes, because she is the only one with the power to help the space creatures succeed. Mary would most likely be diagnosed as _____ schizophrenic.
 - paranoid
 - catatonic
 - disorganized
 - undifferentiated
- As an alternative to the current classification scheme, it has been proposed that schizophrenic disorders be divided into just two categories based on:
 - whether the prognosis is favorable or unfavorable.
 - whether the disorder is mild or severe.
 - the predominance of thought disturbances.
 - the predominance of negative versus positive symptoms.
- Most of the drugs that are useful in the treatment of schizophrenia are known to dampen _____ activity in the brain, suggesting that disruptions in the activity of this neurotransmitter may contribute to the development of the disorder.
 - norepinephrine
 - serotonin
 - acetylcholine
 - dopamine
- The main problem with the current classification scheme for personality disorders is that:
 - it falsely implies that nearly everyone has at least one personality disorder.
 - the criteria for diagnosis are so detailed and specific that even extremely disturbed people fail to meet them.
 - the categories often overlap, making diagnosis unreliable.
 - it contains too few categories to be useful.
- The diagnosis of antisocial personality disorder would apply to an individual who:
 - withdraws from social interaction due to an intense fear of rejection or criticism.
 - withdraws from social interaction due to a lack of interest in interpersonal intimacy.
 - is emotionally cold, suspicious of everyone, and overly concerned about being slighted by others.
 - is callous, impulsive, and manipulative.
- Involuntary commitment to a psychiatric facility:
 - can occur only after a mentally ill individual has been convicted of a violent crime.
 - usually occurs because people appear to be a danger to themselves or others.
 - no longer occurs under modern civil law.
 - will be a lifelong commitment, even if the individual is no longer mentally ill.
- Those who embrace a relativistic view of psychological disorders would agree that:
 - the criteria of mental illness vary considerably across cultures.
 - there are universal standards of normality and abnormality.
 - Western diagnostic concepts have validity and utility in other cultural contexts.
 - both b and c are true.
- About _____ of patients with eating disorders are female.
 - 40%
 - 50%–60%
 - 75%
 - 90%–95%

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



<http://www.thomsonedu.com>

Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/

Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



Treatment of Psychological Disorders



The Elements of the Treatment Process

Treatments: How Many Types Are There?

Clients: Who Seeks Therapy?

Therapists: Who Provides Professional Treatment?

Insight Therapies

Psychoanalysis

Client-Centered Therapy

Group Therapy

How Effective Are Insight Therapies?

How Do Insight Therapies Work?

Behavior Therapies

Systematic Desensitization

Aversion Therapy

Social Skills Training

Cognitive-Behavioral Treatments

How Effective Are Behavior Therapies?

Biomedical Therapies

Treatment with Drugs

Electroconvulsive Therapy (ECT)

Illustrated Overview of Five Major Approaches to Treatment

Current Trends and Issues in Treatment

Grappling with the Constraints of Managed Care

Blending Approaches to Treatment

FEATURED STUDY • Combining Insight Therapy and Medication

Increasing Multicultural Sensitivity in Treatment

Institutional Treatment in Transition

Disenchantment with Mental Hospitals

Deinstitutionalization

Mental Illness, the Revolving Door, and Homelessness

Reflecting on the Chapter's Themes

PERSONAL APPLICATION • Looking for a Therapist

Where Do You Find Therapeutic Services?

Is the Therapist's Profession or Sex Important?

Is Treatment Always Expensive?

Is the Therapist's Theoretical Approach Important?

What Should You Look for in a Prospective Therapist?

What Is Therapy Like?

CRITICAL THINKING APPLICATION • From Crisis to Wellness—But Was It the Therapy?

Recap

Practice Test

What do you picture when you hear the term *psychotherapy*? Unless you've had some personal exposure to therapy, your image of it has likely been shaped by depictions you've seen on television or in the movies. A good example is the 1999 film *Analyze This*, a comedy starring Billy Crystal as psychiatrist Ben Sobol and Robert De Niro as Paul Vitti, a mob boss who is suffering from "panic attacks." Complications ensue when Vitti—a man no one says "no" to—demands that Dr. Sobol cure him of his problem before his rivals in crime turn his "weakness" against him.

With his glasses and beard, Billy Crystal's Dr. Sobol resembles many people's picture of a therapist. Like many movie therapists, Dr. Sobol practices "talk therapy." He listens attentively as his patients talk about what is troubling them. Occasionally he offers comments that reflect their thoughts and feelings back to them or that offer some illuminating insight into their problems. We can get a feeling for his approach from a funny scene in which the uneducated Vitti turns Dr. Sobol's techniques on him:

Vitti: Hey, let's see how you like it. Let's talk about your father.

Dr. Sobol: Let's not.

Vitti: What kind of work does your father do?

Dr. Sobol: It's not important.

Vitti: You paused.

Dr. Sobol: I did not.

Vitti: You just paused. That means you had a feeling, like a thought. . . .

Dr. Sobol: You know, we're running out of time. Let's not waste it talking about my problems.

Vitti: Your father's a problem?

Dr. Sobol: No!

Vitti: That's what you just said.

Dr. Sobol: I did not!

Vitti: Now you're upset.

Dr. Sobol (getting upset): I am not upset!

Vitti: Yes you are.

Dr. Sobol: Will you stop it!

Vitti: You know what, I'm getting good at this.

As in this scene, the film derives much of its humor from popular conceptions—and misconceptions—about therapy. The technique that Vitti makes fun of does resemble one type of therapeutic process. Like Vitti, many people do associate needing therapy with a shameful weakness. Further, therapy is often of considerable benefit in assisting people to make signifi-

cant changes in their lives—even if those changes are not as dramatic as Vitti's giving up his life of crime at the end of the movie. On the other hand, the film's comic exaggerations also highlight some misconceptions about therapy, including the following.

- Vitti is driven to see a "shrink" because he feels like he's "falling apart." In fact, therapists help people with all kinds of problems. People need not have severe symptoms of mental illness to benefit from therapy.

- Dr. Sobol is a psychiatrist, but most therapists are not. And although Dr. Sobol quotes Freud and the film's plot turns on interpreting a dream (in this case, it's the psychiatrist's dream!), many therapists make little or no use of Freudian techniques.

- Dr. Sobol relies on "talk therapy" to produce insights that will help his patients overcome their troubles. In reality, this approach is only one of the many techniques used by therapists.

- Dr. Sobol "cures" Vitti by getting him to acknowledge a traumatic event in his childhood (the death of his father) that is at the root of his problems. But only rarely does therapy produce a single dramatic insight that results in wholesale change for the client.

In this chapter, we'll take a down-to-earth look at *psychotherapy*, using the term in its broadest sense, to refer to all the diverse approaches used in the treatment of mental disorders and psychological problems. We'll start by discussing some general questions about the provision of treatment. After considering

The popular film Analyze This derived much of its humor from common misconceptions about the process of psychotherapy.

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these issues, we'll examine the goals, techniques, and effectiveness of some of the more widely used approaches to therapy and discuss recent trends and issues in treatment. In the Personal Application, we'll look at practical questions related to finding and

choosing a therapist and getting the most out of therapy. And in the Critical Thinking Application we'll address problems involved in determining whether therapy actually helps.

> The Elements of the Treatment Process

PREVIEW QUESTIONS

- What are the three major approaches to the treatment of psychological disorders?
- What are the correlates of treatment seeking?
- Why do only a portion of the people who need treatment receive it?
- What professions are involved in the treatment of psychological disorders?

Sigmund Freud is widely credited with launching modern psychotherapy. Ironically, the landmark case that inspired Freud was actually treated by one of his colleagues, Josef Breuer. Around 1880, Breuer began to treat a young woman referred to as Anna O (which was a pseudonym—her real name was Bertha Pappenheim). Anna exhibited a variety of physical maladies, including headaches, coughing, and a loss of feeling and movement in her right arm. Much to his surprise, Breuer discovered that Anna's physical symptoms cleared up when he encouraged her to talk about emotionally charged experiences from her past.

When Breuer and Freud discussed the case, they speculated that talking things through had enabled Anna to drain off bottled-up emotions that had caused her symptoms. Breuer found the intense emotional exchange in this treatment not to his liking, so he didn't follow through on his discovery. However, Freud applied Breuer's insight to other patients, and his successes led him to develop a systematic treatment procedure, which he called *psychoanalysis*. Anna O called her treatment "the talking cure." However, as you'll see, psychotherapy isn't always curative, and many modern treatments place little emphasis on talking.

Freud's breakthrough ushered in a century of progress for psychotherapy. Psychoanalysis spawned many offspring as Freud's followers developed their own systems of treatment. Since then, approaches to treatment have steadily grown more numerous, more diverse, and more effective. Today, people can choose from a bewildering array of therapies.

Treatments: How Many Types Are There?

In their efforts to help people, psychotherapists use many treatment methods. These methods include discussion, advice, emotional support, persuasion, conditioning procedures, relaxation training, role playing, drug therapy, biofeedback, and group therapy. No one knows exactly how many distinct types of psychotherapy there are. One expert (Kazdin, 1994) estimates that there may be over 400 approaches to

treatment. Fortunately, we can impose some order on this chaos. As varied as therapists' procedures are, approaches to treatment can be classified into three major categories:

1. *Insight therapies*. Insight therapy is "talk therapy" in the tradition of Freud's psychoanalysis. In insight therapies, clients engage in complex verbal interactions with their therapists. The goal in these discussions is to pursue increased insight regarding the nature of the client's difficulties and to sort through possible solutions. Insight therapy can be conducted with an individual or with a group. Broadly speaking, family therapy and marital therapy fall in this category.

2. *Behavior therapies*. Behavior therapies are based on the principles of learning, which were introduced in Chapter 6. Instead of emphasizing personal insights, behavior therapists make direct efforts to alter problematic responses (phobias, for instance) and maladaptive habits (drug use, for instance). Behavior therapists work on changing clients' overt behaviors. They use different procedures for different kinds of problems. Most of their procedures involve classical conditioning, operant conditioning, or observational learning.

3. *Biomedical therapies*. Biomedical approaches to therapy involve interventions into a person's biological functioning. The most widely used procedures are drug therapy and electroconvulsive (shock) therapy. As the term *biomedical* suggests, these treatments have traditionally been provided only by physicians with a medical degree (usually psychiatrists). This situation is changing, however, as psychologists have been campaigning for prescription privileges (Norfleet, 2002; Welsh, 2003). To date, psychologists have obtained prescription authority in two states (New Mexico and Louisiana), and they have made legislative progress toward this goal in many other states (Long, 2005). Although some psychologists have argued against pursuing the right to prescribe medication (Heiby, 2002; Robiner et al., 2003), the movement is gathering momentum and seems likely to prevail.

Image Not Available

The case of Anna O, whose real name was Bertha Pappenheim, provided the inspiration for Sigmund Freud's invention of psychoanalysis.

Figure 15.1

Treatment seeking for various disorders. In a study of the extent to which people seek treatment for psychological disorders, Wang et al. (2005) found that only a minority of people promptly pursue treatment for their disorder. The data summarized here show the percentage of people who obtain professional treatment within the first year after the onset of various disorders. The percentages vary depending on the disorder, but all the figures are surprisingly low. (Data from Wang et al., 2005)

Clients: Who Seeks Therapy?

In the therapeutic triad (therapists, treatments, clients), the greatest diversity is seen among the clients. According to the 1999 Surgeon General's report on mental health (U.S. Department of Health and Human Services, 1999) about 15% of the U.S. population use mental health services in a given year. These people bring to therapy the full range of human problems: anxiety, depression, unsatisfactory interpersonal relations, troublesome habits, poor self-control, low self-esteem, marital conflicts, self-doubt, a sense of emptiness, and feelings of personal stagnation. The two most common presenting problems are excessive anxiety and depression (Narrow et al., 1993).

Interestingly, people often delay for many years before finally seeking treatment for their psychological problems (Kessler, Olfson, & Berglund, 1998). One recent large-scale study (Wang, Berglund et al., 2005) found that the median delay in seeking treatment was 6 years for bipolar disorder and for drug dependence, 8 years for depression, 9 years for generalized anxiety disorder, and 10 years for panic disorder! **Figure 15.1** summarizes data from the same study on the percentage of people with various disorders who seek treatment within the first year after the onset of the disorder. As you can see, the figures are surprisingly low for most disorders.

A client in treatment does *not* necessarily have an identifiable psychological disorder. Some people seek professional help for everyday problems (career decisions, for instance) or vague feelings of discontent (Strupp, 1996). One surprising finding in recent research has been that only about half of the people who use mental health services in a given year meet the criteria for a full-fledged mental disorder (Kessler et al., 2005b).

People vary considerably in their willingness to seek psychotherapy. One study found that even among people who perceive a need for professional assistance, only 59% actually seek professional help (Mojtabai, Olfson, & Mechanic, 2002). As you can see in **Figure 15.2**, women are more likely than men to receive therapy. Treatment is also more likely when people have medical insurance and when they have

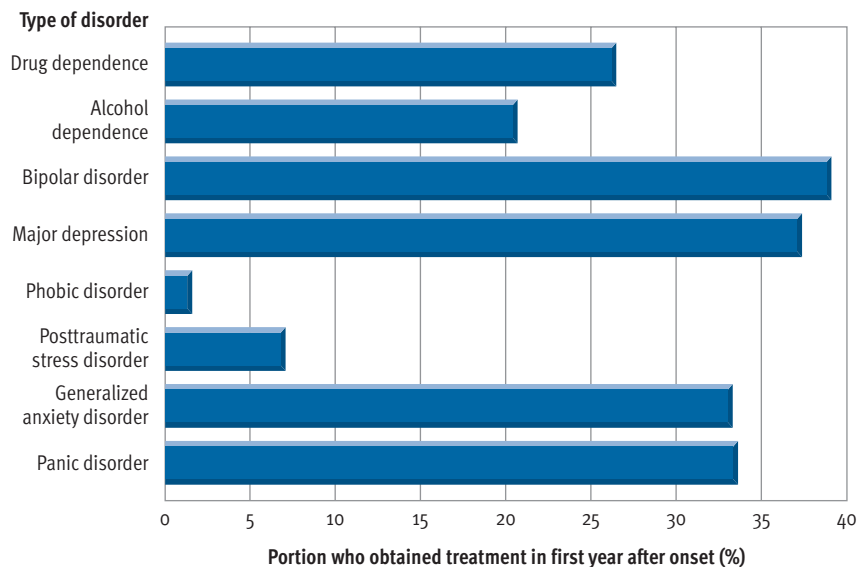
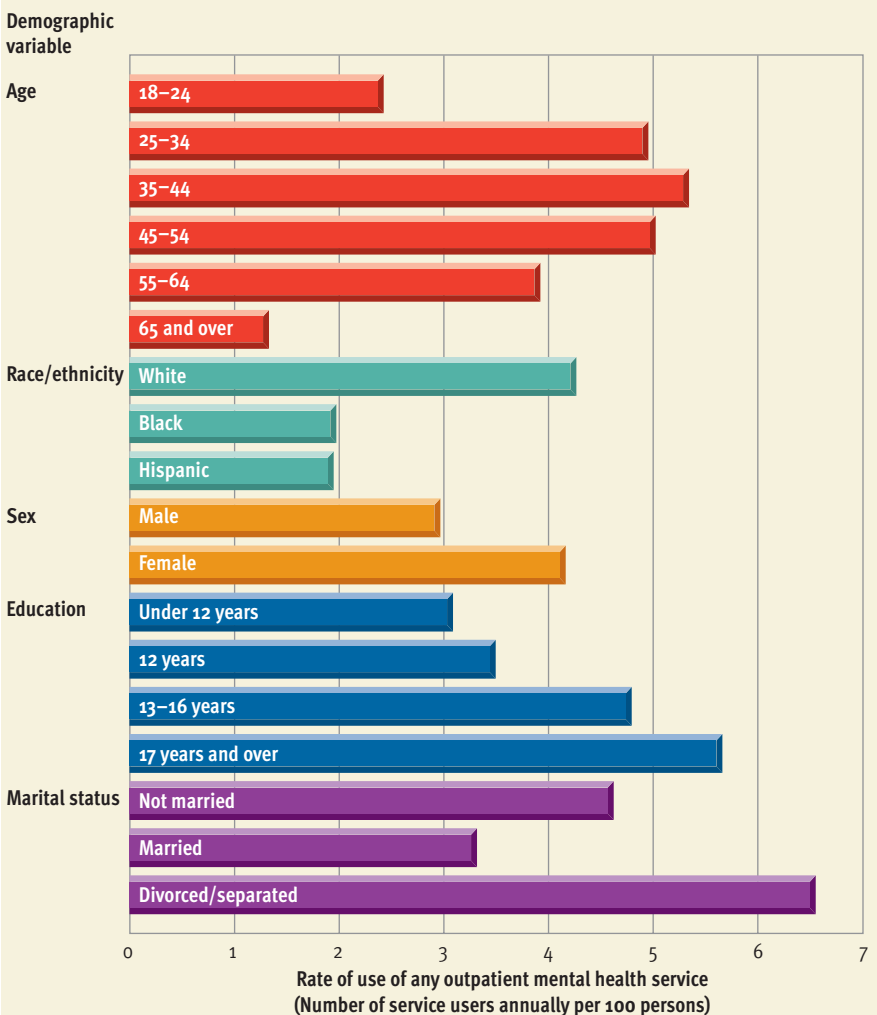


Figure 15.2

Therapy utilization rates. Olfson and colleagues (2002) gathered data on the use of non-hospital outpatient mental health services in the United States in relation to various demographic variables. In regard to marital status, utilization rates are particularly high among those who are divorced or separated. The use of therapy is greater among those who have more education; in terms of age, utilization peaks in the 35–44 age bracket. Females are more likely to pursue therapy than males are, but utilization rates are extremely low among ethnic minorities. (Data from Olfson et al., 2002)



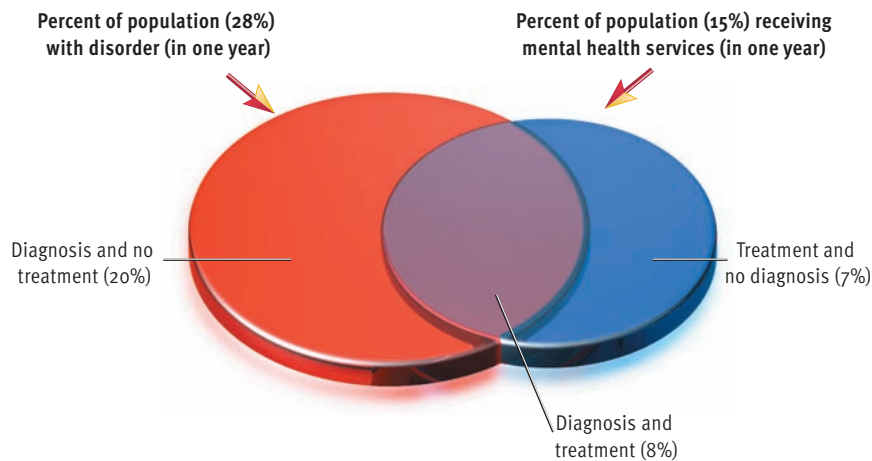


Figure 15.3

Psychological disorders and professional treatment. Not everyone who has a psychological disorder receives professional treatment, and not everyone who seeks treatment has a clear disorder. This graph, from the Surgeon General's report on mental health, shows that 15% of the U.S. adult population receive mental health treatment each year. Almost half of these people (7%) do not receive a psychiatric diagnosis, although some of them probably have milder disorders that are not assessed in epidemiological research. This graph also shows that over two-thirds of the people who do have disorders do not receive professional treatment. (Data from *Mental Health: A Report of the Surgeon General*, U.S. Public Health Service, 1999)

more education (Olfson et al., 2002; Wang, Lane et al., 2005). Unfortunately, it appears that many people who need therapy don't receive it (Kessler et al., 2005b). As Figure 15.3 shows, only a portion of the people who need treatment get it. People who could benefit from therapy do not seek it for a variety of reasons. Lack of health insurance and cost concerns appear to be major barriers to obtaining needed care for many people. According to the Surgeon General's report, the biggest roadblock is the "stigma surrounding the receipt of mental health treatment." Unfortunately, many people equate seeking therapy with admitting personal weakness.

Therapists: Who Provides Professional Treatment?

People troubled by personal problems often solicit help from their friends, relatives, and clergy. These sources of assistance may provide excellent advice, but their counsel does not qualify as therapy. Therapy refers to professional treatment by someone with special training. However, a common source of confusion about psychotherapy is the variety of "helping professions" available to offer assistance (Murstein & Fontaine, 1993). Psychology and psychiatry are the principal professions involved in the provision of psychotherapy. However, therapy is increasingly provided by clinical social workers, psychiatric nurses, counselors, and marriage and family therapists. Let's look at the various mental health professions.

Psychologists

Two types of psychologists may provide therapy. *Clinical psychologists and counseling psychologists specialize in the diagnosis and treatment of psychological disorders and everyday behavioral problems.* Clinical psychologists' training emphasizes the treatment of full-fledged disorders. In contrast, counseling psychologists' training is slanted toward the treatment of everyday adjustment problems. In practice, however, quite a bit of overlap occurs between clinical and counseling psychologists in training, skills, and the clientele that they serve.

Both types of psychologists must earn a doctoral degree (Ph.D., Psy.D., or Ed.D.). A doctorate in psychology requires about five to seven years of training beyond a bachelor's degree. The process of gaining admission to a Ph.D. program in clinical psychology is highly competitive (about as difficult as getting into medical school). Psychologists receive most of their training in universities or independent professional schools. They then serve a one-year internship in a clinical setting, such as a hospital, usually followed by one or two years of postdoctoral fellowship training.

In providing therapy, psychologists use either insight or behavioral approaches. In comparison to psychiatrists, they are more likely to use behavioral techniques and less likely to use psychoanalytic methods. Clinical and counseling psychologists do psychological testing as well as psychotherapy, and many also conduct research.

Psychiatrists

Psychiatrists are physicians who specialize in the diagnosis and treatment of psychological disorders. Many psychiatrists also treat everyday behavioral problems. However, in comparison to psychologists, psychiatrists devote more time to relatively severe disorders (schizophrenia, mood disorders) and less time to everyday marital, family, job, and school problems.

Psychiatrists have an M.D. degree. Their graduate training requires four years of coursework in medical school and a four-year apprenticeship in a residency at a hospital. Their psychotherapy training occurs during their residency, since the required coursework in medical school is essentially the same for everyone, whether they are going into surgery, pediatrics, or psychiatry. In their provision of therapy, psychiatrists increasingly emphasize drug therapies (Olfson et al., 2002). In comparison to psychologists, psychiatrists are more likely to use psychoanalysis and less likely to use group therapies or behavior therapies. That said, contemporary psychiatrists primarily depend on medication as their principal mode of treatment.

Web Link 15.1



Online Dictionary of Mental Health

This thematically arranged "dictionary" at the University of Sheffield (UK) Medical School comprises diverse links related to many forms of psychotherapy, the treatment of psychological disorders, and general issues of mental health.

Other Mental Health Professionals

Several other mental health professions also provide psychotherapy services, and some of these professions are growing rapidly. In hospitals and other institutions, *clinical social workers* and *psychiatric nurses* often work as part of a treatment team with a psychologist or psychiatrist. Psychiatric nurses, who may have a bachelor's or master's degree in their field, play a large role in hospital inpatient treatment. Clinical social workers generally have a master's degree and typically work with patients and their families to ease the patient's integration back into the community. Although social workers and psychiatric nurses have traditionally worked in institutional settings, they increasingly provide a wide range of therapeutic services as independent practitioners.

Many kinds of *counselors* also provide therapeutic services. Counselors are usually found working in schools, colleges, and assorted human service agencies (youth centers, geriatric centers, family planning centers, and so forth). Counselors typically have a master's degree. They often specialize in particular types of problems, such as vocational counseling, marital counseling, rehabilitation counseling, and drug counseling.

Although there are clear differences among the helping professions in education and training, their

roles in the treatment process overlap considerably. In this chapter, we will refer to psychologists or psychiatrists as needed, but otherwise we'll use the terms *clinician*, *therapist*, and *provider* to refer to mental health professionals of all kinds, regardless of their professional degree.

Now that we have discussed the basic elements in psychotherapy, we can examine specific approaches to treatment in terms of their goals, procedures, and effectiveness. We'll begin with some representative insight therapies.

➤ REVIEW OF KEY POINTS

- Approaches to treatment are diverse, but they can be grouped into three categories: insight therapies, behavior therapies, and biomedical therapies.
- Clients bring a wide variety of problems to therapy and do not necessarily have a disorder. People vary in their willingness to seek treatment, and many people who need therapy do not receive it.
- Therapists come from a variety of professional backgrounds. Clinical and counseling psychologists, psychiatrists, clinical social workers, psychiatric nurses, and counselors are the principal providers of therapeutic services.
- Each of these professions shows different preferences for approaches to treatment. Psychologists typically practice insight or behavior therapy. Psychiatrists rely more heavily on drug therapies.

➤ Insight Therapies

There are many schools of thought about how to do insight therapy. Therapists with various theoretical orientations use different methods to pursue different kinds of insights. However, what these varied approaches have in common is that **insight therapies involve verbal interactions intended to enhance clients' self-knowledge and thus promote healthful changes in personality and behavior.**

Although there may be hundreds of insight therapies, the leading eight or ten approaches appear to account for the lion's share of treatment. In this section, we'll delve into psychoanalysis, related psychodynamic approaches, and client-centered therapy. We'll also discuss how insight therapy can be done with groups as well as individuals.

Psychoanalysis



After the case of Anna O, Sigmund Freud worked as a psychotherapist for almost 50 years in Vienna. Through a painstaking process of trial and error, he developed innovative techniques for the treatment

of psychological disorders and distress. His system of *psychoanalysis* came to dominate psychiatry for many decades. Although the dominance of psychoanalysis has eroded in recent years, a diverse collection of psychoanalytic approaches to therapy continue to evolve and to remain influential today (Eagle & Wolitzky, 1992; Ursano & Silberman, 1999).

Psychoanalysis is an insight therapy that emphasizes the recovery of unconscious conflicts, motives, and defenses through techniques such as free association and transference. To appreciate the logic of psychoanalysis, we have to look at Freud's thinking about the roots of mental disorders. Freud mostly treated anxiety-dominated disturbances, such as phobic, panic, obsessive-compulsive, and conversion disorders, which were then called *neuroses*.

Freud believed that neurotic problems are caused by unconscious conflicts left over from early childhood. As explained in Chapter 12, he thought that these inner conflicts involve battles among the id, ego, and superego, usually over sexual and aggressive impulses. He theorized that people depend on

PREVIEW QUESTIONS

- What are the goals and techniques of psychoanalysis?
- What are resistance and transference?
- What are the goals and techniques of client-centered therapy?
- How is group therapy conducted?
- What is the evidence on the efficacy of insight therapy?



Figure 15.4

Freud's view of the roots of disorders. According to Freud, unconscious conflicts between the id, ego, and superego sometimes lead to anxiety. This discomfort may lead to pathological reliance on defensive behavior.



SIGMUND FREUD

"The news that reaches your consciousness is incomplete and often not to be relied on."

defense mechanisms to avoid confronting these conflicts, which remain hidden in the depths of the unconscious (see **Figure 15.4**). However, he noted that defensive maneuvers often lead to self-defeating behavior. Furthermore, he asserted that defenses tend to be only partially successful in alleviating anxiety, guilt, and other distressing emotions. With this model in mind, let's take a look at the therapeutic procedures used in psychoanalysis.

Probing the Unconscious

Given Freud's assumptions, we can see that the logic of psychoanalysis is quite simple. The analyst attempts to probe the murky depths of the unconscious to discover the unresolved conflicts causing the client's neurotic behavior. In a sense, the analyst functions as a "psychological detective." In this effort to explore the unconscious, the therapist relies on two techniques: free association and dream analysis.

In free association clients spontaneously express their thoughts and feelings exactly as they occur, with as little censorship as possible. In free associating, clients expound on anything that comes to mind, regardless of how trivial, silly, or embarrassing it might be. Gradually, most clients begin to let everything pour out without conscious censorship. The analyst studies these free associations for clues about what is going on in the client's unconscious.

In dream analysis the therapist interprets the symbolic meaning of the client's dreams. Freud saw dreams as the "royal road to the unconscious," the most direct means of access to patients' innermost conflicts, wishes, and impulses. Clients are encouraged and trained to remember their dreams, which they describe in therapy. The therapist then analyzes the symbolism in these dreams to interpret their meaning.

To better illustrate these matters, let's look at an actual case treated through psychoanalysis (adapted from Greenson, 1967, pp. 40–41). Mr. N was troubled by an unsatisfactory marriage. He claimed to love his wife, but he preferred sexual relations with prostitutes. Mr. N reported that his parents also en-

dured lifelong marital difficulties. His childhood conflicts about their relationship appeared to be related to his problems. Both dream analysis and free association can be seen in the following description of a session in Mr. N's treatment:

Mr. N reported a fragment of a dream. All that he could remember is that he was waiting for a red traffic light to change when he felt that someone had bumped into him from behind. . . . The associations led to Mr. N's love of cars, especially sports cars. He loved the sensation, in particular, of whizzing by those fat, old expensive cars. . . .

His father always hinted that he had been a great athlete, but he never substantiated it. . . . Mr. N doubted whether his father could really perform. His father would flirt with a waitress in a cafe or make sexual remarks about women passing by, but he seemed to be showing off. If he were really sexual, he wouldn't resort to that.

As is characteristic of free association, Mr. N's train of thought meandered about with little direction. Nonetheless, clues about his unconscious conflicts are apparent. What did Mr. N's therapist extract from this session? The therapist saw sexual overtones in the dream fragment, where Mr. N was bumped from behind. The therapist also inferred that Mr. N had a competitive orientation toward his father, based on the free association about whizzing by fat, old expensive cars. As you can see, analysts must *interpret* their clients' dreams and free associations. This is a critical process throughout psychoanalysis.

Interpretation

Interpretation refers to the therapist's attempts to explain the inner significance of the client's thoughts, feelings, memories, and behaviors. Contrary to popular belief, analysts do not interpret everything, and they generally don't try to dazzle clients with startling revelations. Instead, analysts move forward inch by inch, offering interpretations that should be just out of the client's own reach. Mr. N's therapist eventually offered the following interpretations to his client:

I said to Mr. N near the end of the hour that I felt he was struggling with his feelings about his father's sexual life. He seemed to be saying that his father was sexually not a very potent man. . . . He also recalls that he once found a packet of condoms under his father's pillow when he was an adolescent and he thought, "My father must be going to prostitutes." I then intervened and pointed out that the condoms under his father's pillow seemed to indicate more obviously that his father used the condoms with his mother, who slept in the same bed. However, Mr. N wanted to believe his wish-fulfilling fantasy: mother



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In psychoanalysis, the therapist encourages the client to reveal thoughts, feelings, dreams, and memories, which can then be interpreted in relation to the client's current problems.

doesn't want sex with father and father is not very potent. The patient was silent and the hour ended.

As you may have already guessed, the therapist concluded that Mr. N's difficulties were rooted in an Oedipal complex (see Chapter 12). The man had unresolved sexual feelings toward his mother and hostile feelings about his father. These unconscious conflicts, rooted in Mr. N's childhood, were distorting his intimate relations as an adult.

Resistance

How would you expect Mr. N to respond to the therapist's suggestion that he was in competition with his father for the sexual attention of his mother? Obviously, most clients would have great difficulty accepting such an interpretation. Freud fully expected clients to display some resistance to therapeutic efforts. **Resistance refers to largely unconscious defensive maneuvers intended to hinder the progress of therapy.** Why would clients try to resist the helping process? Because they don't want to face up to the painful, disturbing conflicts that they have buried in their unconscious. Although they have sought help, they are reluctant to confront their real problems.

Resistance can take many forms. Clients may show up late for their sessions, may merely pretend to engage in free association, or may express hostility toward their therapist. For instance, Mr. N's therapist noted that after the session just described, "The next day he [Mr. N] began by telling me that he was furi-

ous with me . . ." Analysts use a variety of strategies to deal with their clients' resistance. Often, a key consideration is the handling of transference, which we consider next.

Transference

Transference occurs when clients unconsciously start relating to their therapist in ways that mimic critical relationships in their lives. Thus, a client might start relating to a therapist as if the therapist were an overprotective mother, a rejecting brother, or a passive spouse. In a sense, the client *transfers* conflicting feelings about important people onto the therapist. For instance, in his treatment, Mr. N transferred some of the competitive hostility he felt toward his father onto his analyst.

Psychoanalysts often encourage transference so that clients can reenact relations with crucial people in the context of therapy. These reenactments can help bring repressed feelings and conflicts to the surface, allowing the client to work through them. The therapist's handling of transference is complicated and difficult, because transference may arouse confusing, highly charged emotions in the client.

Undergoing psychoanalysis is not easy. It can be a slow, painful process of self-examination that routinely requires three to five years of hard work. Ultimately, if resistance and transference can be handled effectively, the therapist's interpretations should lead the client to profound insights. For instance, Mr. N eventually admitted, "The old boy is probably right, it does tickle me to imagine that my mother preferred me and I could beat out my father. Later, I wondered whether this had something to do with my own screwed-up sex life with my wife." According to Freud, once clients recognize the unconscious sources of conflicts, they can resolve these conflicts and discard their neurotic defenses.

Modern Psychodynamic Therapies

Though still available, classical psychoanalysis as done by Freud is not widely practiced anymore (Kay & Kay, 2003). Freud's psychoanalytic method was geared to a particular kind of clientele that he was seeing in Vienna many years ago. As his followers fanned out across Europe and America, many found it necessary to adapt psychoanalysis to different cultures, changing times, and new kinds of patients. Thus, many variations on Freud's original approach to psychoanalysis have developed over the years. These descendants of psychoanalysis, which continue to emphasize exploration of the unconscious, are collectively known as *psychodynamic approaches* to therapy.



Web Link 15.2



The American Psychoanalytic Association
The website for this professional organization provides a great deal of useful information about psychoanalytic approaches to treatment. The resources include news releases, background information on psychoanalysis, an engine for literature searches, and a bookstore.

Some of these adaptations, such as those made by Carl Jung (1917) and Alfred Adler (1927), were sweeping revisions based on fundamental differences in theory. Other variations, such as those devised by Melanie Klein (1948) and Heinz Kohut (1971), made substantial changes in theory while retaining certain central ideas. Still other revisions (Alexander, 1954; Stekel, 1950) simply involved efforts to modernize and streamline psychoanalytic techniques. Hence, today we have a rich diversity of psychodynamic approaches to therapy.

Client-Centered Therapy



You may have heard of people going into therapy to “find themselves” or to “get in touch with their real feelings.” These now-popular phrases emerged out of the human potential movement, which was stimulated in part by the work of Carl Rogers (1951, 1986). Using a humanistic perspective, Rogers devised *client-centered therapy* (also known as *person-centered therapy*) in the 1940s and 1950s.

Client-centered therapy is an insight therapy that emphasizes providing a supportive emotional climate for clients, who play a major role in determining the pace and direction of their therapy. You may wonder why the troubled, untrained client is put in charge of the pace and direction of the therapy. Rogers (1961) provides a compelling justification:

It is the client who knows what hurts, what directions to go, what problems are crucial, what experiences have been deeply buried. It began to occur to me that unless I had a need to demonstrate my own cleverness and learning, I would do better to rely upon the client for the direction of movement in the process. (pp. 11–12)

Rogers’s theory about the principal causes of neurotic anxieties is quite different from the Freudian explanation. As discussed in Chapter 12, Rogers maintains that most personal distress is due to inconsistency, or “incongruence,” between a person’s self-concept and reality (see **Figure 15.5**). According to his theory, incongruence makes people feel threatened by realistic feedback about themselves from

others. For example, if you inaccurately viewed yourself as a hard-working, dependable person, you would feel threatened by contradictory feedback from friends or co-workers. According to Rogers, anxiety about such feedback often leads to reliance on defense mechanisms, to distortions of reality, and to stifled personal growth. Excessive incongruence is thought to be rooted in clients’ overdependence on others for approval and acceptance.

Given Rogers’s theory, client-centered therapists stalk insights that are quite different from the repressed conflicts that psychoanalysts go after. Client-centered therapists help clients to realize that they do not have to worry constantly about pleasing others and winning acceptance. They encourage clients to respect their own feelings and values. They help people restructure their self-concept to correspond better to reality. Ultimately, they try to foster self-acceptance and personal growth.

Therapeutic Climate



According to Rogers, the *process* of therapy is not as important as the emotional *climate* in which the therapy takes place. He believes that it is critical for the therapist to provide a warm, supportive, accepting climate, which creates a safe environment in which clients can confront their shortcomings without feeling threatened. The lack of threat should reduce clients’ defensive tendencies and thus help them open up. To create this atmosphere of emotional support, client-centered therapists must provide three conditions:

1. **Genuineness.** The therapist must be genuine with the client, communicating honestly and spontaneously. The therapist should not be phony or defensive.
2. **Unconditional positive regard.** The therapist must also show complete, nonjudgmental acceptance of the client as a person. The therapist should provide warmth and caring for the client, with no strings attached. This does not mean that the therapist must approve of everything that the client says or does. A therapist can disapprove of a particular behavior while continuing to value the client as a human being.



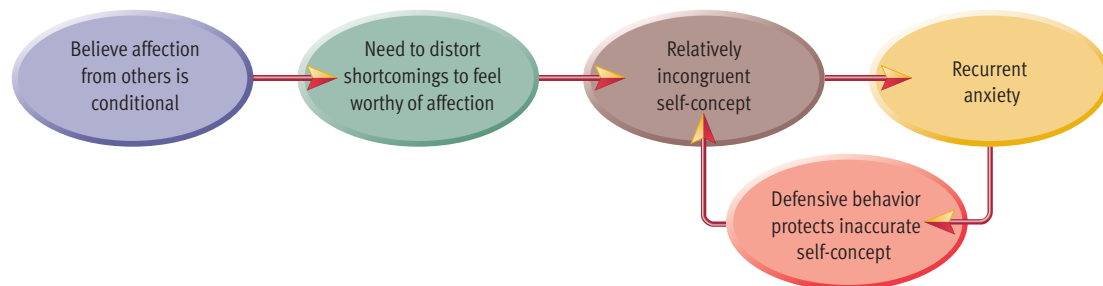
CARL ROGERS

“To my mind, empathy is in itself a healing agent.”

Figure 15.5

Rogers’s view of the roots of disorders.

Rogers’s theory posits that anxiety and self-defeating behavior are rooted in an incongruent self-concept that makes one prone to recurrent anxiety, which triggers defensive behavior, which fuels more incongruence.



3. *Empathy*. Finally, the therapist must provide accurate empathy for the client. This means that the therapist must understand the client's world from the client's point of view. Furthermore, the therapist must be articulate enough to communicate this understanding to the client.

Rogers firmly believed that a supportive emotional climate is the critical force promoting healthy changes in therapy. More recently, however, some client-centered therapists have begun to place more emphasis on the therapeutic process (Rice & Greenberg, 1992).

Therapeutic Process



In client-centered therapy, the client and therapist work together as equals. The therapist provides relatively little guidance and keeps interpretation and advice to a minimum. So, just what does the client-centered therapist do, besides creating a supportive climate? Primarily, the therapist provides feedback to help clients sort out their feelings. The therapist's key task is *clarification*. Client-centered therapists try to function like a human mirror, reflecting statements back to their clients, but with enhanced clarity. They help clients become more aware of their true feelings by highlighting themes that may be obscure in the clients' rambling discourse.

By working with clients to clarify their feelings, client-centered therapists hope to gradually build toward more far-reaching insights. In particular, they try to help clients better understand their interpersonal relationships and become more comfortable with their genuine selves. Obviously, these are ambitious goals. Client-centered therapy resembles psychoanalysis in that both seek to achieve a major reconstruction of a client's personality.

Group Therapy

Although it dates back to the early part of the 20th century, group therapy came of age during World War II and its aftermath in the 1950s (Rosenbaum, Lakin, & Roback, 1992). During this period, the expanding demand for therapeutic services forced clinicians to use group techniques (Scheidlinger, 1993). **Group therapy is the simultaneous psychological treatment of several clients in a group.** Most major insight therapies have been adapted for use with groups. In fact, the ideas underlying Rogers's client-centered therapy spawned the much-publicized encounter group movement. Although group therapy can be conducted in a variety of ways, we can provide a general overview of the process as it usually unfolds with outpatient populations (see Alonso, Alonso, &



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Piper, 2003; Stone, 2003; Vinogradov, Cox, & Yalom, 2003).

Participants' Roles

A therapy group typically consists of 4–12 people, with 6–8 participants regarded as an ideal number (Vinogradov et al., 2003). The therapist usually screens the participants, excluding persons who seem likely to be disruptive. Some theorists maintain that judicious selection of participants is crucial to effective group treatment (Salvendy, 1993). There is some debate about whether it is best for the group to be homogeneous—made up of people who are similar in age, sex, and psychological problem. Practical necessities usually dictate that groups are at least somewhat diversified.

In group therapy, participants essentially function as therapists for one another (Stone, 2003). Group members describe their problems, trade viewpoints, share experiences, and discuss coping strategies. Most important, they provide acceptance and emotional support for each other. In this supportive atmosphere, group members work at peeling away the social masks that cover their insecurities. Once their problems are exposed, members work at correcting them. As members come to value one another's opinions, they work hard to display healthy changes to win the group's approval.

In group treatment, the therapist's responsibilities include selecting participants, setting goals for the group, initiating and maintaining the therapeutic process, and protecting clients from harm (Vinogradov et al., 2003). The therapist often plays a relatively subtle role in group therapy, staying in the background and focusing mainly on promoting

Client-centered therapists emphasize the importance of a supportive emotional climate in therapy. They also work to clarify, rather than interpret, the feelings expressed by their patients.



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Group treatments have proven particularly helpful when members share similar problems, such as alcoholism, overeating, or having been sexually abused as a child. Many approaches to insight therapy that were originally designed for individuals—such as client-centered therapy—have been adapted for treatment of groups.

group cohesiveness (although this strategy will vary depending on the nature of the group). The therapist models supportive behaviors for the participants and tries to promote a healthy climate. He or she always retains a special status, but the therapist and clients are usually on much more equal footing in group therapy than in individual therapy. The leader in group therapy expresses emotions, shares feelings, and copes with challenges from group members.

Advantages of the Group Experience

Group therapies obviously save time and money, which can be critical in understaffed mental hospitals and other institutional settings (Vinogradov et al., 2003). Therapists in private practice usually charge less for group than individual therapy, making therapy affordable for more people. However, group therapy is *not* just a less costly substitute for individual therapy. For many types of patients and problems, group therapy can be just as effective as individual treatment (Alonso et al., 2003; Stone, 2003). Moreover, group therapy has unique strengths of its own. For example, in group therapy participants often come

to realize that their misery is not unique. They are reassured to learn that many other people have similar or even worse problems. Another advantage is that group therapy provides an opportunity for participants to work on their social skills in a safe environment. Yet another advantage is that certain types of problems and clients respond especially well to the social support that group therapy can provide.

Whether insight therapies are conducted on a group or an individual basis, clients usually invest considerable time, effort, and money. Are these therapies worth the investment? Let's examine the evidence on their effectiveness.

How Effective Are Insight Therapies?

Evaluating the effectiveness of any approach to treatment is a complex challenge (Kendall, Holmbeck, & Verduin, 2004; Hill & Lambert, 2004). For one thing, psychological disorders (like many physical illnesses) sometimes run their course and clear up on their own. **A spontaneous remission is a recovery from a disorder that occurs without formal treatment.** Thus, if a client experiences a recovery after treatment, one cannot automatically assume that the recovery was due to the treatment (see the Critical Thinking Application).

Evaluating the effectiveness of treatment is especially complicated for insight therapies. If you were to undergo insight therapy, how would you judge its efficacy? By how you felt? By looking at your behavior? By asking your therapist? By consulting your friends and family? What would you be looking for? Various schools of thought pursue entirely different goals. And clients' ratings of their progress are likely to be slanted toward a favorable evaluation because they want to justify their effort, their heartache, their expense, and their time. Even evaluations by professional therapists can be highly subjective (Luborsky et al., 1999). Moreover, people enter therapy with diverse problems of varied severity, creating huge con-

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founds in efforts to assess the effectiveness of therapeutic interventions.

Despite these difficulties, thousands of outcome studies have been conducted to evaluate the effectiveness of insight therapy. These studies have examined a broad range of clinical problems and used diverse methods to assess therapeutic outcomes, including scores on psychological tests and ratings by family members, as well as therapists' and clients' ratings. These studies consistently indicate that insight therapy is superior to no treatment or to placebo treatment and that the effects of therapy are reasonably durable (Kopta et al., 1999; Lambert & Ogles, 2004). Studies generally find the greatest improvement early in treatment (the first 13–18 weekly sessions), with further gains gradually diminishing in size over time (Lambert, Bergin, & Garfield, 2004). Overall, about 50% of patients show a clinically meaningful recovery within about 20 sessions, and another 20% of patients achieve this goal after about 45 sessions (Lambert & Ogles, 2004; see **Figure 15.6**). Of course, these broad generalizations mask considerable variability in outcome, but the general trends are encouraging.

How Do Insight Therapies Work?

Although there is considerable evidence that insight therapy tends to produce positive effects for a sizable majority of clients, vigorous debate continues about the *mechanisms of action* underlying these positive effects. The advocates of various therapies tend to attribute the benefits of therapy to the particular methods and procedures used by each specific approach to therapy (Chambless & Hollon, 1998). In essence, they argue that different therapies achieve similar benefits through different processes. An alternative view espoused by many theorists is that the diverse approaches to therapy share certain *common factors* and that these common factors account for much of the improvement experienced by clients (Frank & Frank, 1991). Evidence supporting the common factors view has mounted in recent years (Ahn & Wampold, 2001; Lambert & Barley, 2001).

What are the common denominators that lie at the core of diverse approaches to therapy? The models proposed to answer this question vary considerably, but the most widely cited factors include (1) the development of a therapeutic alliance with a professional helper, (2) the provision of emotional support and empathic understanding by the therapist, (3) the cultivation of hope and positive expectations in the client, (4) the provision of a rationale for the client's

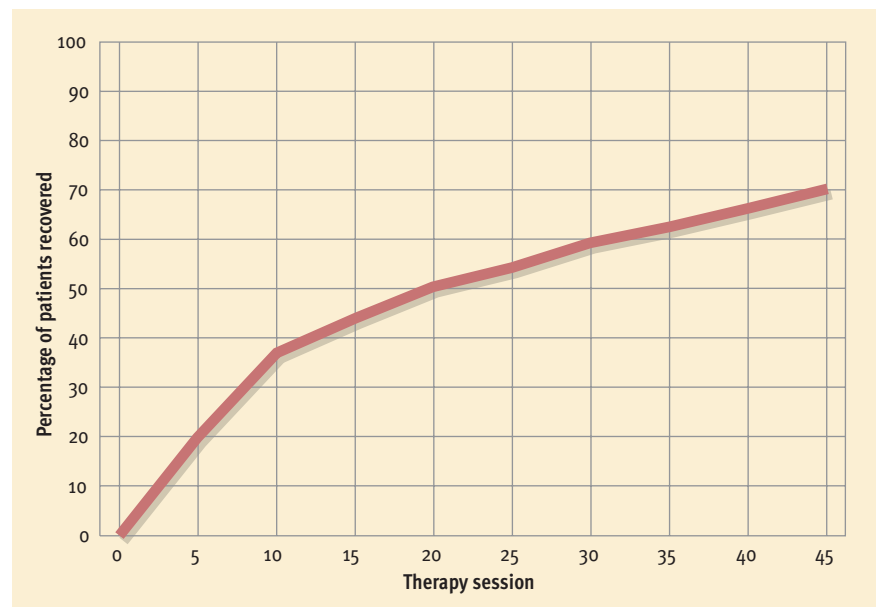


Figure 15.6

Recovery as a function of number of therapy sessions. Based on a national sample of over 6000 patients, Lambert, Hansen, and Finch (2001) mapped out the relationship between recovery and the duration of treatment. These data show that about half of the patients had experienced a clinically significant recovery after 20 weekly sessions of therapy. After 45 sessions of therapy, about 70% had recovered.

Source: Adapted from Lambert, M. J., Hansen, N. B., & Finch, A. E. (2001). Patient-focused research: Using patient outcome data to enhance treatment effects. *Journal of Consulting and Clinical Psychology*, 69, 159–172. Copyright © 2001 by the American Psychological Association. Used by permission of the publisher and authors.

problems and a plausible method for reducing them, and (5) the opportunity to express feelings, confront problems, gain new insights, and learn new patterns of behavior (Grencavage & Norcross, 1990; Weinberger, 1995). How important are these factors in therapy? Some theorists argue that common factors account for virtually *all* of the progress that clients make in therapy (Wampold, 2001). It seems more likely that the benefits of therapy represent the combined effects of common factors and specific procedures (Beutler & Harwood, 2002). Either way, it is clear that common factors play a significant role in insight therapy.

REVIEW OF KEY POINTS

- Insight therapies involve verbal interactions intended to enhance self-knowledge. Freudian approaches to therapy assume that neuroses originate from unresolved conflicts lurking in the unconscious. Therefore, in psychoanalysis free association and dream analysis are used to explore the unconscious.
- When an analyst's probing hits sensitive areas, resistance can be expected. The transference relationship may be used to overcome this resistance so that the client can handle interpretations that lead to insight. Classical psychoanalysis is not widely practiced anymore, but Freud's legacy lives on in a rich diversity of modern psychodynamic therapies.

- Rogers's client-centered therapy assumes that neurotic anxieties are derived from incongruence between a person's self-concept and reality. Accordingly, the client-centered therapist tries to provide a supportive climate in which clients can restructure their self-concept. The process of client-centered therapy emphasizes clarification of the client's feelings and self-acceptance.
- Most theoretical approaches to insight therapy have been adapted for use with groups. Participants in group therapy essentially act as therapists for one another, exchanging

insights and emotional support. Group therapy has unique advantages in comparison to individual therapy.

- Evaluating the effectiveness of any approach to therapy is complex and difficult. Nonetheless, the weight of modern evidence suggests that insight therapies are superior to no treatment or to placebo treatment. Much of the improvement seen in clients in therapy may be attributable to the operation of common factors.

> Behavior Therapies

PREVIEW QUESTIONS

- What assumptions are behavior therapies based on?
- How do behavior therapists treat phobias?
- How does aversion therapy work?
- What are the goals and techniques of social skills training?
- How do cognitive-behavioral techniques work?
- What is the evidence on the efficacy of behavior therapy?

Behavior therapy is different from insight therapy in that behavior therapists make no attempt to help clients achieve grand insights about themselves. Why not? Because behavior therapists believe that such insights aren't necessary to produce constructive change. For example, consider a client troubled by compulsive gambling. The behavior therapist doesn't care whether this behavior is rooted in unconscious conflicts or parental rejection. What the client needs is to get rid of the maladaptive behavior. Consequently, the therapist simply designs a program to eliminate the compulsive gambling.

The crux of the difference between insight therapy and behavior therapy is this: Insight therapists treat pathological symptoms as signs of an underlying problem, whereas behavior therapists think that the symptoms *are* the problem. Thus, **behavior therapies involve the application of learning principles to direct efforts to change clients' maladaptive behaviors.**

Behaviorism has been an influential school of thought in psychology since the 1920s. Nevertheless, behaviorists devoted little attention to clinical issues until the 1950s, when behavior therapy emerged out of three independent lines of research fostered by B. F. Skinner and his colleagues (Skinner, Solomon, & Lindsley, 1953) in the United States; by Hans Eysenck (1959) and his colleagues in Britain; and by Joseph Wolpe (1958) and his colleagues in South Africa (Glass & Arnkoff, 1992). Since then, there has been an explosion of interest in behavioral approaches to psychotherapy.

Behavior therapies are based on certain assumptions (Berkowitz, 2003). *First, it is assumed that behavior is a product of learning.* No matter how self-defeating or pathological a client's behavior might be, the behaviorist believes that it is the result of past learning and conditioning. *Second, it is assumed that what has been learned can be unlearned.* The same learning principles that explain how the maladaptive behavior was acquired can be used to get rid of it. Thus,

behavior therapists attempt to change clients' behavior by applying the principles of classical conditioning, operant conditioning, and observational learning.

Systematic Desensitization



Devised by Joseph Wolpe (1958), systematic desensitization revolutionized psychotherapy by giving therapists their first useful alternative to traditional "talk therapy" (Fishman & Franks, 1992). **Systematic desensitization is a behavior therapy used to reduce phobic clients' anxiety responses through counterconditioning.** The treatment assumes that most anxiety responses are acquired through classical conditioning (as we discussed in Chapter 14). According to this model, a harmless stimulus (for instance, a bridge) may be paired with a fear-arousing event (lightning striking it) so that it becomes a conditioned stimulus eliciting anxiety. The goal of systematic desensitization is to weaken the association between the conditioned stimulus (the bridge) and the conditioned response of anxiety (see Figure 15.7). Systematic desensitization involves three steps.

First, the therapist helps the client build an anxiety hierarchy. The hierarchy is a list of anxiety-arousing stimuli related to the specific source of anxiety, such as flying, academic tests, or snakes. The client ranks

Figure 15.7

The logic underlying systematic desensitization.

Behaviorists argue that many phobic responses are acquired through classical conditioning, as in the example diagrammed here. Systematic desensitization targets the conditioned associations between phobic stimuli and fear responses.

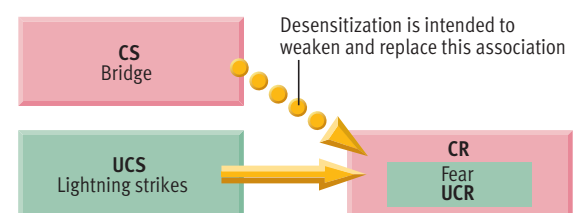


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JOSEPH WOLPE

"Neurotic anxiety is nothing but a conditioned response."

the stimuli from the least anxiety arousing to the most anxiety arousing. This ordered list of stimuli is the *anxiety hierarchy*. An example of an anxiety hierarchy for one woman's fear of heights is shown in **Figure 15.8**.

The second step involves training the client in deep muscle relaxation. This second phase may begin during early sessions while the therapist and client are still constructing the anxiety hierarchy. Various therapists use different relaxation training procedures. Whatever procedures are used, the client must learn to engage in deep, thorough relaxation on command from the therapist.

In the third step, the client tries to work through the hierarchy, learning to remain relaxed while imagining each stimulus. Starting with the least anxiety-arousing stimulus, the client imagines the situation as vividly as possible while relaxing. If the client experiences strong anxiety, he or she drops the imaginary scene and concentrates on relaxation. The client keeps repeating this process until he or she can imagine a scene with little or no anxiety. Once a particular scene is conquered, the client moves on to the next stimulus situation in the anxiety hierarchy. Gradually, over a number of therapy sessions, the client progresses through the hierarchy, unlearning troublesome anxiety responses.

As clients conquer *imagined* phobic stimuli, they may be encouraged to confront the *real* stimuli. Although desensitization to imagined stimuli *can* be effective by itself, contemporary behavior therapists usually follow it up with direct exposures to the real anxiety-arousing stimuli (Emmelkamp, 2004). Indeed, behavioral interventions emphasizing direct exposures to anxiety-arousing situations have become behavior therapists' treatment of choice for phobic and other anxiety disorders. Usually, these real-life con-

Systematic desensitization is a behavioral treatment for phobias. Early studies of the procedure's efficacy often used people who had snake phobias as research subjects because people with snake phobias were relatively easy to find. This research showed that systematic desensitization is generally an effective treatment.



An Anxiety Hierarchy for Systematic Desensitization	
Degree of fear	
5	I'm standing on the balcony of the top floor of an apartment tower.
10	I'm standing on a stepladder in the kitchen to change a light bulb.
15	I'm walking on a ridge. The edge is hidden by shrubs and treetops.
20	I'm sitting on the slope of a mountain, looking out over the horizon.
25	I'm crossing a bridge 6 feet above a creek. The bridge consists of an 18-inch-wide board with a handrail on one side.
30	I'm riding a ski lift 8 feet above the ground.
35	I'm crossing a shallow, wide creek on an 18-inch-wide board, 3 feet above water level.
40	I'm climbing a ladder outside the house to reach a second-story window.
45	I'm pulling myself up a 30-degree wet, slippery slope on a steel cable.
50	I'm scrambling up a rock, 8 feet high.
55	I'm walking 10 feet on a resilient, 18-inch-wide board, which spans an 8-foot-deep gulch.
60	I'm walking on a wide plateau, 2 feet from the edge of a cliff.
65	I'm skiing an intermediate hill. The snow is packed.
70	I'm walking over a railway trestle.
75	I'm walking on the side of an embankment. The path slopes to the outside.
80	I'm riding a chair lift 15 feet above the ground.
85	I'm walking up a long, steep slope.
90	I'm walking up (or down) a 15-degree slope on a 3-foot-wide trail. On one side of the trail the terrain drops down sharply; on the other side is a steep upward slope.
95	I'm walking on a 3-foot-wide ridge. The slopes on both sides are long and more than 25 degrees steep.
100	I'm walking on a 3-foot-wide ridge. The trail slopes on one side. The drop on either side of the trail is more than 25 degrees.

frontations prove harmless, and individuals' anxiety responses decline.

According to Wolpe (1958, 1990), the principle at work in systematic desensitization is simple. Anxiety and relaxation are incompatible responses. The trick is to recondition people so that the conditioned stimulus elicits relaxation instead of anxiety. This is *counter-conditioning*—an attempt to reverse the process of classical conditioning by associating the crucial stimulus with a new conditioned response. Although Wolpe's explanation of how systematic desensitization works has been questioned, the technique's effectiveness in eliminating specific anxieties has been well documented (Spiegler & Guevremont, 2003).

Aversion Therapy



Aversion therapy is far and away the most controversial of the behavior therapies. It's not something that you would sign up for unless you were pretty desperate. Psychologists usually suggest it only as a treatment of last resort, after other interventions have failed. What's so terrible about aversion therapy? The client has to endure decidedly unpleasant stimuli, such as shocks or drug-induced nausea.

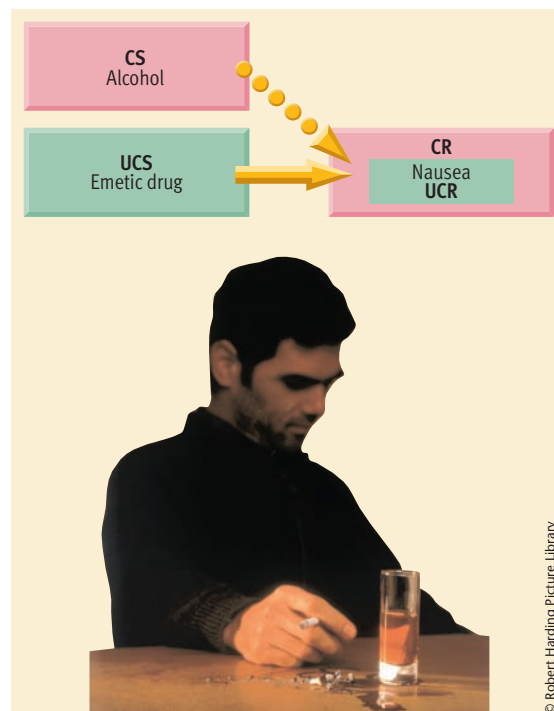
Aversion therapy is a behavior therapy in which an aversive stimulus is paired with a stimulus that elicits an undesirable response. For example, alcoholics have had an *emetic drug* (one that causes nausea and vomiting) paired with their favorite drinks

Figure 15.8
Example of an anxiety hierarchy. Systematic desensitization requires the construction of an anxiety hierarchy like the one shown here, which was developed for a woman who had a fear of heights but wanted to go hiking in the mountains.

Source: Rudestam, K. E. (1980). *Methods of self-change: An ABC primer*. Belmont, CA: Wadsworth. Copyright © 1980 by Wadsworth Publishing. Reprinted by permission of the author.

Figure 15.9

Aversion therapy. Aversion therapy uses classical conditioning to create an aversion to a stimulus that has elicited problematic behavior. For example, in the treatment of drinking problems, alcohol may be paired with a nausea-inducing drug to create an aversion to drinking.



during therapy sessions (Landabaso et al., 1999). By pairing the drug with alcohol, the therapist hopes to create a conditioned aversion to alcohol (see **Figure 15.9**).

Aversion therapy takes advantage of the automatic nature of responses produced through classical conditioning. Admittedly, alcoholics treated with aversion therapy know that they won't be given an emetic outside of their therapy sessions. However, their reflex response to the stimulus of alcohol may be changed so they respond to it with nausea and distaste (remember the "sauce béarnaise syndrome" described in Chapter 6?). Obviously, this response should make it much easier to resist the urge to drink.

Aversion therapy is not a widely used technique, and when it is used it is usually only one element in a larger treatment program. Troublesome behaviors treated successfully with aversion therapy have included drug and alcohol abuse, sexual deviance, gambling, shoplifting, stuttering, cigarette smoking, and overeating (Bordnick et al., 2004; Emmelkamp, 1994; Grossman & Ruiz, 2004; Maletzky, 2002).

Social Skills Training

Many psychological problems grow out of interpersonal difficulties. Behavior therapists point out that people are not born with social finesse—they acquire social skills through learning. Unfortunately, some people have not learned how to be friendly, how to make conversation, how to express anger appropriately, and so forth. Social ineptitude can contribute

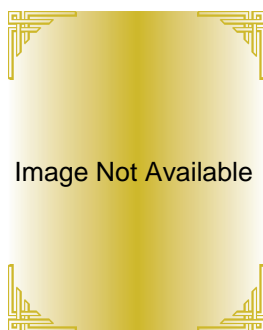
to anxiety, feelings of inferiority, and various kinds of disorders. In light of these findings, therapists are increasingly using social skills training in efforts to improve clients' social abilities. This approach to therapy has yielded promising results in the treatment of social anxiety (Shear & Beidel, 1998), autism (Kransny et al., 2003), attention deficit disorder (Antshel & Remer, 2003) and schizophrenia (Bellack et al., 2004).

Social skills training is a behavior therapy designed to improve interpersonal skills that emphasizes modeling, behavioral rehearsal, and shaping. This type of behavior therapy can be conducted with individual clients or in groups. Social skills training depends on the principles of operant conditioning and observational learning. With *modeling*, the client is encouraged to watch socially skilled friends and colleagues in order to acquire appropriate responses (eye contact, active listening, and so on) through observation. In *behavioral rehearsal*, the client tries to practice social techniques in structured role-playing exercises. The therapist provides corrective feedback and uses approval to reinforce progress. Eventually, of course, clients try their newly acquired skills in real-world interactions. Usually, they are given specific homework assignments. *Shaping* is used in that clients are gradually asked to handle more complicated and delicate social situations. For example, a nonassertive client may begin by working on making requests of friends. Only much later will he be asked to tackle standing up to his boss at work.

Cognitive-Behavioral Treatments

In Chapter 14, we learned that cognitive factors play a key role in the development of many anxiety and mood disorders. Citing the importance of such findings, in the 1970s behavior therapists started to focus more attention on their clients' cognitions (Arnkoff & Glass, 1992; Hollon & Beck, 2004). **Cognitive-behavioral treatments use varied combinations of verbal interventions and behavior modification techniques to help clients change maladaptive patterns of thinking.** Some of these treatments, such as Albert Ellis's (1973) *rational emotive behavior therapy* and Aaron Beck's (1976) *cognitive therapy*, emerged out of an insight therapy tradition, whereas other treatments, such as the systems developed by Donald Meichenbaum (1977) and Michael Mahoney (1974), emerged from the behavioral tradition. Here we will focus on Beck's cognitive therapy as an example of a cognitive-behavioral treatment (see Chapter 13 for a discussion of some of Ellis's ideas).

Cognitive therapy uses specific strategies to correct habitual thinking errors that underlie various



AARON BECK

"Most people are barely aware of the automatic thoughts which precede unpleasant feelings or automatic inhibitions."

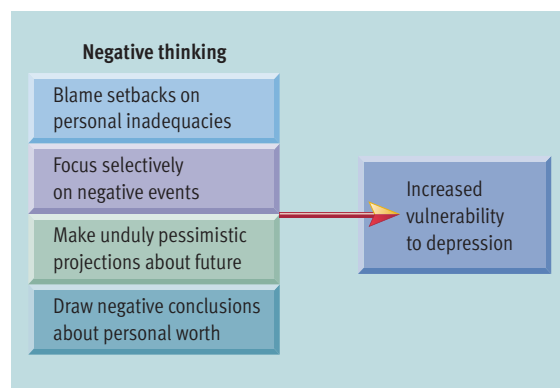
types of disorders. In recent years cognitive therapy has been applied fruitfully to a wide range of disorders (Rush & Beck, 2000), but it was originally devised as a treatment for depression. According to cognitive therapists, depression is caused by “errors” in thinking (see **Figure 15.10**). They assert that depression-prone people tend to (1) blame their setbacks on personal inadequacies without considering circumstantial explanations, (2) focus selectively on negative events while ignoring positive events, (3) make unduly pessimistic projections about the future, and (4) draw negative conclusions about their worth as a person based on insignificant events. For instance, imagine that you got a low grade on a minor quiz in a class. If you made the kinds of errors in thinking just described, you might blame the grade on your woeful stupidity, dismiss comments from a classmate that it was an unfair test, gloomily predict that you will surely flunk the course, and conclude that you are not genuine college material.

The goal of cognitive therapy is to change clients’ negative thoughts and maladaptive beliefs. To begin, clients are taught to detect their automatic negative thoughts. These are self-defeating statements that people are prone to make when analyzing problems. Examples might include “I’m just not smart enough,” “No one really likes me,” or “It’s all my fault.” Clients are then trained to subject these automatic thoughts to reality testing. The therapist helps them to see how unrealistically negative the thoughts are.

Cognitive therapy uses a variety of behavioral techniques, such as modeling, systematic monitoring of one’s behavior, and behavioral rehearsal (Wright, Beck, & Thase, 2003). Cognitive therapists often give their clients “homework assignments” that focus on changing clients’ overt behaviors. Clients may be in-

Figure 15.10

Beck’s view of the roots of disorders. Beck’s theory initially focused on the causes of depression, although it was gradually broadened to explain other disorders. According to Beck, depression is caused by the types of negative thinking shown here.



concept check 15.1



Understanding Therapists’ Conceptions of Disorders

Check your understanding of the three approaches to insight treatment covered in the text by matching each approach with the appropriate explanation of the typical origins of clients’ psychological disorders. The answers are in Appendix A.

Theorized causes of disorders

- _____ 1. Problems rooted in pervasive negative thoughts about self and errors in thinking
- _____ 2. Problems rooted in unconscious conflicts left over from childhood
- _____ 3. Problems rooted in inaccurate self-concept and excessive concern about pleasing others

Therapy

- a. Psychoanalysis
- b. Client-centered therapy
- c. Cognitive therapy

structed to engage in overt responses on their own, outside of the clinician’s office. For example, one shy, insecure young man in cognitive therapy was told to go to a singles bar and engage three different women in conversations for up to five minutes each (Rush, 1984). He was instructed to record his thoughts before and after each of the conversations. This assignment elicited various maladaptive patterns of thought that gave the young man and his therapist plenty to work on in subsequent sessions.

How Effective Are Behavior Therapies?

Behavior therapists have historically placed more emphasis on the importance of measuring therapeutic outcomes than insight therapists have. Hence, there is ample evidence attesting to the effectiveness of behavior therapy (Lambert & Bergin, 1992). Of course, behavior therapies are not well suited to the treatment of some types of problems (vague feelings of discontent, for instance). Furthermore, it’s misleading to make global statements about the effectiveness of behavior therapies, because they include many types of procedures designed for very different purposes. For example, the value of systematic desensitization for phobias has no bearing on the value of aversion therapy for sexual deviance.

For our purposes, it is sufficient to note that there is favorable evidence on the efficacy of most of the widely used behavioral interventions (Jacob & Pelham, 2000). Behavior therapies can make important contributions to the treatment of phobias, obsessive-compulsive disorders, sexual dysfunction, schizophrenia, drug-related problems, eating disorders, psychosomatic disorders, hyperactivity, autism, and mental retardation (Berkowitz, 2003; Emmelkamp, 2004).

Web Link 15.3



The Beck Institute of Cognitive Therapy and Research

This site offers a diverse array of materials relating to Aaron Beck’s cognitive therapy. Resources include newsletters, a referral system, a bookstore, recommended readings for clients, and questions and answers about cognitive therapy.



Understanding Therapists' Goals

Check your understanding of therapists' goals by matching various therapies with the appropriate description. The answers are in Appendix A.

Principal therapeutic goals

- _____ 1. Elimination of maladaptive behaviors or symptoms
- _____ 2. Acceptance of genuine self, personal growth
- _____ 3. Recovery of unconscious conflicts, character reconstruction
- _____ 4. Detection and reduction of negative thinking

Therapy

- a. Psychoanalysis
- b. Client-centered therapy
- c. Cognitive therapy
- d. Behavior therapy

REVIEW OF KEY POINTS

- Behavior therapies use the principles of learning in direct efforts to change specific aspects of behavior. Wolpe's systematic desensitization, a treatment for phobias, involves the construction of an anxiety hierarchy, relaxation training, and step-by-step movement through the hierarchy, pairing relaxation with each phobic stimulus.
- In aversion therapy, a stimulus associated with an unwanted response is paired with an unpleasant stimulus in an effort to eliminate the maladaptive response. Social skills training can improve clients' interpersonal skills through shaping, modeling, and behavioral rehearsal.
- Cognitive-behavioral treatments concentrate on changing the way clients think about events in their lives. Cognitive therapists reeducate clients to detect and challenge automatic negative thoughts that cause depression and anxiety. There is ample evidence that behavior therapies are effective in the treatment of a wide variety of disorders.

Biomedical Therapies

PREVIEW QUESTIONS

- What are the principal types of psychiatric drugs, and what disorders are they used for?
- How effective are psychiatric drugs, and what are their disadvantages?
- What is ECT, and what is it used for?
- How effective is ECT, and what are the risks of using it?

In the 1950s, a French surgeon looking for a drug that would reduce patients' autonomic response to surgical stress noticed that chlorpromazine produced a mild sedation. Based on this observation, Delay and Deniker (1952) decided to give chlorpromazine to hospitalized schizophrenic patients. They wanted to see whether the drug would have calming effects. Their experiment was a dramatic success. Chlorpromazine became the first effective antipsychotic drug, and a revolution in psychiatry was begun. Hundreds of thousands of severely disturbed patients who had appeared doomed to spend the remainder of their lives in mental hospitals were gradually sent home, thanks to the therapeutic effects of antipsychotic drugs. Today, biomedical therapies such as drug treatment lie at the core of psychiatric practice.

Biomedical therapies are physiological interventions intended to reduce symptoms associated with psychological disorders. These therapies assume that psychological disorders are caused, at least in part, by biological malfunctions. As we discussed in the previous chapter, this assumption clearly has merit for many disorders, especially the more severe ones. We will discuss two biomedical approaches to psychotherapy: drug therapy and electroconvulsive (shock) therapy.

Treatment with Drugs

Psychopharmacotherapy is the treatment of mental disorders with medication. We will refer to this kind of treatment more simply as *drug therapy*. The four

main categories of therapeutic drugs for psychological problems are (1) antianxiety drugs, (2) antipsychotic drugs, (3) antidepressant drugs, and (4) mood stabilizing drugs.

Antianxiety Drugs

Many people routinely pop pills to relieve anxiety. The drugs involved in this common coping strategy are **antianxiety drugs, which relieve tension, apprehension, and nervousness**. The most popular of these drugs are Valium and Xanax. These are the trade names (the proprietary names that pharmaceutical companies use in marketing drugs) for diazepam and alprazolam, respectively.

Valium, Xanax, and other drugs in the *benzodiazepine* family are often called *tranquilizers*. These drugs exert their effects almost immediately, and they can be fairly effective in alleviating feelings of anxiety (Ballenger, 2000). However, their effects are measured in hours, so their impact is relatively short-lived. Antianxiety drugs are routinely prescribed for people with anxiety disorders, but they are also given to millions of people who simply suffer from chronic nervous tension. In the mid-1970s, pharmacists in the United States were filling nearly *100 million* prescriptions each year for Valium and similar antianxiety drugs. Many critics characterized this level of use as excessive (Lickey & Gordon, 1991). However, since the 1990s, benzodiazepine prescriptions have declined noticeably (Raj & Sheehan, 2004).

All the drugs used to treat psychological problems have potentially troublesome side effects that show



Table 15.1 Side Effects of Xanax and Valium

Table Not Available

up in some patients but not others. The antianxiety drugs are no exception. The most common side effects of Valium and Xanax are listed in Table 15.1. Some of these side effects—such as drowsiness, depression, nausea, and confusion—present serious problems for some patients. These drugs also have potential for abuse, drug dependence, and overdose, although these risks have probably been exaggerated in the press (Ballenger, 2000; Silberman, 1998). Another drawback is that patients who have been on antianxiety drugs for a while often experience withdrawal symptoms when their drug treatment is stopped (Raj & Sheehan, 2004).

A newer antianxiety drug called Buspar (buspirone), which does not belong to the benzodiazepine family, appears useful in the treatment of generalized anxiety disorder (Brawman-Mintzer, Lydiard, & Ballenger, 2000). Unlike Valium, Buspar is slow acting, exerting its effects in one to three weeks, but it has fewer sedative side effects (Ninan & Muntasser, 2004).

Antipsychotic Drugs

Antipsychotic drugs are used primarily in the treatment of schizophrenia. They are also given to people with severe mood disorders who become delusional. The trade (and generic) names of some classic drugs in this category are Thorazine (chlorpromazine), Mellaril (thioridazine), and Haldol (haloperidol). **Antipsychotic drugs are used to gradually reduce psychotic symptoms, including hyperactivity, mental confusion, hallucinations, and delusions.**

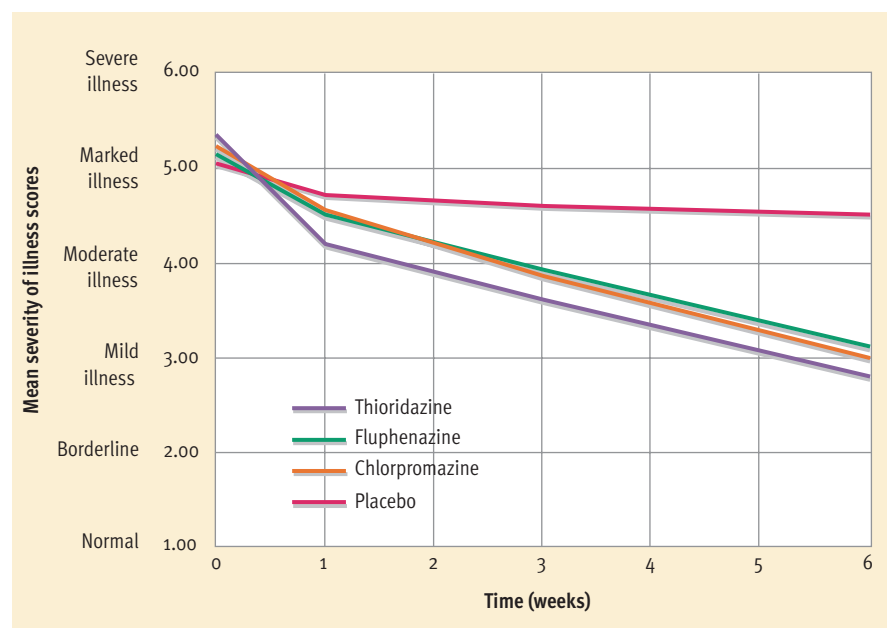
The traditional antipsychotics appear to decrease activity at certain subtypes of dopamine synapses, although the exact relationship between their neurochemical effects and their clinical effects remains obscure (Egan & Hyde, 2000; Miyamoto et al., 2003).

Studies suggest that antipsychotics reduce psychotic symptoms in about 70% of patients, albeit in varied degrees (Marder, 2000). When antipsychotic drugs are effective, they work their magic gradually, as shown in Figure 15.11. Patients usually begin to respond within two days to a week. Further improvement may occur for several months. Many schizophrenic patients are placed on antipsychotics indefinitely, because these drugs can reduce the likelihood of a relapse into an active schizophrenic episode (Marder & van Kammen, 2000).

Antipsychotic drugs undeniably make a huge contribution to the treatment of severe mental disorders, but they are not without problems. They have many unpleasant side effects (Cohen, 1997; Wilkaitis, Mulvihill, & Nasrallah, 2004). Drowsiness, constipation, and cotton mouth are common. The drugs may also produce effects that resemble the symptoms of Parkinson's disease, including muscle tremors, muscular rigidity, and impaired motor coordination. After being released from a hospital, many schizophrenic patients, supposedly placed on antipsychotics indefinitely, discontinue their drug regimen because of the disagreeable side effects. Unfortunately, a relapse eventually occurs in most patients after they stop taking antipsychotic medication (Gitlin et al., 2001). In addition to their nuisance side effects, antipsychotics may cause a more severe and lasting problem called *tardive dyskinesia*, which is seen in about 20%–30%

Figure 15.11
The time course of antipsychotic drug effects. Antipsychotic drugs reduce psychotic symptoms gradually, over a span of weeks, as graphed here. In contrast, patients given placebo medication show little improvement.

Source: Cole, J. O., Goldberg, S. C., & Davis, J. M. (1966). Drugs in the treatment of psychosis. In P. Solomon (Ed.), *Psychiatric drugs*. New York: Grune & Stratton. From data in the NIMH-PSC Collaborative Study I. Reprinted by permission of J. M. Davis.



of patients who receive long-term treatment with traditional antipsychotics (Marder, 2000). **Tardive dyskinesia is a neurological disorder marked by involuntary writhing and ticlike movements of the mouth, tongue, face, hands, or feet.** Once this debilitating syndrome emerges, there is no cure, although spontaneous remission sometimes occurs after the discontinuation of antipsychotic medication (Pi & Simpson, 2000).

Psychiatrists are currently enthusiastic about a new class of antipsychotic agents called *atypical antipsychotic drugs* (such as clozapine, olanzapine, and quetiapine). These drugs are roughly as effective as traditional antipsychotics (Fleischhacker, 2002), and they can help some patients who do not respond to conventional antipsychotic medications (Volavka et al., 2002). Moreover, the atypical antipsychotics produce fewer unpleasant side effects and carry less risk for tardive dyskinesia (Correll, Leucht, & Kane, 2004; Lieberman et al., 2003). Of course, like all powerful drugs, they carry some risks, as they appear to increase patients' vulnerability to diabetes and cardiovascular problems (Meltzer et al., 2002).

Antidepressant Drugs

As their name suggests, **antidepressant drugs gradually elevate mood and help bring people out of a depression.** Prior to 1987, there were two principal classes of antidepressants: *tricyclics* (such as Elavil) and *MAO inhibitors* (such as Nardil). These two sets of drugs affect neurochemical activity in different ways (see **Figure 15.12**) and tend to work with different patients. Overall, they are beneficial for about two-thirds of depressed patients (Gitlin, 2002), although only about one-third of treated patients experience a *complete resolution* of their symptoms (Shulman, 2001).



The tricyclics have fewer problems with side effects and complications than the MAO inhibitors (Rush, 2000). Like antipsychotic drugs, antidepressants exert their effects gradually over a period of weeks.

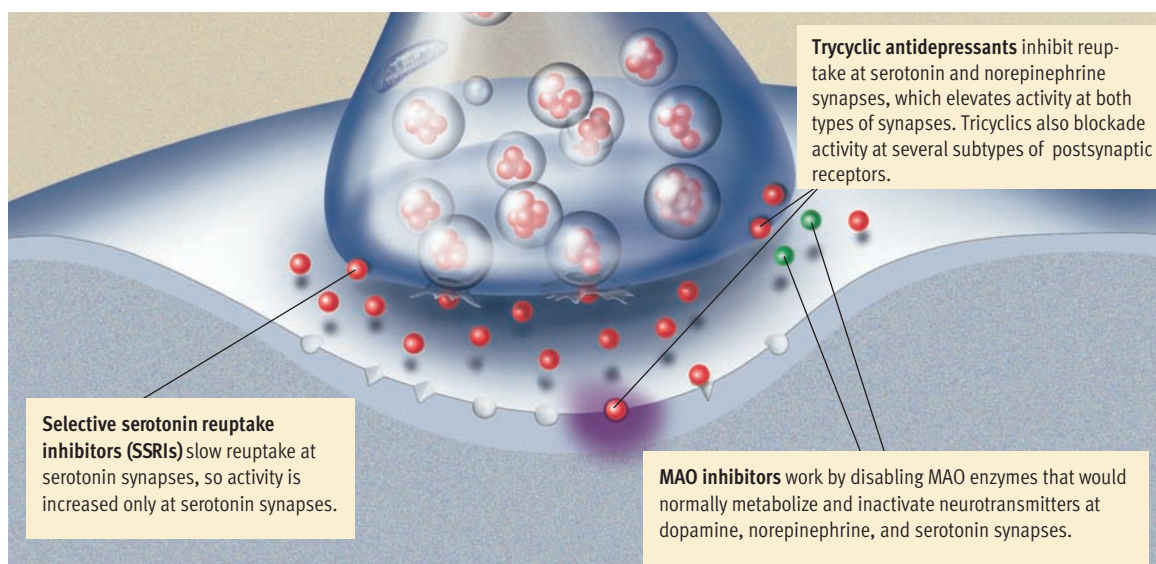
Today, psychiatrists are more likely to prescribe a newer class of antidepressants, called *selective serotonin reuptake inhibitors (SSRIs)*, which slow the reuptake process at serotonin synapses. The drugs in this class, which include Prozac (fluoxetine), Paxil (paroxetine), and Zoloft (sertraline), seem to yield therapeutic gains similar to the tricyclics in the treatment of depression (Boland & Keller, 2003) while producing fewer unpleasant or dangerous side effects (Marangell et al., 2003). SSRIs have also proven valuable in the treatment of obsessive-compulsive disorders, panic disorders, and other anxiety disorders (Rivas-Vazquez, 2001). However, Prozac and the other SSRIs are not “miracle drugs,” as suggested by some popular magazines. Like all drugs for psychological disorders, the SSRIs have side effects and risks that must be carefully weighed against their benefits (Baldessarini, 2001; Ferguson, 2001).

A major concern in recent years has been evidence from a number of studies that SSRIs may increase the risk for suicide (Healy & Whitaker, 2003; Holden, 2004). The challenge of collecting definitive data on this issue is much more daunting than one might guess, in part because suicide rates are already elevated among people who exhibit the disorders for which SSRIs are prescribed (Rihmer, 2003; Wessely & Kerwin, 2004). Some researchers have collected data that suggest that suicide rates have *declined* slightly because of widespread prescription of SSRIs (Olfson et al., 2003), while others have found no association between SSRIs and suicide (Lapierre, 2003; Tardiff, Marzuk, & Leon, 2002). At present, the data are too

Figure 15.12

Antidepressant drugs' mechanisms of action.

The three types of antidepressant drugs all increase activity at serotonin synapses, which is probably the principal basis for their therapeutic effects. However, they increase serotonin activity in different ways, with different spillover effects (Marangell et al. 1999). Tricyclics and MAO inhibitors have effects at a much greater variety of synapses, which presumably explains why they have more side effects. The more recently developed SSRIs are more specific in targeting serotonin synapses.



fragmentary and inconsistent to permit a firm, confident conclusion (Gunnell & Ashby, 2004). That said, the issue should be taken seriously, and patients on SSRIs should be carefully monitored by their physicians and families (Culpepper et al., 2004). Elevated suicide risk appears to mainly be a problem among a small minority of children and adolescents in the first month after starting antidepressants, especially during the first nine days (Jick, Kaye, & Jick, 2004).

Mood Stabilizers

Mood stabilizers are drugs used to control mood swings in patients with bipolar mood disorders.

For many years, lithium was the only effective drug in this category. Lithium has proven valuable in preventing *future* episodes of both mania and depression in patients with bipolar illness (Geddes et al., 2004). Lithium can also be used in efforts to bring patients with bipolar illness out of *current* manic or depressive episodes. However, antipsychotics and antidepressants are more frequently used for these purposes. On the negative side of the ledger, lithium does have some dangerous side effects if its use isn't managed skillfully (Jefferson & Greist, 2000). Lithium levels in the patient's blood must be monitored carefully, because high concentrations can be toxic and even fatal. Kidney and thyroid gland complications are the other major problems associated with lithium therapy.

In recent years a number of alternatives to lithium have been developed. The most popular of these newer mood stabilizers is an anticonvulsant agent called *valproate*, which has become about as widely used as lithium in the treatment of bipolar disorders (Blanco et al., 2002). Valproate appears to be roughly as effective as lithium in efforts to treat current manic episodes and to prevent future affective disturbances (Moseman et al., 2003). The advantage provided by valproate is that it has fewer side effects than lithium and is better tolerated by patients (Bowden, 2004).

How Effective Are Drug Therapies?

Drug therapies can produce clear therapeutic gains for many kinds of patients. What's especially impressive is that they can be effective with disorders that otherwise defy therapeutic endeavors. Nonetheless, drug therapies are controversial. Critics of drug therapy have raised a number of issues (Cohen & McCubbin, 1990; Healy, 2004; Lickey & Gordon, 1991; Whitaker, 2002). First, some critics argue that drug therapies are not as effective as advertised and that they often produce superficial, short-lived curative effects. For example, Valium does not really solve problems with anxiety; it merely provides temporary relief from an unpleasant symptom. Moreover, relapse rates are sub-

Image Not Available

stantial when drug regimens are discontinued. Second, critics charge that many drugs are overprescribed and many patients overmedicated. According to these critics, a number of physicians routinely hand out prescriptions without giving adequate consideration to more complicated and difficult interventions. Third, some critics charge that the damaging side effects of therapeutic drugs are underestimated by psychiatrists and that these side effects are often worse than the illnesses that the drugs are supposed to cure. Citing problems such as tardive dyskinesia, lithium toxicity, and addiction to antianxiety agents, these critics argue that the risks of therapeutic drugs aren't worth the benefits.

Critics maintain that the negative effects of psychiatric drugs are not fully appreciated because the pharmaceutical industry has managed to gain undue influence over the research enterprise as it relates to drug testing (Angell, 2000, 2004; Carpenter, 2002; Healy, 2004). Today, most researchers who investigate the benefits and risks of medications and write treatment guidelines have lucrative financial arrangements with the pharmaceutical industry (Bodenheimer, 2000; Choudhry, Stelfox, & Detsky, 2002). Their studies are funded by drug companies, and they often receive substantial consulting fees. These financial arrangements have become so common, the prestigious *New England Journal of Medicine* had to relax its conflict-of-interest rules because it had difficulty finding expert reviewers who did not have financial ties to the drug industry (Drazen & Curfman, 2002). Unfortunately, these financial ties appear to undermine the objectivity required in scientific research, as studies funded by drug companies are far less likely to report unfavorable results than nonprofit-funded studies (Bekelman, Li, & Gross, 2003; Rennie & Luft, 2000). Industry-financed drug trials also tend to be much too brief to detect the long-term risks associated with new drugs, and when unfavorable results emerge, the data are often withheld from publication (Antonuccio, Danton, & McClanahan, 2003). Also, research

Web Link 15.4



Dr. Bob's Psychopharmacology Tips
Psychopharmacology is the use of medication to treat psychological disorders. Physician and pharmacology specialist Robert Hsiang (University of Chicago) provides both broad and specific references about the interface of drugs and the human mind, including a searchable archive of professional information.

designs are often slanted in a multitude of ways so as to exaggerate the positive effects and minimize the negative effects of the drugs under scrutiny (Carpenter, 2002; Chopra, 2003; Moncrieff, 2001). The conflicts of interest that appear to be pervasive in contemporary drug research raise grave concerns that require attention from researchers, universities, and federal agencies.

Obviously, drug therapies have stirred up some debate. However, this controversy pales in comparison to the furious debates inspired by electroconvulsive (shock) therapy (ECT). ECT is so controversial that the residents of Berkeley, California, voted in 1982 to outlaw ECT in their city. However, in subsequent lawsuits, the courts ruled that scientific questions cannot be settled through a vote, and they overturned the law. What makes ECT so controversial? You'll see in the next section.

Electroconvulsive Therapy (ECT)

In the 1930s, a Hungarian psychiatrist named Ladislav von Meduna speculated that epilepsy and schizophrenia could not coexist in the same body. On the basis of this observation, which turned out to be inaccurate, von Meduna theorized that it might be useful to induce epileptic-like seizures in schizophrenic patients. Initially, a drug was used to trigger these seizures. However, by 1938 a pair of Italian psychiatrists (Cerletti & Bini, 1938) demonstrated that it was safer to elicit the seizures with electric shock. Thus, modern electroconvulsive therapy was born.

Electroconvulsive therapy (ECT) is a biomedical treatment in which electric shock is used to produce a cortical seizure accompanied by convulsions. In ECT, electrodes are attached to the skull over the temporal lobes of the brain (see the photo below). A light anesthesia is induced, and the patient

is given a variety of drugs to minimize the likelihood of complications. An electric current is then applied either to the right side or to both sides of the brain for about a second. Unilateral shock delivered to the right hemisphere is the preferred method of treatment today (Abrams, 2000). The current triggers a brief (about 30 seconds) convulsive seizure. The patient normally awakens in an hour or two and manifests some confusion, disorientation, and nausea, which usually clear up in a matter of hours. People typically receive between 6 and 12 treatments over a period of a month or so (Glass, 2001).

The clinical use of ECT peaked in the 1940s and 1950s, before effective drug therapies were widely available. ECT has long been controversial, and its use did decline in the 1960s and 1970s. Nonetheless, the use of ECT has seen a resurgence in recent decades. Although only about 8% of psychiatrists administer ECT, it is not a rare form of treatment (Hermann et al., 1998). Some critics argue that ECT is overused because it is a lucrative procedure that boosts psychiatrists' income while consuming relatively little of their time in comparison to insight therapy (Frank, 1990). Conversely, some ECT advocates argue that ECT is underutilized because the public harbors many misconceptions about its effects and risks (McDonald et al., 2004). Although ECT is used in the treatment of a variety of disorders, in recent decades it has primarily been recommended for the treatment of depression.

Effectiveness of ECT

The evidence on the therapeutic efficacy of ECT is open to varied interpretations. Proponents of ECT maintain that it is a remarkably effective treatment for major depression (Prudic & Sackeim, 1999; Rudorfer, Henry, & Sackeim, 2003). Moreover, they note that many patients who do not benefit from antidepressant medication improve in response to ECT (Isenberg & Zorumski, 2000). However, opponents of ECT argue that the available studies are flawed and inconclusive and that ECT is probably no more effective than a placebo (Rose et al., 2003). Overall, there does seem to be enough favorable evidence to justify *conservative* use of ECT in treating severe mood disorders in patients who have not responded to medication (Carney & Geddes, 2003; Metzger, 1999). Unfortunately, relapse rates after ECT are distressingly high. Over 50% of patients relapse within 6 to 12 months, although relapse rates can be reduced by giving ECT patients antidepressant drugs (Sackeim et al., 2001).

Curiously, to the extent that ECT may be effective, no one is sure why. The discarded theories about how ECT works could fill several books. Many ECT advocates theorize that the treatment must affect

This patient is being prepared for electroconvulsive therapy. The mouthpiece keeps the patient from biting her tongue during the electrically induced seizures.

Image Not Available

neurotransmitter activity in the brain. However, the evidence supporting this view is fragmentary, inconsistent, and inconclusive (Abrams, 1992; Kapur & Mann, 1993). ECT opponents have a radically different, albeit equally unproven, explanation for why ECT might *appear* to be effective: They maintain that some patients find ECT so aversive that they muster all their willpower to climb out of their depression to avoid further ECT treatments.

Risks Associated with ECT

Even ECT proponents acknowledge that memory losses, impaired attention, and other cognitive deficits are common short-term side effects of electroconvulsive therapy (Isenberg & Zorumski, 2000; Lisanby et al., 2000). However, ECT proponents assert that these deficits are mild and usually disappear within a month or two (Glass, 2001). An American Psychiatric Association (2001) task force concluded that there is no objective evidence that ECT causes structural damage in the brain or that it has any lasting negative effects on the ability to learn and remember information. In contrast, ECT critics maintain that ECT-induced cognitive deficits are often significant and sometimes permanent (Breggin, 1991; Rose et al., 2003), although their evidence seems to be largely anecdotal. Given the concerns about the risks of ECT and the doubts about its efficacy, it appears that the use of ECT will remain controversial for some time to come.

REVIEW OF KEY POINTS

- Biomedical therapies are physiological interventions for psychological problems. A great variety of disorders are

concept check 15.3



Understanding Biomedical Therapies

Check your understanding of biomedical therapies by matching each treatment with its chief use. The answers are in Appendix A.

Treatment	Chief purpose
_____ 1. Antianxiety drugs	a. To reduce psychotic symptoms
_____ 2. Antipsychotic drug	b. To bring a major depression to an end
_____ 3. Antidepressant drugs	c. To suppress tension, nervousness, and apprehension
_____ 4. Mood stabilizers	d. To prevent future episodes of mania or depression in bipolar disorders
_____ 5. Electroconvulsive therapy (ECT)	

treated with drugs. Antianxiety drugs are used to relieve excessive apprehension.

- Antipsychotic drugs are used primarily in the treatment of schizophrenia. Antidepressants are used to bring people out of episodes of depression. Mood stabilizers are used to prevent the recurrence of episodes of disturbance in people with bipolar mood disorders.
- Drug therapies can be quite effective, but they have their drawbacks. All of the drugs produce side effects, and some of these side effects can be very troublesome. Some critics maintain that drugs' curative effects are superficial and that some drugs are overprescribed. Disturbing questions have been raised about the scientific impartiality of contemporary research on therapeutic drugs.
- Electroconvulsive therapy (ECT) is used to trigger a cortical seizure that is believed to have therapeutic value for mood disorders, especially depression. Evidence about the effectiveness and risks of ECT is contradictory, but the overall evidence seems sufficient to justify conservative use of the procedure.

Current Trends and Issues in Treatment

The controversy about ECT is only one of many contentious issues and shifting trends in the world of mental health care. In this section, we will discuss the impact of managed care on psychotherapy, the continuing trend toward blending various approaches to therapy, and efforts to respond more effectively to increasing cultural diversity in Western societies.

Grappling with the Constraints of Managed Care

The 1990s brought a dramatic shift in how people in the United States pay for their health care. Alarmed by skyrocketing health care costs, huge numbers of

employers and individuals moved from traditional fee-for-service arrangements to managed care health plans (Hogan & Morrison, 2003; Kiesler, 2000). In the *fee-for-service* system, hospitals, physicians, psychologists, and other providers charged fees for whatever health care services were needed, and most of these fees were reimbursed by private insurance or the government (through medicaid, medicare, and other programs). In *managed care systems* people enroll in prepaid plans with small co-payments for services, typically run by health maintenance organizations (HMOs), which agree to provide ongoing health care for a specific sum of money. Managed care usually involves a tradeoff: Consumers pay lower prices

PREVIEW QUESTIONS

- How has managed care affected mental health care?
- What have researchers found when they have combined insight therapy and drug therapy?
- What is eclecticism in therapy?
- Why is therapy underutilized by some ethnic groups?

> Illustrated Overview of Five Major Approaches to Treatment

Therapy/founder

Psychoanalysis

Developed by Sigmund Freud in Vienna, from the 1890s through the 1930s

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Roots of disorders

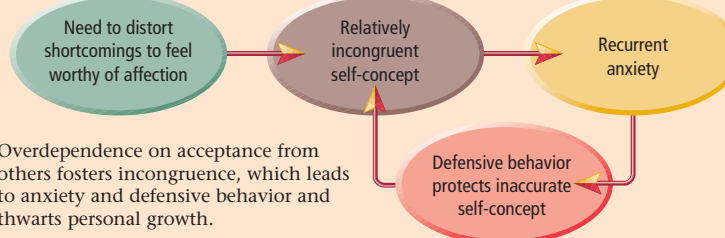


Unconscious conflicts resulting from fixations in earlier development cause anxiety, which leads to defensive behavior. The repressed conflicts typically center on sex and aggression.

Client-centered therapy

Created by Carl Rogers at the University of Chicago during the 1940s and 1950s

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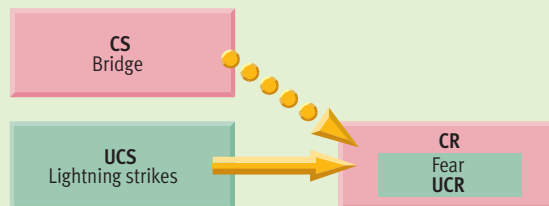


Overdependence on acceptance from others fosters incongruence, which leads to anxiety and defensive behavior and thwarts personal growth.

Behavior therapy

Launched primarily by South African Joseph Wolpe's description of systematic desensitization in 1958

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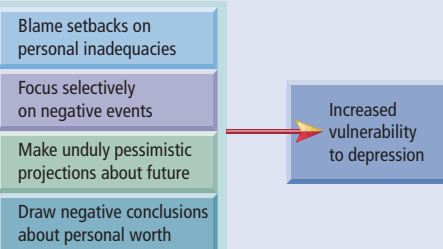


Maladaptive patterns of behavior are acquired through learning. For example, many phobias are thought to be created through classical conditioning and maintained by operant conditioning.

Cognitive-behavioral treatments

One approach devised by Aaron Beck at the University of Pennsylvania in the 1960s and 1970s

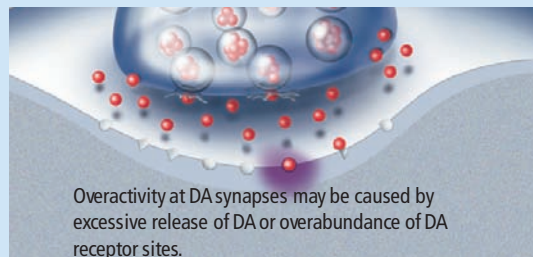
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Pervasive negative thinking about events related to self fosters anxiety and depression, and other forms of pathology.

Biomedical therapy

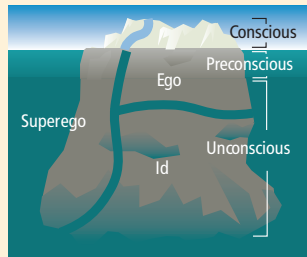
Many researchers contributed; key breakthroughs in drug treatment made around 1950 by John Cade in Australia, Henri Laborit in France, and Jean Delay and Pierre Deniker, also in France



Overactivity at DA synapses may be caused by excessive release of DA or overabundance of DA receptor sites.

Most disorders are attributed to genetic predisposition and physiological malfunctions, such as abnormal neurotransmitter activity. For example, schizophrenia appears to be associated with overactivity at dopamine synapses.

Therapeutic goals

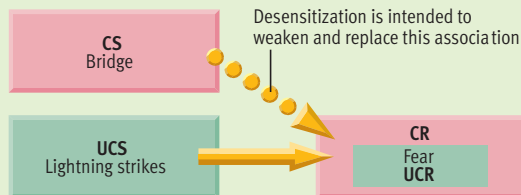


Insights regarding unconscious conflicts and motives; resolution of conflicts; personality reconstruction

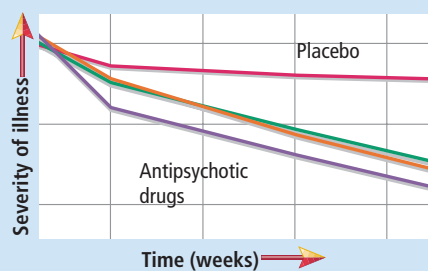
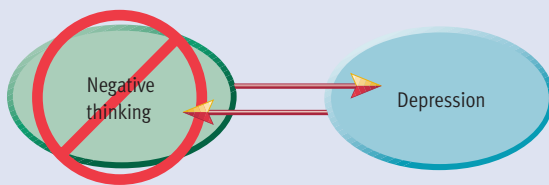


Increased congruence between self-concept and experience; acceptance of genuine self; self-determination and personal growth

Elimination of maladaptive symptoms; acquisition of more adaptive responses



Reduction of negative thinking; substitution of more realistic thinking



Elimination or reduction of symptoms; prevention of relapse

Therapeutic techniques



© Bruce Ayres/Stone/Getty Images

Free association, dream analysis, interpretation, transference



© Zigi Kaluzny/Stone/Getty Images

Genuineness, empathy, unconditional positive regard, clarification, reflecting back to client



© Kent News & Picture/Corbis Sygma

Classical and operant conditioning, systematic desensitization, aversive conditioning, social skills training, reinforcement, shaping, punishment, extinction, biofeedback



© Mancham/Photodisc Red/Getty Images

Thought stopping, recording of automatic thoughts, refuting of negative thinking, homework assignments

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for their care, but they give up much of their freedom to choose their providers and to obtain whatever treatments they believe necessary. If an HMO's treatment expenses become excessive, it won't turn a profit, so HMOs have powerful financial incentives to hold treatment costs down. The HMOs originally promised individuals and employers that they would be able to hold costs down, without having a negative impact on the quality of care, by negotiating lower fees from providers, reducing inefficiency, and cracking down on medically unnecessary services. During the 1990s, managed care *was* successful in reducing the acceleration of medical costs in the United States (Drum & Sekel, 2003). However, critics charge that managed care systems have squeezed all the savings they can out of the "fat" that existed in the old system and that they have responded to continued inflation in their costs and the need to be profitable by rationing care and limiting access to medically *necessary* services (Duckworth & Borus, 1999; Giles & Marafiotte, 1998; Sanchez & Turner, 2003).

The possibility that managed care is having a negative effect on the quality of care is a source of concern throughout the health care professions, but the issue is especially sensitive in the domain of mental health care (Bursztajn & Brodsky, 2002; Campbell, 2000). Critics maintain that mental health care has suffered particularly severe cuts in services because the question of what is "medically necessary" can be more subjective than in other treatment specialties (such as internal medicine or ophthalmology) and because patients who are denied psychotherapy services are relatively unlikely to complain (Duckworth & Borus, 1999). For example, a business executive who is trying to hide his depression or cocaine addiction from his employer will be reluctant to complain to his employer if therapeutic services are denied.

According to critics, the restriction of mental health services sometimes involves outright denial of treatment, but it often takes more subtle forms, such as underdiagnosing conditions, failing to make needed referrals to mental health specialists, and arbitrarily limiting the length of treatment (Bursztajn & Brodsky, 2002; Chambliss, 2000). Long-term therapy is becoming a thing of the past unless patients can pay for it out of pocket, and the goal of treatment has been reduced to reestablishing a reasonable level of functioning (Zatzick, 1999). Many managed care systems hold down costs by erecting *barriers to access*, such as requiring referrals from primary care physicians who don't have appointments available for weeks or months, or authorizing only a few sessions of therapy at a time (Sanchez & Turner, 2003). Another cost-cutting strategy is to reroute patients from

highly trained providers, such as psychiatrists and doctoral-level psychologists, to less-well-trained providers, such as masters-level counselors, who may not be adequately prepared to handle serious psychological disorders (Chambliss, 2000; Seligman & Levant, 1998). Cost containment is also achieved by requiring physicians to prescribe older antidepressant and antipsychotic drugs instead of the newer and much more expensive SSRIs and atypical antipsychotics, even though the newer drugs have fewer side effects and are more effective for some types of patients (Docherty, 1999).

The extensive utilization review procedures required by managed care have also raised concerns about providers' autonomy and clients' confidentiality (Chambliss, 2000; Plante, 2005). Clinicians who have to "sell" their treatment plans to managed care bureaucrats who may know little about mental health care often feel that they have lost control over their professional practice. They also worry that the need to divulge the details of clients' problems to justify treatment may breach the confidentiality of the therapist-client relationship.

Given these realities, it is not surprising that 79% of the psychologists in one national survey indicated that managed care had negatively affected the quality of their treatment efforts (Phelps, Eisman, & Kohout, 1998). Unfortunately, there are no simple solutions to these problems on the horizon. Restraining the burgeoning cost of health care without compromising the quality of care, consumers' freedom of choice, and providers' autonomy is an enormously complex and daunting challenge. At this juncture, it is difficult to predict what the future holds. However, it is clear that economic realities have ushered in an era of transition for the treatment of psychological disorders and problems.

Blending Approaches to Treatment

In this chapter we have reviewed many approaches to treatment. However, there is no rule that a client must be treated with just one approach. Often, a clinician will use several techniques in working with a client. For example, a depressed person might receive cognitive therapy, social skills training, and antidepressant medication. Multiple approaches are particularly likely when a treatment team provides therapy. Studies suggest that combining approaches to treatment has merit (Glass, 2004; Riba & Miller, 2003), as you will see in our Featured Study for this chapter.

Combining Insight Therapy and Medication

Depression is common in older people and contributes to physical health problems, chronic disability, and increased mortality among the elderly. Geriatric depression is also a highly recurrent problem. After successful treatment of depression, elderly patients tend to relapse more quickly and more frequently than younger clients. The purpose of this study was to determine whether a combination of insight therapy and antidepressant medication could reduce the recurrence of depression in an elderly population.

Method

Participants. The participants were 107 elderly patients diagnosed with recurrent, unipolar, major depression. The mean age of the patients at the beginning of the study was 67.6. The subjects had all been successfully treated for a recent episode of depression and had remained stable for four months.

Treatments. The medication employed in the study was *nortriptyline*, a tricyclic antidepressant that appears to be relatively effective and well tolerated in elderly populations. The insight therapy was *interpersonal psychotherapy (IPT)*, an approach to therapy that emphasizes the social roots of depression and focuses on how improved social relations can protect against depression (Klerman & Weissman, 1993). Clients learn how social isolation and unsatisfying interpersonal relationships can provoke depression and how confidants and supportive interactions can decrease vulnerability to depression.

Design. The subjects were randomly assigned to one of four maintenance treatment conditions: (1) monthly interpersonal therapy and medication, (2) medication alone, (3) monthly interpersonal therapy and placebo medication, and (4) placebo medication alone. A *double-blind* procedure was employed, so the clinicians who provided the treatments did not know which subjects were getting genuine medication as opposed to placebo pills. Patients remained in maintenance treatment for three years or until a recurrence of a major depressive episode.

Results

The relapse rates for the four treatment conditions are shown in **Figure 15.13**. The relapse rate for the combination of interpersonal therapy and medication was significantly less than that for either medication alone or interpersonal therapy alone (with placebo medication). The prophylactic value of the combined therapy proved

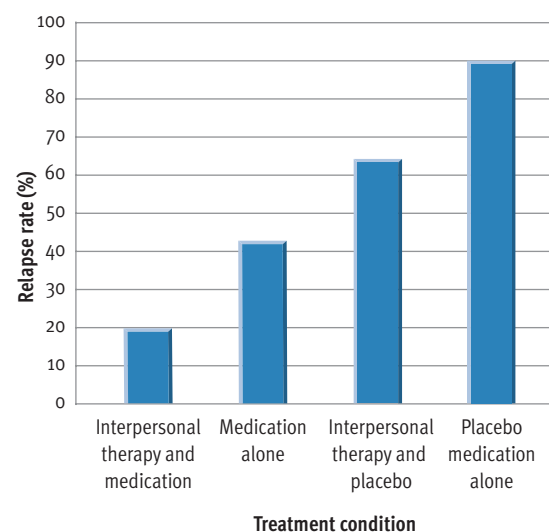
most valuable to patients over 70 years of age and in the first year of the study, during which most relapses occurred.

Discussion

The authors conclude that “the continuation of combined medication and psychotherapy may represent the best long-term treatment strategy for preserving recovery in elderly patients with recurrent major depression” (p. 44). They speculate that the combined treatment may be “best-suited for dealing with both the biological and psychosocial substrates of old-age depression” (p. 45). However, they acknowledge the need for further research and recommend additional studies with newer antidepressant drugs (the SSRIs) that are increasingly popular.

Comment

This study was featured because it illustrated how to conduct a well-controlled experimental evaluation of the efficacy of therapeutic interventions. It also highlighted the value of combining approaches to treatment, which is a laudable trend in the treatment of psychological disorders. The fact that the study was published in the highly prestigious *Journal of the American Medical Association* also demonstrates how prominent and important research on therapeutic efficacy has become in the era of managed care.



FEATURED Study

Source: Reynolds, C. F., III, Frank, E., Perel, J. M., Imber, S. D., Cornes, C., Miller, M. D., Mazumdar, S., Houck, P. R., Dew, M. A., Stack, J. A., Pollock, B. G., & Kupfer, D. J. (1999). Nortriptyline and interpersonal psychotherapy as maintenance therapies for recurrent major depression: A randomized controlled trial in patients older than 50 years. *Journal of the American Medical Association*, 28, 39–45.

Figure 15.13
Relapse rates in the Reynolds et al. (1999) study. Following up over a period of three years, Reynolds et al. (1999) compared the preventive value of (1) monthly interpersonal therapy and medication, (2) medication alone, (3) monthly interpersonal therapy and placebo medication, and (4) placebo medication alone in a sample of elderly patients prone to recurrent depression. The combined treatment of insight therapy and medication yielded the lowest relapse rates and thus proved superior to either insight therapy or drug therapy alone. (Data from Reynolds et al., 1999)

The value of multiple approaches to treatment may explain why a significant trend seems to have crept into the field of psychotherapy: a movement away from strong loyalty to individual schools of thought and a corresponding move toward integrating vari-

ous approaches to therapy (Castonguay et al., 2003; D. A. Smith, 1999). Most clinicians used to depend exclusively on one system of therapy while rejecting the utility of all others. This era of fragmentation may be drawing to a close. In recent surveys of psycholo-



Psych Central

The work of John Grohol, Psych Central is a superb source for learning about all aspects of mental health, including psychological disorders and treatment, professional issues, and information for mental health care consumers. Almost 2000 annotated listings to information sources are offered here.

gists' theoretical orientations, researchers have found that one-half to two-thirds of respondents describe themselves as *eclectic* in approach (Lambert, Bergin, & Garfield, 2004).

Eclecticism in the practice of therapy involves drawing ideas from two or more systems of therapy instead of committing to just one system. Therapists can be eclectic in a number of ways (Arkowitz, 1992; Feixas & Botella, 2004; Goin, 2005). Two common approaches are theoretical integration and technical eclecticism. In *theoretical integration*, two or more systems of therapy are combined or blended to take advantage of the strengths of each. Paul Wachtel's (1977, 1991) efforts to blend psychodynamic and behavioral therapies is a prominent example. *Technical eclecticism* involves borrowing ideas, insights, and techniques from a variety of sources while tailoring one's intervention strategy to the unique needs of each client. Advocates of technical eclecticism, such as Arnold Lazarus (1989, 1992, 1995), maintain that therapists should ask themselves, "What is the best approach for this specific client, problem, and situation?" and then adjust their strategy accordingly.

Increasing Multicultural Sensitivity in Treatment

Modern psychotherapy emerged during the second half of the 19th century in Europe and America, spawned in part by a cultural milieu that viewed the self as an independent, reflective, rational being, capable of self-improvement (Cushman, 1992). Psychological disorders were assumed to have natural causes like physical diseases and to be amenable to medical treatments derived from scientific research. But the individualized, medicalized institution of modern psychotherapy reflects Western cultural values that are far from universal (Sue & Sue, 1999). In many non-industrialized societies, psychological disorders are attributed to supernatural forces (possession, witchcraft, angry gods, and so forth), and victims seek help from priests, shamans, and folk healers, rather than doctors (Wittkower & Warnes, 1984). Thus, efforts to export Western psychotherapies to non-Western cultures have met with mixed success. Indeed, as the Surgeon General's report on mental health emphasizes, the highly culture-bound origins of modern therapies have raised questions about their applicability to ethnic minorities *within* Western culture.

Research on how cultural factors influence the process and outcome of psychotherapy has burgeoned in recent years, motivated in part by the need to improve mental health services for ethnic minority

groups in American society (Lee & Ramirez, 2000; Miranda et al., 2005). The data are ambiguous for a couple of ethnic groups, but studies suggest that American minority groups generally underutilize therapeutic services (Olfson et al., 2002; Vega et al., 1999; Wells et al., 2001). Why? A variety of barriers appear to contribute to this problem, including the following (Snowden & Yamada, 2005; Zane et al., 2004; U.S. Department of Health and Human Services, 1999):

1. **Cultural barriers.** In times of psychological distress, some cultural groups are reluctant to turn to formal, professional sources of assistance. Given their socialization, they prefer to rely on informal assistance from family members, the clergy, respected elders, herbalists, acupuncturists, and so forth, who share their cultural heritage. Many members of minority groups have a history of frustrating interactions with American bureaucracies and are distrustful of large, intimidating, foreign institutions, such as hospitals and community mental health centers (Pierce, 1992).

2. **Language barriers.** Effective communication is crucial to the provision of psychotherapy, yet most hospitals and mental health agencies are not adequately staffed with therapists who speak the languages used by minority groups in their service areas. The resulting communication problems make it awkward and difficult for many minority group members to explain their problems and to obtain the type of help that they need.

3. **Access barriers.** Many minority groups suffer from elevated rates of joblessness and poverty. In our society, people who are unemployed or employed in economically marginal jobs typically do not have health insurance. Thus, poverty and lack of health insurance severely restricts the options of many minorities in pursuing treatment for psychological problems (Miranda & Green, 1999).

4. **Institutional barriers.** When all is said and done, Stanley Sue and Nolan Zane (1987) argue that the "single most important explanation for the problems in service delivery involves the inability of therapists to provide culturally responsive forms of treatment" (p. 37). The vast majority of therapists have been trained almost exclusively in the treatment of white, middle-class Americans and are not familiar with the cultural backgrounds and unique characteristics of various ethnic groups. This culture gap often leads to misunderstandings and ill-advised treatment strategies (Hughes, 1993). Unfortunately, there is a grievous shortage of ethnic therapists to meet the needs of various ethnic groups (Mays & Albee, 1992).

What can be done to improve mental health services for American minority groups? Researchers in this area have offered a variety of suggestions (Hong, Garcia, & Soriano, 2000; Miranda et al., 2005; Pederesen, 1994; Yamamoto et al., 1993). Discussions of possible solutions usually begin with the need to recruit and train more ethnic minority therapists. Studies show that ethnic minorities are more likely to go to mental health facilities that are staffed by a higher proportion of people who share their ethnic background (Snowden & Hu, 1996; Sue, Zane, & Young, 1994). Furthermore, clients' satisfaction with therapy tends to be greater when they are treated by therapists from their own culture. Therapists can also be given special training to work more effectively with people from different cultural backgrounds. Finally, most authorities urge further investigation of how traditional approaches to therapy can be modified and tailored to be more compatible with specific cultural groups' attitudes, values, norms, and traditions.

➤ REVIEW OF KEY POINTS

- Many clinicians and their clients believe that managed care has restricted access to mental health care and undermined its quality. Managed care has also raised concerns about providers' autonomy and clients' confidentiality.
- Combinations of insight, behavioral, and biomedical therapies are often used fruitfully in the treatment of psychological disorders. For example, our Featured Study showed how the tandem of interpersonal therapy and antidepressant medication could be valuable in preventing additional depressive episodes in an elderly population. Many modern therapists are eclectic, using specific ideas, techniques, and strategies gleaned from a number of theoretical approaches.
- The highly culture-bound origins of Western therapies have raised doubts about their applicability to other cultures and even to ethnic groups in Western society. Because of cultural, language, and access barriers, therapeutic services are underutilized by ethnic minorities in America.
- More culturally responsive approaches to treatment will require more minority therapists, special training for therapists, and additional investigation of how traditional therapies can be tailored to be more compatible with specific ethnic groups' cultural heritage.

➤ Institutional Treatment in Transition

Traditionally, much of the treatment of mental illness has been carried out in institutional settings, primarily in mental hospitals. **A mental hospital is a medical institution specializing in providing inpatient care for psychological disorders.** In the United States, a national network of state-funded mental hospitals started to emerge in the 1840s through the efforts of Dorothea Dix and other reformers (see **Figure 15.14** on the next page). Prior to these reforms, the mentally ill who were poor were housed in jails and poorhouses or were left to wander the countryside. Today, mental hospitals continue to play an important role in the delivery of mental health services. However, since World War II, institutional care for mental illness has undergone a series of major transitions—and the dust hasn't settled yet. Let's look at how institutional care has evolved in recent decades.

Disenchantment with Mental Hospitals

By the 1950s, it had become apparent that public mental hospitals were not fulfilling their goals very well (Mechanic, 1980). Experts began to realize that hospitalization often *contributed* to the development of pathology instead of curing it.

What were the causes of these unexpected negative effects? Part of the problem was that the facilities were usually underfunded (Bloom, 1984). The lack of adequate funding meant that the facilities were overcrowded and understaffed. Hospital personnel were undertrained and overworked, making them hard-pressed to deliver minimal custodial care. Despite gallant efforts at treatment, the demoralizing conditions made most public mental hospitals decidedly non-therapeutic (Scull, 1990). These problems were aggravated by the fact that state mental hospitals served large geographic regions but were rarely placed near major population centers. As a result, most patients were uprooted from their community and isolated from their social support networks.

Disenchantment with the public mental hospital system inspired the *community mental health movement* that emerged in the 1960s (Duckworth & Borus, 1999). The community mental health movement emphasizes (1) local, community-based care, (2) reduced dependence on hospitalization, and (3) the prevention of psychological disorders. The community mental health movement jumped into prominence in 1963 when John F. Kennedy became the first American president ever to address the nation on the subject of mental health. Kennedy outlined an ambitious plan to build a national network of community

PREVIEW QUESTIONS

- What led to the community mental health movement?
- What is deinstitutionalization, and what problems has it been blamed for?
- Is increased homelessness a mental health problem or an economic problem?

Figure 15.14
Dorothea Dix and the advent of mental hospitals in America. During the 19th century, Dorothea Dix (inset) campaigned tirelessly to obtain funds for building mental hospitals. Many of these hospitals, such as the New York State Lunatic Asylum, were extremely large facilities. Although public mental hospitals improved the care of the mentally ill, they had a variety of shortcomings, which eventually prompted the deinstitutionalization movement.

Source: Culver Pictures, Inc.; (inset) Detail of painting in Harrisburg State Hospital, photo by Ken Smith/LLR Collection.

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mental health centers. Thus, in the 1960s much of the responsibility for the treatment of psychological disorders was turned over to community mental health centers, which supplement mental hospitals with decentralized and more accessible services. Since then, community mental health centers have had their own funding struggles and have evolved and changed in many ways, but they continue to make a crucial contribution to mental health care (Dixon & Goldman, 2004).

Deinstitutionalization

Mental hospitals continue to care for many people troubled by chronic mental illness, but their role in patient care has diminished. Since the 1960s, a policy of deinstitutionalization has been followed in the United States, as well as most other Western countries (Fakhoury & Priebe, 2002). *Deinstitutionalization refers to transferring the treatment of mental illness from inpatient institutions to community-based facilities that emphasize outpatient care.* This shift in responsibility was made possible by two developments: (1) the emergence of effective drug therapies for severe disorders and (2) the deployment of community mental health centers to coordinate local care (Goff & Gudeman, 1999).

The exodus of patients from mental hospitals has been dramatic. In the United States, the average inpatient population in state and county mental hospitals dropped from a peak of nearly 550,000 in the mid-1950s to around 70,000 in the late 1990s, as shown in Figure 15.15. These trends do not mean that

Figure 15.15
Declining inpatient population at state and county mental hospitals. The inpatient population in public mental hospitals has declined dramatically since the late 1950s, as a result of deinstitutionalization and the development of effective antipsychotic medication. (Data from the National Institute of Mental Health)

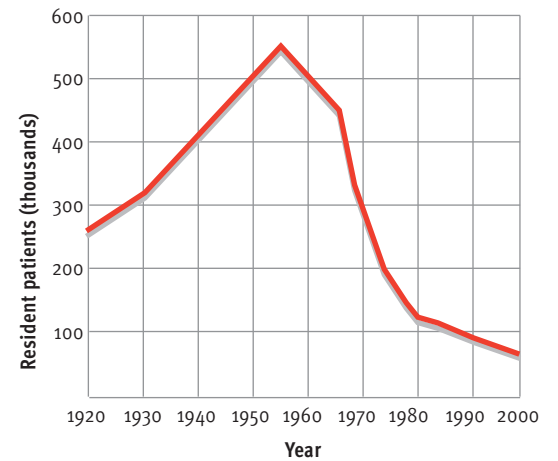


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hospitalization for mental illness has become a thing of the past. A great many people are still hospitalized, but there's been a shift toward placing them in local general hospitals for brief periods instead of distant psychiatric hospitals for long periods (Kiesler, 1992). In keeping with the philosophy of deinstitutionalization, these local facilities try to get patients stabilized and back into the community as swiftly as possible.

How has deinstitutionalization worked out? It gets mixed reviews. On the positive side, many people have benefited by avoiding or shortening disruptive and unnecessary hospitalization. Ample evidence suggests that alternatives to hospitalization can be both as effective as and less costly than inpatient care (McGrew et al., 1999; Reinhartz, Lesage, & Contandriopoulos, 2000). Moreover, follow-up studies of discharged patients reveal that a substantial majority prefer the greater freedom provided by community-based treatment (Leff, Trieman, & Gooch, 1996).

Nonetheless, some unanticipated problems have arisen (Elpers, 2000; Munk-Jorgensen, 1999; Talbott, 2004). Many patients suffering from chronic psychological disorders had nowhere to go when they were released. They had no families, friends, or homes to return to. Many had no work skills and were poorly prepared to live on their own. These people were supposed to be absorbed by "halfway houses," sheltered workshops, and other types of intermediate care facilities. Unfortunately, many communities were never able to fund and build the planned facilities (Hogan & Morrison, 2003; Lamb, 1998). Coordination of support services for the chronically mentally ill has often been poor, and former patients have not been integrated effectively into their communities (Deweese, Pulice, & McCormick, 1996).

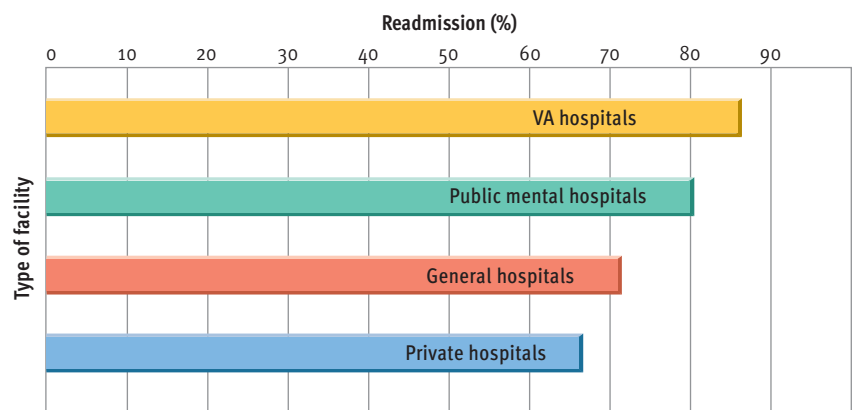
Thus, deinstitutionalization left two major problems in its wake: a "revolving door" population of people who flow in and out of psychiatric facilities, and a sizable population of homeless mentally ill people.

Mental Illness, the Revolving Door, and Homelessness

Although the proportion of hospital days attributable to mental illness has dwindled, admission rates for psychiatric hospitalization have actually climbed. What has happened? Deinstitutionalization and drug therapy have created a revolving door through which many mentally ill people pass again and again (Geller, 1992; Langdon et al., 2001).

Most of the people caught in the mental health system's revolving door suffer from chronic, severe disorders that frequently require hospitalization (Haywood et al., 1995). They respond well to drug therapies in the hospital, but once they're stabilized through drug therapy, they no longer qualify for expensive hospital treatment according to the new standards created by deinstitutionalization. Thus, they're sent back out the door, into communities that often aren't prepared to provide adequate outpatient care. Because they lack appropriate care and support, their condition deteriorates and they soon require readmission to a hospital, where the cycle begins once again. Over two-thirds of all psychiatric inpatient admissions involve rehospitalizing a former patient, as Figure 15.16 shows.

Figure 15.16
Percentage of psychiatric inpatient admissions that are readmissions.
The extent of the revolving door problem is apparent from these figures on the percentage of inpatient admissions that are readmissions at various types of facilities. (Data from the National Institute of Mental Health)



Deinstitutionalization has also been blamed for the growing population of homeless people. Studies have consistently found elevated rates of mental illness among the homeless. Taken as a whole, the evidence suggests that roughly one-third of the homeless suffer from severe mental illness (schizophrenic and mood disorders), that another one-third or more are struggling with alcohol and drug problems, that many qualify for multiple diagnoses, and that the prevalence of mental illness among the homeless may be increasing (Bassuk et al., 1998; Folsom et al., 2005; Haugland et al., 1997; North et al., 2004; Vazquez, Munoz, & Sanz, 1997).

The popular media routinely equate homelessness with mental illness, and it is widely assumed that deinstitutionalization is largely responsible for the rapid growth of homelessness in America. Although deinstitutionalization probably has *contributed* to the growth of homelessness, many experts in this area maintain that it is misleading to blame the problem of homelessness chiefly on deinstitutionalization (Main, 1998; Sullivan, Burnam, & Koegel, 2000). Those who criticize the tendency to equate homelessness with mental illness worry that this equation diverts attention from the real causes of the homelessness crisis (Kiesler, 1991). They marshal evidence to show that the sharp increase in the homeless population is due to a variety of economic, social, and political trends, including increased unemployment and poverty, decreased support for welfare and subsidized

housing programs, the loss of much low-income housing to urban renewal, and so forth (Cohen & Thompson, 1992; Mojtabai, 2005; Rossi, 1990). They maintain that homelessness is primarily an economic problem and that it requires economic solutions.

In light of the revolving door problem and homelessness among the mentally ill, what can we conclude about deinstitutionalization? It appears to be a worthwhile idea that has been poorly executed (Lamb, 1998). Overall, the policy has probably been a benefit to countless people with milder disorders but a cruel trick on many others with severe, chronic disorders. Ultimately, it's clear that our society is not providing adequate care for a sizable segment of the mentally ill population (Appelbaum, 2002; Elpers, 2000; Torrey, 1996). That's not a new development. Inadequate care for mental illness has always been the norm. Societies always struggle with the problem of what to do with the mentally ill and how to pay for their care (Duckworth & Borus, 1999).

What's the solution? Virtually no one advocates returning to the era of custodial warehouses. Many do advocate increasing the quality and availability of intermediate care facilities and programs (Lamb, 1999). Research shows that intermediate care initiatives (such as outreach and case management programs) can be effective, but they require significant funding (Rosenheck, 2000). Only time will tell whether American society will be willing to make the financial commitment to follow through on this recommendation.

> Reflecting on the Chapter's Themes

Theoretical
Diversity



Cultural
Heritage



In our discussion of psychotherapy, one of our unifying themes—the value of theoretical diversity—was particularly prominent, and one other theme—the importance of culture—surfaced briefly. Let's discuss the latter theme first. The approaches to treatment described in this chapter are products of modern, white, middle-class, Western culture. Some of these therapies have proven useful in some other cultures, but many have turned out to be irrelevant or counterproductive when used with different cultural groups, including ethnic minorities in Western society. Thus, we have seen once again that cultural factors influence psychological processes and that Western psychology cannot assume that its theories and practices have universal applicability.

As for theoretical diversity, its value can be illustrated with a rhetorical question: Can you imagine

what the state of modern psychotherapy would be if everyone in psychology and psychiatry had simply accepted Freud's theories about the nature and treatment of psychological disorders? If not for theoretical diversity, psychotherapy might still be in the dark ages. Psychoanalysis can be a useful method of therapy, but it would be a tragic state of affairs if it were the *only* treatment available. Multitudes of people have benefited from alternative approaches to treatment that emerged out of tensions between psychoanalytic theory and other theoretical perspectives. People have diverse problems, rooted in varied origins, that call for the pursuit of different therapeutic goals. Thus, it's fortunate that people can choose from a diverse array of approaches to treatment. The illustrated overview on pages 616–617 summarizes and compares the approaches that we've discussed

in this chapter. This summary chart shows that the major approaches to treatment each have their own vision of the nature of human discontent and the ideal remedy.

Of course, diversity can be confusing. The range and variety of available treatments in modern psychotherapy leaves many people puzzled about their options. Thus, in our Personal Application we'll sort through the practical issues involved in selecting a therapist.

➤ REVIEW OF KEY POINTS

- Disenchantment with the negative effects of mental hospitals led to the advent of more localized community mental health centers and a policy of deinstitutionalization. Long-term hospitalization for mental disorders is largely a thing of the past.
- Unfortunately, deinstitutionalization has left some unanticipated problems in its wake, including the revolving door problem and increased homelessness, although some theorists argue that homelessness is primarily an economic problem.

PERSONAL Application

Looking for a Therapist

Answer the following "true" or "false."

- ____ 1 Psychotherapy is an art as well as a science.
- ____ 2 Psychotherapy can be harmful or damaging to a client.
- ____ 3 Psychotherapy does not have to be expensive.
- ____ 4 The type of professional degree that a therapist holds is relatively unimportant.

All of these statements are true. Do any of them surprise you? If so, you're in good company. Many people know relatively little about the practicalities of selecting a therapist.

The task of finding an appropriate therapist is complex. Should you see a psychologist or psychiatrist? Should you opt for individual therapy or group therapy? Should you see a client-centered therapist or a behavior therapist? The unfortunate part of this situation is that people seeking psychotherapy often feel overwhelmed by personal problems. The last thing they need is to be confronted by yet another complex problem.

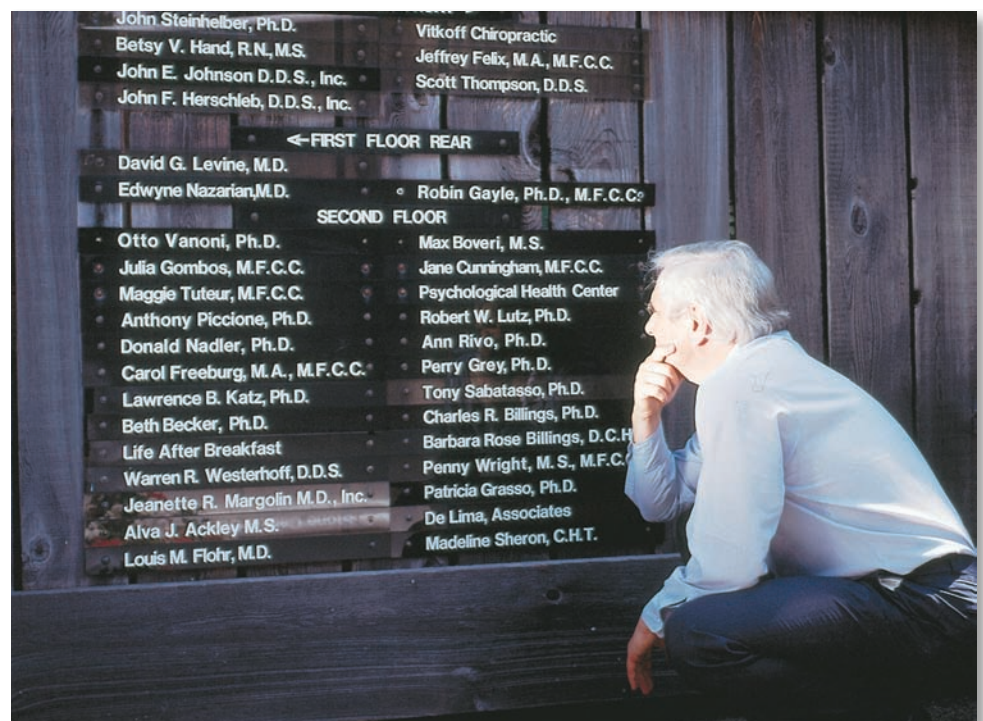
Nonetheless, the importance of finding a good therapist cannot be overestimated. Treatment can sometimes have harmful rather than helpful effects. We have already discussed how drug therapies and ECT can sometimes be damaging, but problems are not limited to these interventions. Talking

about your problems with a therapist may sound harmless, but studies indicate that insight therapies can also backfire (Lambert & Ogles, 2004; Singer & Lalich, 1996). Although a great many talented therapists are available, psychotherapy, like any other profession, has incompetent practitioners as well. Therefore, you should shop for a skilled ther-

apist, just as you would for a good attorney or a good mechanic.

In this application, we'll go over some information that should be helpful if you ever have to look for a therapist for yourself or for a friend or family member (based on Beutler, Bongar, & Shurkin, 2001; Ehrenberg & Ehrenberg, 1994; Pittman, 1994).

Finding the right therapist is no easy task. You need to take into account the therapist's training and orientation, fees charged, and personality. An initial visit should give you a good idea of what a particular therapist is like.



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Where Do You Find Therapeutic Services?

Psychotherapy can be found in a variety of settings. Contrary to general belief, most therapists are not in private practice. Many work in institutional settings such as community mental health centers, hospitals, and human service agencies. The principal sources of therapeutic services are described in Table 15.2. The exact configuration of therapeutic services available will vary from one community to another. To find out what your community has to offer, it is a good idea to consult your friends, your local phone book, or your local community mental health center.

Is the Therapist’s Profession or Sex Important?

Psychotherapists may be trained in psychology, psychiatry, social work, counseling, psychiatric nursing, or marriage and family therapy. Researchers have *not* found any reliable associations between therapists’ professional background and therapeutic efficacy (Beutler et al., 2004), probably because many talented therapists can be found in all of these professions. Thus, the kind of degree that a therapist holds doesn’t need to be a crucial consideration in your selection process.

Whether a therapist’s sex is important depends on your attitude. If *you* feel that the

therapist’s sex is important, then for you it is. The therapeutic relationship must be characterized by trust and rapport. Feeling uncomfortable with a therapist of one sex or the other could inhibit the therapeutic process. Hence, you should feel free to look for a male or female therapist if you prefer to do so. This point is probably most relevant to female clients whose troubles may be related to sexism in our society (Kaplan, 1985). It is entirely reasonable for women to seek a therapist with a feminist perspective if that would make them feel more comfortable.

Speaking of sex, you should be aware that sexual exploitation is an occasional problem in the context of therapy. Studies indicate that a small minority of therapists take advantage of their clients sexually (Pope, Keith-Spiegel, & Tabachnick, 1986). These incidents almost always involve a male therapist making advances to a female client. The available evidence indicates that these sexual liaisons are usually harmful to clients (Gabbard, 1994; Williams, 1992). There are absolutely no situations in which therapist-client sexual relations are an ethical therapeutic practice. If a therapist makes sexual advances, a client should terminate treatment.

Is Treatment Always Expensive?

Psychotherapy does not have to be prohibitively expensive. Private practitioners tend

to be the most expensive, charging between \$75 and \$140 per (50-minute) hour. These fees may seem high, but they are in line with those of similar professionals, such as dentists and attorneys. Community mental health centers and social service agencies are usually supported by tax dollars. As a result they can charge lower fees than most therapists in private practice. Many of these organizations use a sliding scale, so that clients are charged according to how much they can afford to pay. Thus, most communities have inexpensive opportunities for psychotherapy. Moreover, most health insurance plans and HMOs provide coverage for at least some forms of mental health care.

Is the Therapist’s Theoretical Approach Important?

Logically, you might expect that the diverse approaches to therapy vary in effectiveness. For the most part, this is *not* what researchers find, however. After reviewing many studies of therapeutic efficacy, Jerome Frank (1961) and Lester Luborsky and his colleagues (1975) both quote the dodo bird who has just judged a race in *Alice in Wonderland*: “Everybody has won, and *all* must have prizes.” Improvement rates for various theoretical orientations usually come out pretty close in most studies (Lambert & Bergin, 2004; Luborsky et al., 2002; Wampold, 2001; see Figure 15.17).

However, these findings are a little misleading, as the estimates of overall effectiveness have been averaged across many types of patients and many types of problems. Most experts seem to think that *for certain types of problems, some approaches to therapy are more effective than others* (Beutler, 2002; Crits-Christoph, 1997; Norcross, 1995). For example, Martin Seligman (1995) asserts that panic disorders respond best to cognitive therapy, that specific phobias are most amenable to treatment with systematic desensitization, and that obsessive-compulsive disorders are best treated with behavior therapy or medication. Thus, for a specific type of problem, a therapist’s theoretical approach *may* make a difference.

It is also important to point out that the finding that different approaches to therapy are roughly equal in overall efficacy does

Table 15.2 Principal Sources of Therapeutic Services

Source	Comments
Private practitioners	Self-employed therapists are listed in the Yellow Pages under their professional category, such as psychologists or psychiatrists. Private practitioners tend to be relatively expensive, but they also tend to be highly experienced therapists.
Community mental health centers	Community mental health centers have salaried psychologists, psychiatrists, and social workers on staff. The centers provide a variety of services and often have staff available on weekends and at night to deal with emergencies.
Hospitals	Several kinds of hospitals provide therapeutic services. There are both public and private mental hospitals that specialize in the care of people with psychological disorders. Many general hospitals have a psychiatric ward, and those that do not usually have psychiatrists and psychologists on staff and on call. Although hospitals tend to concentrate on inpatient treatment, many provide outpatient therapy as well.
Human service agencies	Various social service agencies employ therapists to provide short-term counseling. Depending on your community, you may find agencies that deal with family problems, juvenile problems, drug problems, and so forth.
Schools and workplaces	Most high schools and colleges have counseling centers where students can get help with personal problems. Similarly, some large businesses offer in-house counseling to their employees.

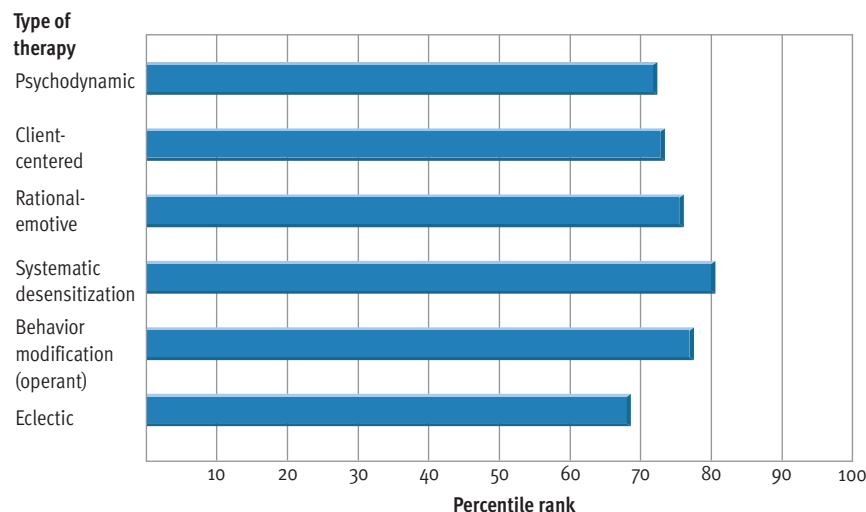


Figure 15.17

Estimates of the effectiveness of various approaches to psychotherapy. Smith and Glass (1977) reviewed nearly 400 studies in which clients who were treated with a specific type of therapy were compared with a control group made up of individuals with similar problems who went untreated. The bars indicate the percentile rank (on outcome measures) attained by the average client treated with each type of therapy when compared to control subjects. The higher the percentile, the more effective the therapy was. As you can see, the various approaches were fairly similar in their overall effectiveness.

Source: Adapted from Smith, M. L., & Glass, G. V. (1977). Meta-analysis of psychotherapy outcome series. *American Psychologist*, 32, 752–760. Copyright © 1977 by the American Psychological Association. Adapted by permission of the publisher and author.

not mean that all *therapists* are created equal. Some therapists unquestionably are more effective than others. However, these variations in effectiveness appear to depend on individual therapists' personal skills rather than on their theoretical orientation (Beutler et al., 2004). Good, bad, and mediocre therapists are found within each school of thought.

The key point is that effective therapy requires skill and creativity. Arnold Lazarus, who devised multimodal therapy, emphasizes that therapists "straddle the fence between science and art." Therapy is scientific in that interventions are based on extensive theory and empirical research (Forsyth & Strong, 1986). Ultimately, though, each client is a unique human being, and the therapist

has to creatively fashion a treatment program that will help that individual.

What Should You Look For in a Prospective Therapist?

Some clients are timid about asking prospective therapists questions about their training, approach, fees, and so forth. However, these are reasonable questions, and the vast majority of therapists will be most accommodating in providing answers. Usually, you can ask your preliminary questions over the phone. If things seem promising, you may decide to make an appointment for an interview (for which you will probably have to pay). In this interview, the therapist will gather more information to determine the likelihood of helping you, given his or her training and approach to treatment. At the same time, you should be making a similar judgment about whether *you* believe the therapist can help you with your problems.

What should you look for? First, you should look for personal warmth and sincere concern. Try to judge whether you will be able to talk to this person in a candid, nondefensive way. Second, look for empathy and understanding. Is the person capable of appreciating your point of view? Third, look for self-confidence. Self-assured therapists will communicate a sense of competence without trying to intimidate you with jargon or boasting needlessly about what they can do for you. When all is said and done, you should *like* your therapist. Otherwise, it will be difficult to establish the needed rapport.



Therapy is both a science and an art. It is scientific in that practitioners are guided in their work by a huge body of empirical research. It is an art in that therapists often have to be creative in adapting their treatment procedures to individual patients and their idiosyncrasies.

What Is Therapy Like?

It is important to have realistic expectations about therapy, or you may be unnecessarily disappointed. Some people expect miracles. They expect to turn their life around quickly with little effort. Others expect their therapist to run their lives for them. These are unrealistic expectations.

Therapy is usually a slow process. Your problems are not likely to melt away quickly. Moreover, therapy is hard work, and your therapist is only a facilitator. Ultimately, *you* have to confront the challenge of changing your behavior, your feelings, or your personality. This process may not be pleasant. You may have to face up to some painful truths about yourself. As Ehrenberg and Ehrenberg (1986) point out, "Psychotherapy takes time, effort, and courage."

➤ REVIEW OF KEY POINTS

- Therapeutic services are available in many settings, and such services need not be expensive. Both excellent and mediocre therapists can be found in all of the mental health professions. Thus, therapists' personal skills are more important than their professional degree.
- The various theoretical approaches to therapy appear to be fairly similar in overall effectiveness. However, for certain types of problems, some approaches are probably more effective than others, and all therapists are not created equal. In selecting a therapist, warmth, empathy, confidence, and likability are desirable traits, and it is reasonable to insist on a therapist of one sex or the other.

CRITICAL THINKING Application

From Crisis to Wellness—But Was It the Therapy?

It often happens this way. Problems seem to go from bad to worse—the trigger could be severe pressures at work, an acrimonious fight with your spouse, or a child's unruly behavior spiraling out of control. At some point, you recognize that it might be prudent to seek professional assistance from a therapist, but where do you turn? If you are like most people, you will probably hesitate before actively seeking professional help. People hesitate because therapy carries a stigma, because the task of finding a therapist is daunting, and because they hope that their psychological problems will clear up on their own—which *does* happen with some regularity. When people finally decide to pursue mental health care, it is often because they feel like they have reached rock bottom in terms of their functioning and they have no choice. Motivated by their crisis, they enter into treatment, looking for a ray of hope. Will therapy help them feel better?

It may surprise you to learn that the answer *generally* would be “yes,” even if professional treatment itself were utterly worthless and totally ineffectual. There are two major reasons that people entering therapy are likely to get better, regardless of whether their treatment is effective. You can probably guess one of these reasons, which has been mentioned repeatedly in the chapter: the power of the *placebo*. **Placebo effects occur when people's expectations lead them to experience some change even though they receive a fake treatment** (like getting a sugar pill instead of a real drug). Clients generally enter therapy with expectations that it will have positive effects, and as we have emphasized throughout this text, *people have a remarkable tendency to see what they expect to see*. Because of this factor, studies of the efficacy of medical drugs always include a placebo condition in which subjects are given fake medication (see Chapter 2). Researchers are often quite surprised by just how much the placebo subjects improve (Fisher & Greenberg, 1997; Walsh et al., 2002). Pla-

cebo effects can be powerful and should be taken into consideration whenever efforts are made to evaluate the efficacy of some approach to treatment.

The other factor at work is the main focus in this Application. It is an interesting statistical phenomenon that we have not discussed previously: *regression toward the mean*. **Regression toward the mean occurs when people who score extremely high or low on some trait are measured a second time and their new scores fall closer to the mean (average)**. Regression effects work in both directions: On the second measurement high scorers tend to fall back toward the mean and low scorers tend to creep upward toward the mean. For example, let's say we wanted to evaluate the effectiveness of a one-day coaching program intended to improve performance on the SAT test. We reason that coaching is most likely to help students who have performed poorly on the test, so we recruit a sample of high school students who have previously scored in the bottom 20% on the SAT. Thanks to regression toward the mean, most of these students will score higher if they take the SAT a second time, so our coaching program may *look* effective even if it has no value. By the way, if we set out to see whether our coaching program could increase the performance of high scorers, regression effects would be working *against* us. If we recruited a sample of students who had scored in the upper

20% on the SAT, their scores would tend to move downward when tested a second time, which could cancel out most or all of the beneficial effects of the coaching program. The processes underlying regression toward the mean are complex matters of probability, but they can be approximated by a simple principle: If you are near the bottom, there's almost nowhere to go but up, and if you are near the top, there's almost nowhere to go but down.

What does all of this have to do with the effects of professional treatment for psychological problems and disorders? Well, chance



Placebo effects and regression toward the mean are two prominent factors that make it difficult to evaluate the efficacy of various approaches to therapy.

variations in the ups and downs of life occur for all of us. But recall that most people enter psychotherapy during a time of severe crisis, when they are at a really low point in their lives. If you measure the mental health of a group of people entering therapy, they will mostly get relatively low scores. If you measure their mental health again a few months later, chances are that most of them will score higher—with or without therapy—because of regression toward the mean. This is not a matter of idle speculation. Studies of untreated subjects demonstrate that poor scores on measures of mental health regress toward the mean when participants are assessed a second time (Flett, Vredenburg, & Krames, 1995; Hsu, 1995).

Does the fact that most people will get better even without therapy mean that there is no sound evidence that psychotherapy works? No, regression effects, along with placebo effects, do create major headaches for researchers evaluating the efficacy of various therapies, but these problems *can* be circumvented. Control groups, random assignment, placebo conditions, and statistical adjustments can be used to control for regression and placebo effects, as well as for other threats to validity. As discussed in the main body of the chapter, researchers have accumulated rigorous evidence that most approaches to therapy have demonstrated efficacy. However, our discussion of placebo and regression effects shows you some of the factors that make this type of research far more complicated and challenging than might be anticipated.

Recognizing how regression to the mean can occur in a variety of contexts is an important critical thinking skill, so let's look at some additional examples. Think about an outstanding young pro baseball player who has a fabulous first season and is named "Rookie of the Year." What sort of performance would you predict for this athlete for the next year? Before you make your prediction, think about regression to the mean. Statistically speaking, our Rookie of the Year is likely to perform well above average the next year, but not as well as he did in his first year. If you are a sports fan, you may recognize this pattern as the "sophomore slump." Many sports columnists have written about the sophomore slump, which

Image Not Available

Placebo effects and regression toward the mean can help explain why phony, worthless treatments can have sincere supporters who really believe that the bogus interventions are effective.

they typically blame on the athlete's personality or motivation ("He got lazy," "He got cocky," "The money and fame went to his head," and so forth). A simple appeal to regression toward the mean could explain this sort of outcome, with no need to denigrate the personality or motivation of the athlete. Of course, sometimes the Rookie of the Year performs even better during his second year. Thus, our baseball example can be used to emphasize an important point. Regression to the mean is not an inevitability. It is a statistical tendency that predicts

what will happen far more often than not, but it is merely a matter of probability—which means it is a much more reliable principle when applied to groups (say, the top ten rookies in a specific year) rather than to individuals.

Let's return to the world of therapy for one last thought about the significance of both regression and placebo effects. Over the years, a host of quacks, charlatans, con artists, herbalists, and faith healers have marketed and sold an endless array of worthless treatments for both psychological problems and physical maladies. In many instances, people who have been treated with these phony therapies have expressed satisfaction or even praise and gratitude. For instance, you may have heard someone sincerely rave about some herbal remedy or psychic advice that you were pretty sure was really worthless. If so, you were probably puzzled by their glowing testimonials. Well, you now have two highly plausible explanations for why people can honestly believe that they have derived great benefit from harebrained, bogus treatments: placebo effects and regression effects. The people who provide testimonials for worthless treatments may have experienced *genuine* improvements in their conditions, but those improvements were probably the result of placebo effects and regression toward the mean. Placebo and regression effects add to the many reasons that you should always be skeptical about anecdotal evidence. And they help explain why charlatans can be so successful and why unsound, ineffective treatments can have sincere proponents.

Table 15.3 Critical Thinking Skills Discussed in This Application

Skill	Description
Recognizing situations in which placebo effects might occur	The critical thinker understands that if people have expectations that a treatment will produce a certain effect, they may experience that effect even if the treatment was fake or ineffectual.
Recognizing situations in which regression toward the mean may occur	The critical thinker understands that when people are selected for their extremely high or low scores on some trait, their subsequent scores will probably fall closer to the mean.
Recognizing the limitations of anecdotal evidence	The critical thinker is wary of anecdotal evidence, which consists of personal stories used to support one's assertions. Anecdotal evidence tends to be unrepresentative, inaccurate, and unreliable.

CHAPTER 15 *Recap*

Key Ideas

The Elements of the Treatment Process

- Approaches to treatment are diverse, but they can be grouped into three categories: insight therapies, behavior therapies, and biomedical therapies.
- Therapists come from a variety of professional backgrounds. Clinical and counseling psychologists, psychiatrists, clinical social workers, psychiatric nurses, counselors, and marriage and family therapists are key providers of therapeutic services.

Insight Therapies

- Insight therapies involve verbal interactions intended to enhance self-knowledge. In psychoanalysis, free association and dream analysis are used to explore the unconscious. When an analyst's probing hits sensitive areas, resistance can be expected.
- The transference relationship may be used to overcome this resistance so that the client can handle interpretations that lead to insight. Classical psychoanalysis is not widely practiced anymore, but Freud's legacy lives on in a rich diversity of modern psychodynamic therapies.
- The client-centered therapist tries to provide a supportive climate in which clients can restructure their self-concept. The process of therapy emphasizes clarification of the client's feelings and self-acceptance.
- Most theoretical approaches to insight therapy have been adapted for use with groups. Evaluating the effectiveness of any approach to treatment is complex and difficult. Nonetheless, the weight of the evidence suggests that insight therapies are superior to no treatment or placebo treatment. Studies suggest that common factors make a significant contribution to the benefits of various therapies.

Behavior Therapies

- Behavior therapies use the principles of learning in direct efforts to change specific aspects of behavior. Wolpe's systematic desensitization is a counter-conditioning treatment for phobias. In aversion therapy, a stimulus associated with an unwanted response is paired with an unpleasant stimulus in an effort to eliminate the maladaptive response.
- Social skills training can improve clients' interpersonal skills through shaping, modeling, and behavioral rehearsal. Beck's cognitive therapy concentrates on changing the way clients think about events in their lives. There is ample evidence that behavior therapies are effective in the treatment of a wide variety of disorders.

Biomedical Therapies

- Biomedical therapies are physiological interventions for psychological problems. Antianxiety drugs are used to relieve excessive apprehension. Antipsychotic drugs are used primarily in the treatment of schizophrenia. Antidepressants are used to bring people out of episodes of depression. Bipolar mood disorders are treated with lithium and other mood stabilizers.
- Drug therapies can be quite effective, but they have their drawbacks. All of the drugs produce problematic side effects. The adverse effects of psychiatric drugs may be underestimated because pharmaceutical research is not as impartial as it should be.
- Electroconvulsive therapy (ECT) is used to trigger a cortical seizure that is believed to have therapeutic value for mood disorders, especially depression. Evidence about the effectiveness and risks of ECT is contradictory.

Current Trends and Issues in Treatment

- Many clinicians and their clients believe that managed care has restricted access to mental health care and undermined its quality. Managed care has also raised concerns about providers' autonomy and clients' confidentiality.
- Combinations of insight, behavioral, and biomedical therapies are often used fruitfully in the treatment of psychological disorders. Many modern therapists are eclectic, using specific ideas, techniques, and strategies gleaned from a number of theoretical approaches.

- Because of cultural, language, and access barriers, therapeutic services are underutilized by ethnic minorities in America. However, the crux of the problem is the failure of institutions to provide culturally sensitive and responsive forms of treatment for ethnic minorities.

Institutional Treatment in Transition

- Disenchantment with the negative effects of mental hospitals led to the advent of more localized community mental health centers and a policy of deinstitutionalization. Long-term hospitalization for mental disorders is largely a thing of the past.
- Unfortunately, deinstitutionalization has left some unanticipated problems in its wake, such as the revolving door problem and increased homelessness. However, many theorists believe that homelessness is primarily an economic problem.

Reflecting on the Chapter's Themes

- Our discussion of psychotherapy highlighted the value of theoretical diversity. Conflicting theoretical orientations have generated varied approaches to treatment. Our coverage of therapy also showed once again that cultural factors shape psychological processes.

PERSONAL APPLICATION • Looking for a Therapist

- Therapeutic services are available in many settings, and such services need not be expensive. Excellent therapists and mediocre therapists can be found in all of the mental health professions, using the full range of therapeutic approaches.
- In selecting a therapist, warmth, empathy, confidence, and likability are desirable traits, and it is reasonable to insist on a therapist of one sex or the other. Therapy is often a difficult, gradual process that usually requires hard work.

CRITICAL THINKING APPLICATION • From Crisis to Wellness—But Was It the Therapy?

- People entering therapy are likely to get better even if their treatment is ineffective, because of placebo effects and regression toward the mean.
- Regression toward the mean occurs when people selected for their extremely high or low scores on some trait are measured a second time and their new scores fall closer to the mean. Regression and placebo effects may also help explain why people can often be deceived by phony, ineffectual treatments.

Key Terms

Antianxiety drugs (p. 610)
Antidepressant drugs (p. 612)
Antipsychotic drugs (p. 611)
Aversion therapy (p. 607)
Behavior therapies (p. 606)
Biomedical therapies (p. 610)
Client-centered therapy (p. 602)
Clinical psychologists (p. 598)
Cognitive-behavioral treatments (p. 608)
Cognitive therapy (pp. 608–609)
Counseling psychologists (p. 598)
Deinstitutionalization (p. 622)
Dream analysis (p. 600)
Eclecticism (p. 620)
Electroconvulsive therapy (ECT) (p. 614)
Free association (p. 600)
Group therapy (p. 603)
Insight therapies (p. 599)
Interpretation (p. 600)

Mental hospital (p. 621)
Mood stabilizers (p. 613)
Placebo effects (p. 628)
Psychiatrists (p. 598)
Psychoanalysis (p. 599)
Psychopharmacotherapy (p. 610)
Regression toward the mean (p. 628)
Resistance (p. 601)
Social skills training (p. 608)
Spontaneous remission (p. 604)
Systematic desensitization (p. 606)
Tardive dyskinesia (p. 612)
Transference (p. 601)

Key People

Aaron Beck (pp. 608–609)
Dorothea Dix (pp. 621–622)
Sigmund Freud (pp. 599–601)
Carl Rogers (pp. 602–603)
Joseph Wolpe (pp. 606–607)

CHAPTER 15 Practice Test

1. After undergoing psychoanalysis for several months, Karen has suddenly started "forgetting" to attend her therapy sessions. Karen's behavior is most likely a form of:
 - A. resistance.
 - B. transference.
 - C. insight.
 - D. catharsis.
2. Because Suzanne has an unconscious sexual attraction to her father, she behaves seductively toward her therapist. Suzanne's behavior is most likely a form of:
 - A. resistance.
 - B. transference.
 - C. misinterpretation.
 - D. an unconscious defense mechanism.
3. The key task of the client-centered therapist is:
 - A. interpretation of the client's thoughts, feelings, memories, and behaviors.
 - B. clarification of the client's feelings.
 - C. confrontation of the client's irrational thoughts.
 - D. modification of the client's problematic behaviors.
4. The goal of behavior therapy is to:
 - A. identify the early childhood unconscious conflicts that are the source of the client's symptoms.
 - B. achieve major personality reconstruction.
 - C. alter the frequency of specific problematic responses by using conditioning techniques.
 - D. alter the client's brain chemistry by prescribing specific drugs.
5. A therapist openly challenges a client's statement that she is a failure as a woman because her boyfriend left her, insisting that she justify it with evidence. Which type of therapy is probably being used?
 - A. psychodynamic therapy
 - B. client-centered therapy
 - C. aversion therapy
 - D. cognitive therapy
6. Collectively, numerous studies of therapeutic outcome suggest that:
 - A. insight therapy is superior to no treatment or placebo treatment.
 - B. individual insight therapy is effective, but group therapy is not.
 - C. group therapy is effective, but individual insight therapy is not.
 - D. insight therapy is only effective if patients are in therapy for at least two years.
7. Systematic desensitization is particularly effective for the treatment of _____ disorders.
 - A. generalized anxiety
 - B. panic
 - C. obsessive-compulsive
 - D. phobic
8. Linda's therapist has her practice active listening skills in structured role-playing exercises. Later, Linda is gradually asked to practice these skills with family members, friends, and finally, her boss. Linda is undergoing:
 - A. systematic desensitization.
 - B. biofeedback.
 - C. a token economy procedure.
 - D. social skills training.
9. After being released from a hospital, many schizophrenic patients stop taking their antipsychotic medication because:
 - A. their mental impairment causes them to forget.
 - B. of the unpleasant side effects.
 - C. most schizophrenics don't believe they are ill.
 - D. of all of the above.
10. Selective serotonin reuptake inhibitors (SSRIs) can be effective in the treatment of _____ disorders.
 - A. depressive
 - B. schizophrenic
 - C. obsessive-compulsive
 - D. both a and c
11. Modern psychotherapy:
 - A. was spawned by a cultural milieu that viewed the self as an independent, rational being.
 - B. embraces universal cultural values.
 - C. has been successfully exported to many non-Western cultures.
 - D. involves both b and c.
12. The community mental health movement emphasizes:
 - A. segregation of the mentally ill from the general population.
 - B. increased dependence on long-term inpatient care.
 - C. local care and the prevention of psychological disorders.
 - D. all of the above.
13. Many people repeatedly go in and out of mental hospitals. Typically, such people are released because _____; they are eventually readmitted because _____.
 - A. they have been stabilized through drug therapy; their condition deteriorates once again because of inadequate outpatient care
 - B. they run out of funds to pay for hospitalization; they once again can afford it
 - C. they have been cured of their disorder; they develop another disorder
 - D. they no longer want to be hospitalized; they voluntarily re-commit themselves
14. The type of professional training a therapist has:
 - A. is the most important indicator of his or her competence.
 - B. should be the major consideration in choosing a therapist.
 - C. is not all that important, since talented therapists can be found in all of the mental health professions.
 - D. involves both a and b.
15. Which of the following could be explained by regression toward the mean?
 - A. You get an average bowling score in one game and a superb score in the next game.
 - B. You get an average bowling score in one game and a very low score in the next game.
 - C. You get an average bowling score in one game and another average score in the next game.
 - D. You get a terrible bowling score in one game and an average score in the next game.

1 A p. 601
 2 B p. 601
 3 B p. 603
 4 C p. 606
 5 D p. 609
 6 A p. 604-605
 7 D p. 606-607
 8 D p. 608
 9 B p. 611
 10 D p. 612
 11 A p. 620
 12 C p. 621
 13 A p. 623
 14 C p. 626
 15 D p. 628

Answers

PsykTrek

Go to the PsykTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



<http://www.thomsonedu.com>

Go to this site for the link to ThomsonNOW, your one-stop study shop. Take a Pretest for this chapter, and ThomsonNOW will generate a personalized Study Plan based on your test results. The Study Plan will identify the topics you need to review and direct you to online resources to help you master those topics. You can then take a Posttest to help you determine the concepts you have mastered and what you still need to work on.

Companion Website

http://psychology.wadsworth.com/weiten_themes7e/

Go to this site to find online resources directly linked to your book, including a glossary, flash cards, drag-and-drop exercises, quizzes, and more!



CHAPTER

16

Social Behavior



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When Muffy, “the quintessential yuppie,” met Jake, “the ultimate working-class stiff,” her friends got very nervous.

Muffy is a 28-year-old stockbroker and a self-described “snob” with a group of about ten close women friends. Snobs all. They’re graduates of fancy business schools. All consultants, investment bankers, and CPAs. All “cute, bright, fun to be with, and really intelligent,” according to Muffy. They’re all committed to their high-powered careers, but they all expect to marry someday, too.

Unfortunately, most of them don’t date much. In fact, they spend a good deal of time “lamenting the dearth of ‘good men’” Well, lucky Muffy actually met one of those “good men.” Jake is a salesman. He comes from a working-class neighborhood. His clothes come from Sears.

He wasn’t like the usual men Muffy dated. He treats Muffy the way she’s always dreamed of being treated. He listens; he cares; he remembers. “He makes me feel safe and more cherished than any man I’ve ever known,” she says.

So she decided to bring him to a little party of about 30 of her closest friends. . . .

Perhaps it was only Jake’s nerves that caused him to commit some truly unforgivable faux pas that night. His sins were legion. Where do we start? First of all, he asked for a beer when everyone else was drinking white wine. He wore a worn turtleneck while everyone else had just removed the Polo tags from their clothing. He smoked. . . .

“The next day at least half of the people who had been at the party called to give me their impressions. They all said that they felt they just had to let me know that they thought Jake ‘lacked polish’ or ‘seemed loud’ or ‘might not be a suitable match,’” Muffy says.

Now, you may think that Muffy’s friends are simply very sensitive, demanding people. But you’d be wrong. Actually, they’ve been quite accepting of some of the other men that Muffy has brought to their little parties. Winston, for example, was a great favorite.

“He got drunk, ignored me, and asked for other women’s phone numbers right in front of me. But he was six-foot-four, the classic preppie, with blond hair, horn-rimmed glasses, and Ralph Lauren clothes.”

So now Muffy is confused. “Jake is the first guy I’ve been out with in a long time that I’ve really liked. I was excited about him and my friends knew that. I was surprised by their reaction. I’ll admit there’s some validity in all their comments, but it’s hard to express how violent it was. It made me think about what these women really want in a man. Whatever they say, what they really want is someone they can take to a business dinner. They want someone who comes with a tux. Like a Ken doll.”

Muffy may have come to a crossroads in her young life. It’s clear that there’s no way she can bring Jake among her friends for a while.

“I don’t want their reaction to muddy my feelings until I get them sorted out,” she says.

(Excerpt from *Tales from the Front* by Cheryl Lavin and Laura Kaveh, Copyright © 1988 by Cheryl Lavin and Laura Kaveh. Used by permission of Doubleday, a division of Random House, Inc.)

The preceding account is a real story, taken from a book about contemporary intimate relationships (Lavin, & Kaveh, 1988, pp. 118–121). Muffy is on the horns of a difficult dilemma. Romantic relationships are important to most people, but so are friendships, and Muffy may have to choose between the two. Muffy’s story illustrates the significance of social relations in people’s lives. It also foreshadows each of the topics that we’ll cover in this chapter, as we look at behavior in its social context.

Social psychology is the branch of psychology concerned with the way individuals’ thoughts, feelings, and behaviors are influenced by others. Our coverage of social psychology will focus on six broad topics highlighted in Muffy’s story:

- *Person perception.* The crux of Muffy’s problem is that Jake didn’t make a very good impression on her friends, primarily because her friends have preconceived views of “working-class stiff.” To what extent do people’s expectations color their impressions of others?
- *Attribution processes.* Muffy is struggling to understand her friends’ rejection of Jake. When she implies that Jake’s rejection is due to their snotty elitism, she’s engaging in attribution, making an inference about the causes of her friends’ behavior. How do people use attributions to explain social behavior?
- *Interpersonal attraction.* Jake and Muffy are different in many important ways—is it true that opposites attract? Why does Jake’s lack of similarity to Muffy’s friends lead to such disdain?
- *Attitudes.* Muffy’s girlfriends have negative attitudes about working-class men. How are attitudes formed? What leads to attitude change? How do attitudes affect people’s behavior?
- *Conformity and obedience.* Muffy’s friends discourage her from dating Jake, putting her under pressure to conform to their values. What factors influence conformity? Can people be coaxed into doing things that contradict their values?
- *Behavior in groups.* Muffy belongs to a tight-knit group of friends who think along similar lines. Do people behave differently when they are in groups as opposed to when they are alone? Why do people in groups often think alike?

Social psychologists study how people are affected by the actual, imagined, or implied presence of others.

Their interest is not limited to individuals' interactions with others, as people can engage in social behavior even when they're alone. For instance, if you were driving by yourself on a deserted highway and tossed your trash out your car window, your littering would be a social action. It would defy social

norms, reflect your socialization and attitudes, and have repercussions (albeit, small) for other people in your society. Social psychologists often study individual behavior in a social context. This interest in understanding individual behavior should be readily apparent in our first section, on person perception.

> Person Perception: Forming Impressions of Others

PREVIEW QUESTIONS

- How do aspects of physical appearance sway impressions of others?
- What are social schemas and stereotypes?
- How do illusory correlations and other phenomena illustrate subjectivity in person perception?
- How do evolutionary psychologists explain biases in person perception?

Can you remember the first meeting of your introductory psychology class? What impression did your professor make on you that day? Did your instructor appear to be confident? Easygoing? Pompous? Open-minded? Cynical? Friendly? Were your first impressions supported or undermined by subsequent observations? When you interact with people, you're constantly engaged in **person perception, the process of forming impressions of others**. People show considerable ingenuity in piecing together clues about others' characteristics. However, impressions are often inaccurate because of the many biases and fallacies that occur in person perception. In this section we consider some of the factors that influence, and often distort, people's perceptions of others.

Effects of Physical Appearance



"You shouldn't judge a book by its cover." "Beauty is only skin deep." People know better than to let physical attractiveness determine their perceptions of others' personal qualities. Or do they? Studies have shown that judgments of others' personality are often swayed by their appearance, especially their physical attractiveness. People tend to ascribe desirable personality characteristics to those who are good looking, seeing them as more sociable, friendly, poised, warm, and well adjusted than those who are less attractive (Eagly et al., 1991; Wheeler & Kim, 1997). In reality, research findings suggest that little correlation exists between attractiveness and personality traits (Feingold, 1992). Why do we inaccurately assume that a connection exists between good looks and personality? One reason is that extremely attractive people are vastly overrepresented in the entertainment media, where they are mostly portrayed in a highly favorable light (Smith, McIntosh, & Bazzini, 1999).

You might guess that physical attractiveness would influence perceptions of competence less than perceptions of personality, but the data suggest otherwise. A recent review of the relevant research found that people have a surprisingly strong tendency to

view good-looking individuals as more competent than less attractive individuals (Langlois et al., 2000). This bias literally pays off for good-looking people, as they tend to secure better jobs and earn higher salaries than less attractive individuals (Collins & Zebrowitz, 1995; Frieze, Olson, & Russell, 1991). For example, research on attorneys whose law school class photos were evaluated by independent raters found that physical attractiveness boosted their actual income by 10%–12% (Engemann & Owyang, 2005). Fortunately, not all trait inferences are influenced by physical attractiveness. For instance, good looks seem to have relatively little impact on perceptions of honesty and integrity (Eagly et al., 1991).

Observers are also quick to draw inferences about people based on how they move, talk, and gesture—that is, their style of nonverbal expressiveness—and these inferences tend to be fairly accurate (Ambady & Rosenthal, 1993; Borkenau et al., 2004). For example, based on a mere 10 seconds of videotape, participants can guess strangers' sexual orientation (heterosexual-

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homosexual) with decent accuracy (Ambady, Hallahan, & Conner, 1999). It is also widely believed that it is reasonable to draw inferences about someone's personality based on his or her handshake. Surprisingly little research has been conducted on handshaking and person perception, but preliminary evidence suggests that a firm, vigorous handshake is associated with relatively favorable first impressions (Chaplin et al., 2000).

Cognitive Schemas

Even though every individual is unique, people tend to categorize one another. For instance, in our opening story, Muffy is characterized as “the quintessential yuppie,” and Jake as a “working-class stiff.” Such labels reflect the use of cognitive schemas in person perception. As we discussed in the chapter on memory (Chapter 7), *schemas* are cognitive structures that guide information processing. Individuals use schemas to organize the world around them—including their social world. **Social schemas are organized clusters of ideas about categories of social events and people.** People have social schemas for events such as dates, picnics, committee meetings, and family reunions, as well as for certain categories of people, such as “dumb jocks,” “social climbers,” “frat rats,” and “wimps” (see **Figure 16.1**). Individuals depend on social schemas because the schemas help them to efficiently process and store the wealth of information that they take in about others in their interactions. Hence, people routinely place one another in categories, and these categories influence the process of person perception (Macrae & Bodenhausen, 2000).

Stereotypes

Some of the schemas that individuals apply to people are unique products of their personal experiences, while other schemas may be part of their shared cultural background. *Stereotypes* are special types of schemas that fall into the latter category. **Stereotypes**

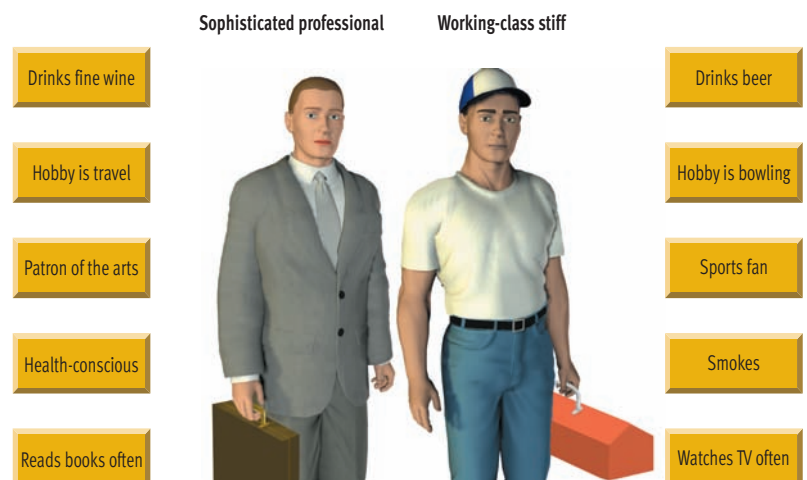
are widely held beliefs that people have certain characteristics because of their membership in a particular group.

The most common stereotypes in our society are those based on sex, age, and membership in ethnic or occupational groups. People who subscribe to traditional *gender stereotypes* tend to assume that women are emotional, submissive, illogical, and passive, while men are unemotional, dominant, logical, and aggressive. *Age stereotypes* suggest that elderly people are slow, feeble, rigid, forgetful, and asexual. Notions that Jews are mercenary, Germans are methodical, and Italians are passionate are examples of common *ethnic stereotypes*. *Occupational stereotypes* suggest that lawyers are manipulative, accountants are conforming, artists are moody, and so forth.

Stereotyping is a normal cognitive process that is frequently automatic and that saves on the time and effort required to get a handle on people individually (Devine & Monteith, 1999; Operario & Fiske, 2001). Stereotypes save energy by simplifying our social world. However, this conservation of energy often comes at some cost in terms of accuracy (Wigboldus, Dijksterhuis, & Knippenberg, 2003). Stereotypes tend to be broad overgeneralizations that ignore the diversity within social groups and foster inaccurate

Figure 16.1

Examples of social schemas. Everyone has social schemas for various “types” of people, such as sophisticated professionals or working-class stiffs. Social schemas are clusters of beliefs that guide information processing.





Social Psychology Network

Wesleyan University social psychologist Scott Plous offers a broad collection of resources related to all aspects of social (and general) psychology as well as information about careers and graduate study in this field.

perceptions of people (Hilton & von Hippel, 1996). Obviously, not all males, Jews, and lawyers behave alike. Most people who subscribe to stereotypes realize that not all members of a group are identical. For instance, they may admit that some men aren't competitive, some Jews aren't mercenary, and some lawyers aren't manipulative. However, they may still tend to assume that males, Jews, and lawyers are *more likely* than others to have these characteristics. Even if stereotypes mean only that people think in terms of slanted *probabilities*, their expectations may lead them to misperceive individuals with whom they interact. As we've noted in previous chapters, perception is subjective, and people often see what they expect to see.

Subjectivity in Person Perception

Stereotypes and other schemas create biases in person perception that frequently lead to confirmation of people's expectations about others. If someone's behavior is ambiguous, people are likely to interpret what they see in a way that's consistent with their expectations (Olson, Roese, & Zanna, 1996). Thus, after dealing with a pushy female customer, a salesman who holds traditional gender stereotypes might characterize the woman as "emotional." In contrast, he might characterize a male who exhibits the same pushy behavior as "aggressive."

People not only see what they expect to see, they also tend to overestimate how often they see it (Johnson & Mullen, 1994; Shavitt et al., 1999). ***Illusory correlation occurs when people estimate that they have encountered more confirmations of an association between social traits than they have actually seen.*** People also tend to underestimate the number of disconfirmations they have encountered, as illustrated by statements like "I've never met an honest lawyer."

Memory processes can contribute to confirmatory biases in person perception in a variety of ways. Often, individuals selectively recall facts that fit with their schemas and stereotypes (Fiske, 1998; Quinn, Macrae, & Bodenhausen, 2003). Evidence for such a tendency was found in a study by Cohen (1981). In this experiment, participants watched a videotape of a woman, described as either a waitress or a librarian, who engaged in a variety of activities, including listening to classical music, drinking beer, and watching TV. When asked to recall what the woman did during the filmed sequence, participants tended to remember activities consistent with their stereotypes of waitresses and librarians. For instance, subjects who thought the

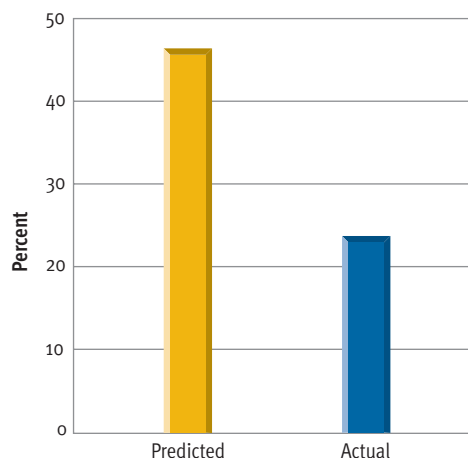
woman was a waitress tended to recall her beer drinking, while subjects who thought she was a librarian tended to recall her listening to classical music.

Further evidence for the subjectivity of social perception comes from a phenomenon called the *spotlight effect*—people's tendency to assume that the social spotlight shines more brightly on them than it actually does (Gilovich & Savitsky, 1999). Recent studies show that people often overestimate the degree to which others pay attention to their appearance and behavior. For example, in one study some college students were induced to wear an embarrassing Barry Manilow T-shirt in interactions with other participants and were subsequently asked to estimate the percentage of the other subjects who had noticed the shirt. Their estimates were over twice as high as the actual percentage of subjects who noticed the embarrassing T-shirt (see Figure 16.2; Gilovich, Medvec, & Savitsky, 2000). The bad news about the spotlight effect is that it occurs in moments of triumph as well as moments of embarrassment, so our successes and accomplishments often garner less attention from others than we believe they do. The good news is that our blunders and failures are less salient to others than we think they are and that people's inferences about us based on these blunders are

Figure 16.2

The spotlight effect. In a study of the spotlight effect, Gilovich, Medvec, and Savitsky (2000) induced college students to wear an embarrassing T-shirt while interacting with other participants. The shirt depicted Barry Manilow, a singer who was characterized by the authors as "not terribly popular among college students." The subjects who wore the Manilow shirt were asked to predict what percentage of the other participants would notice the shirt. As you can see, their predictions far exceeded the actual number of participants who noticed the embarrassing shirt.

Source: Adapted from Gilovich, T., Medvec, V. H., & Savitsky, K. (2000). The spotlight effect in social judgment: An egocentric bias in estimates of the salience of one's own actions and appearance. *Journal of Personality and Social Psychology*, 78, 211–222. Copyright © 2000 by the American Psychological Association. Used by permission of the publisher and author.



not as harsh as widely assumed (Savitsky, Epley, & Gilovich, 2001).

An Evolutionary Perspective on Bias in Person Perception

Why is the process of person perception riddled with bias? Evolutionary psychologists argue that many of the biases seen in social perception were adaptive in humans' ancestral environment (Krebs & Denton, 1997). For example, they argue that person perception is swayed by physical attractiveness because attractiveness was associated with reproductive potential in women and with health, vigor, and the accumulation of material resources in men.

What about the human tendency to automatically categorize others? Evolutionary theorists attribute this behavior to our distant ancestors' need to quickly separate friend from foe. They assert that humans are programmed by evolution to immediately classify people as members of an **ingroup**—a group that one belongs to and identifies with, or as members of an **outgroup**—a group that one does not belong to or identify with. This crucial categorization is thought to structure subsequent perceptions. As Krebs and Denton (1997) put it, "It is as though the act of classifying others as ingroup or outgroup members activates two quite different brain circuits" (p. 27). In-group members tend to be viewed in a favorable light, whereas outgroup members tend to be viewed

in terms of various negative stereotypes. According to Krebs and Denton, these negative stereotypes ("They are inferior; they are all alike; they will exploit us") move outgroups out of our domain of empathy, so we feel justified in not liking them or discriminating against them.

Thus, evolutionary psychologists ascribe much of the bias in person perception to cognitive mechanisms that have been shaped by natural selection. Their speculation is thought provoking, but empirical work is needed to test their hypotheses.

REVIEW OF KEY POINTS

- People's perceptions of others can be distorted by a variety of factors, including physical appearance. People tend to attribute desirable characteristics, such as intelligence, competence, warmth, and friendliness, to those who are good looking.
- Perceptions of people are also influenced by their style of nonverbal expressiveness. People use social schemas to categorize others into types. Stereotypes are widely held social schemas that lead people to expect that others will have certain characteristics because of their membership in a specific group.
- Gender, age, ethnic, and occupational stereotypes are common. In interacting with others, stereotypes may lead people to see what they expect to see and to overestimate how often they see it. The spotlight effect also illustrates the subjective nature of social perception.
- Evolutionary psychologists argue that many biases in person perception were adaptive in humans' ancestral past. The human tendency to automatically categorize others may reflect the primitive need to quickly separate friend from foe.

> Attribution Processes: Explaining Behavior

It's Friday evening and you're sitting around at home feeling bored. You call a few friends to see whether they'd like to go out. They all say that they'd love to go, but they have other commitments and can't. Their commitments sound vague, and you feel that their reasons for not going out with you are rather flimsy. How do you explain these rejections? Do your friends really have commitments? Are they worn out by school and work? When they said that they'd love to go, were they being sincere? Or do they find you boring? Could they be right? Are you boring? These questions illustrate a process that people engage in routinely: the explanation of behavior. *Attributions* play a key role in these explanatory efforts, and they have significant effects on social relations.

What are attributions? **Attributions are inferences that people draw about the causes of events, oth-**

ers' behavior, and their own behavior. If you conclude that a friend turned down your invitation because she's overworked, you have made an attribution about the cause of her behavior (and, implicitly, have rejected other possible explanations). If you conclude that you're stuck at home with nothing to do because you failed to plan ahead, you've made an attribution about the cause of an event (being stuck at home). If you conclude that you failed to plan ahead because you're a procrastinator, you've made an attribution about the cause of your own behavior. People make attributions mainly because they have a strong need to understand their experiences. They want to make sense out of their own behavior, others' actions, and the events in their lives. In this section, we'll take a look at some of the patterns seen when people make attributions.

PREVIEW QUESTIONS

- What are attributions, and how do internal and external attributions differ?
- What types of factors influence the likelihood of internal versus external attributions?
- How do actors and observers differ in their patterns of attribution?
- What are defensive attribution and the self-serving bias?
- How do individualism and collectivism influence attribution bias?



FRITZ HEIDER

"Often the momentary situation which, at least in part, determines the behavior of a person is disregarded and the behavior is taken as a manifestation of personal characteristics."

Internal Versus External Attributions



Fritz Heider (1958) was the first to describe how people make attributions. He asserted that people tend to locate the cause of behavior either *within a person*, attributing it to personal factors, or *outside a person*, attributing it to environmental factors.

Elaborating on Heider's insight, various theorists have agreed that explanations of behavior and events can be categorized as internal or external attributions (Jones & Davis, 1965; Kelley, 1967; Weiner, 1974).

Internal attributions ascribe the causes of behavior to personal dispositions, traits, abilities, and feelings. External attributions ascribe the causes of behavior to situational demands and environmental constraints. For example, if a friend's business fails, you might attribute it to his or her lack of business acumen (an internal, personal factor) or to negative trends in the nation's economic climate (an external, situational explanation). Parents who find out that their teenage son has just banged up the car may blame it on his carelessness (a personal disposition) or on slippery road conditions (a situational factor).

Internal and external attributions can have a tremendous impact on everyday interpersonal interactions.

Blaming a friend's business failure on poor business acumen as opposed to a poor economy will have a great impact on how you view your friend. Likewise, if parents attribute their son's automobile accident to slippery road conditions, they're likely to deal with the event very differently than if they attribute it to his carelessness.

Attributions for Success and Failure



Some psychologists have sought to discover additional dimensions of attributional thinking besides the internal-external dimension. After studying the attributions that people make in explaining success and failure, Bernard Weiner (1980, 1986, 1994) concluded that people often focus on the *stability* of the causes underlying behavior. According to Weiner, the stable-unstable dimension cuts across the internal-external dimension, creating four types of attributions for success and failure, as shown in **Figure 16.3**.

Let's apply Weiner's model to a concrete event. Imagine that you're contemplating why you failed to get a job that you wanted. You might attribute your setback to internal factors that are stable (lack of ability) or unstable (inadequate effort to put together an eye-catching résumé). Or you might attribute your setback to external factors that are stable (too much outstanding competition) or unstable (bad luck). If you got the job, your explanations for your success would fall into the same four categories: internal-stable (your excellent ability), internal-unstable (your hard work to assemble a superb résumé), external-stable (lack of top-flight competition), and external-unstable (good luck).

Bias in Attribution



Attributions are only inferences. Your attributions may not be the correct explanations for events. Paradoxical as it may seem, people often arrive at inaccurate explanations even when they contemplate the causes of *their own behavior*. Attributions ultimately represent *guesswork* about the causes of events, and these guesses tend to be slanted in certain directions. Let's look at the principal biases seen in attribution.

Actor-Observer Bias



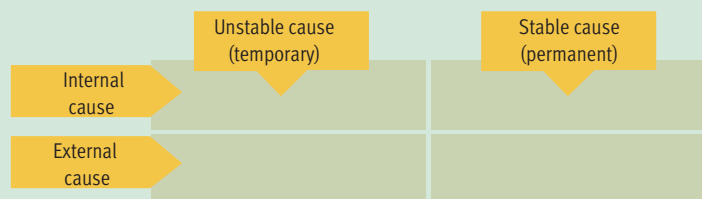
Your view of your own behavior can be quite different from the view of someone else observing you. When an actor and an observer draw inferences about the causes of the actor's behavior, they often make different attributions. A common form of bias seen in observers is **the fundamental attribution error**,

concept check 16.1

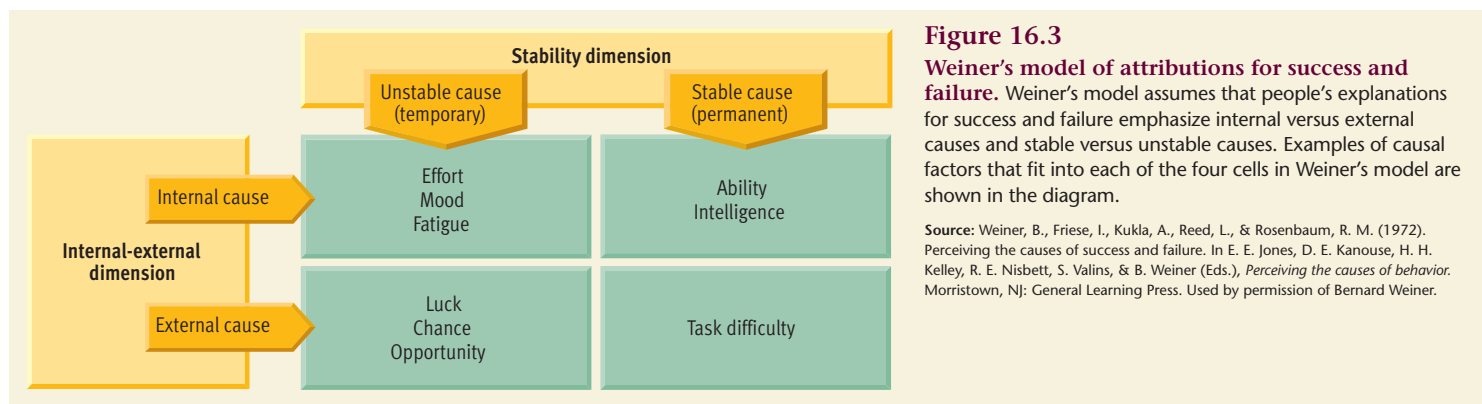


Analyzing Attributions

Check your understanding of attribution processes by analyzing possible explanations for an athletic team's success. Imagine that the women's track team at your school has just won a regional championship that qualifies it for the national tournament. Around the campus, you hear people attribute the team's success to a variety of factors. Examine the attributions shown below and place each of them in one of the cells of Weiner's model of attribution (just record the letter inside the cell). The answers are in Appendix A.



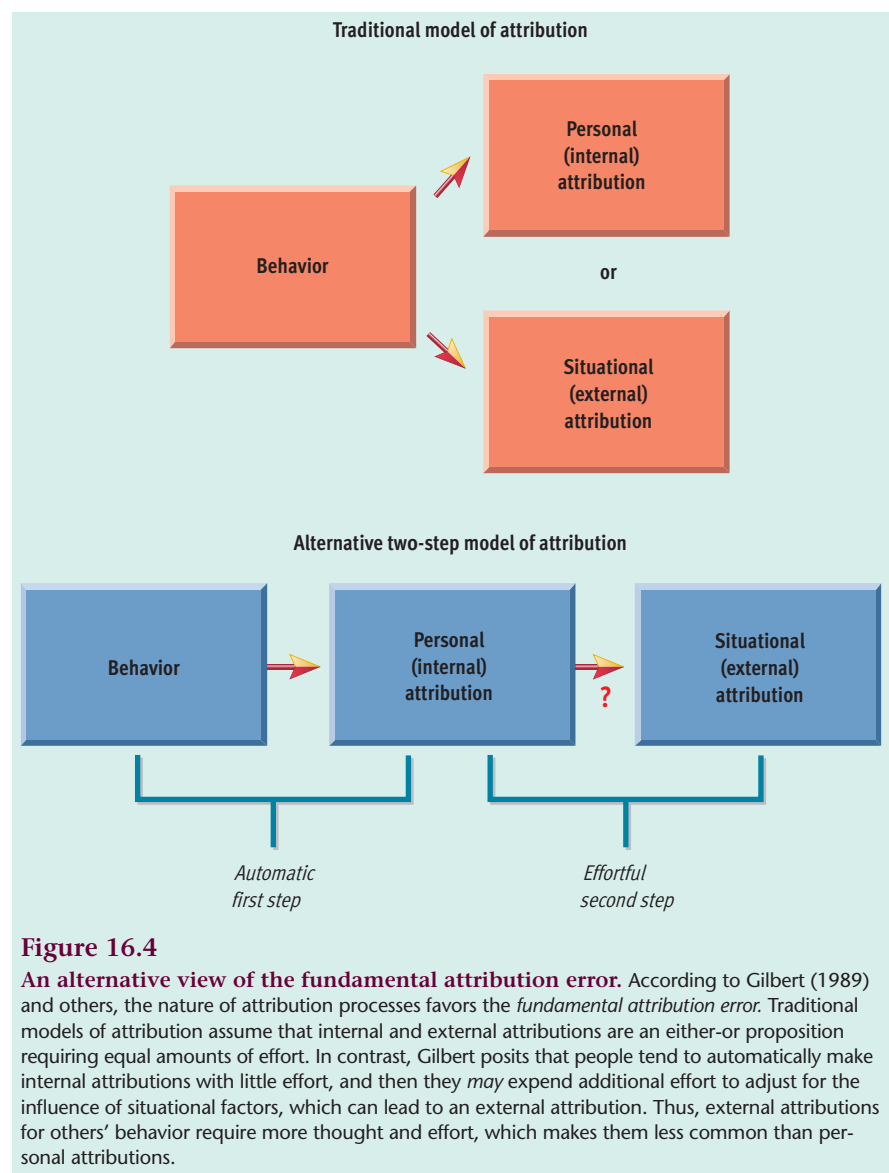
- "They won only because the best two athletes on Central State's team were out with injuries—talk about good fortune!"
- "They won because they have some of the best talent in the country."
- "Anybody could win this region; the competition is far below average in comparison to the rest of the country."
- "They won because they put in a great deal of last-minute effort and practice, and they were incredibly fired up for the regional tourney after last year's near miss."



which refers to observers' bias in favor of internal attributions in explaining others' behavior. Of course, in many instances, an internal attribution may not be an "error." However, observers have a curious tendency to overestimate the likelihood that an actor's behavior reflects personal qualities rather than situational factors (Krull, 2001). Why? One reason is that situational pressures may not be readily apparent to an observer. As Gilbert and Malone (1995) put it, "When one tries to point to a situation, one often stabs empty air" (p. 25). It is not that people assume that situational factors have little impact on behavior (Gawronski, 2004). Rather, it's that attributing others' behavior to their dispositions is a relatively effortless, almost automatic process, whereas explaining people's behavior in terms of situational factors requires more thought and effort (see Figure 16.4; Krull & Erickson, 1995). Another factor favoring internal attributions is that many people feel that few situations are so coercive that they negate all freedom of choice (Forsyth, 2004).

To illustrate the gap that often exists between actors' and observers' attributions, imagine that you're visiting your bank and you fly into a rage over a mistake made on your account. Observers who witness your rage are likely to make an internal attribution and infer that you are surly, temperamental, and quarrelsome. They may be right, but if asked, you'd probably attribute your rage to the frustrating situation. Perhaps you're normally a calm, easygoing person, but today you've been in line for 20 minutes, you just straightened out a similar error by the same bank last week, and you're being treated rudely by the teller. Observers are often unaware of historical and situational considerations such as these, so they tend to make internal attributions for another's behavior (Gilbert, 1998).

In contrast, the circumstances that have influenced an actor's behavior tend to be more salient to the actor. Hence, actors are more likely than observers to locate the cause of their behavior in the situation. In general, then, *actors favor external attributions for their behavior, whereas observers are more likely to explain the*



same behavior with internal attributions (Jones & Nisbett, 1971; Krueger, Ham, & Linford, 1996).

Defensive Attribution

In attempting to explain the calamities and setbacks that befall other people, an observer's tendency to



A common example of defensive attribution is the tendency to blame the homeless for their plight.



© Mark Peterson/Corbis

make internal attributions may become even stronger than normal. Let's say that a friend gets mugged and severely beaten. You may attribute the mugging to your friend's carelessness or stupidity ("He should have known better than to be in that neighborhood at that time") rather than to bad luck. Why? Because if you attribute your friend's misfortune to bad luck, you have to face the ugly reality that it could just as easily happen to you. To avoid such disturbing thoughts, people often attribute mishaps to victims' negligence (Salminen, 1992; Thornton, 1984, 1992).

Defensive attribution is a tendency to blame victims for their misfortune, so that one feels less likely to be victimized in a similar way. *Hindsight bias* probably contributes to this tendency, but blaming victims also helps people maintain their belief that they live in a just world, where they're unlikely to experience similar troubles (Lerner & Goldberg, 1999). The bias toward making defensive attributions can have unfortunate consequences. Blaming victims causes them to be seen in a negative light, and undesirable traits are unfairly attributed to them. Thus, it is assumed that burglary victims must be careless, that people who get fired must be incompetent, that poor people must be lazy, that rape victims must be seductive ("She probably asked for it"), and so on. As you can see, defensive attribution can lead to unwarranted derogation of victims of misfortune.

To some extent, such attributional tendencies are influenced by people's political ideology (Skitka et al., 2002). Conservatives tend to attribute poverty, homelessness, and criminal behavior to individuals' personal shortcomings. In contrast, liberals are more

likely to attribute these social problems to institutional failures and unjust social practices. Research suggests that this disparity is mainly due to differences in peoples' willingness to consider situational factors that might contribute to poverty, homelessness, and other social problems (Skitka et al., 2002).



Self-Serving Bias

The self-serving bias in attribution comes into play when people attempt to explain success and failure. This bias may either strengthen or weaken one's normal attributional tendencies, depending on whether one is trying to explain positive or negative outcomes (Campbell & Sedikides, 1999; Mezulis et al., 2004). **The self-serving bias is the tendency to attribute one's successes to personal factors and one's failures to situational factors.** Interestingly, this bias grows stronger as time passes after an event, so that people tend to take progressively more credit for their successes and less responsibility for their failures (Burger, 1986).

In explaining *failure*, the usual actor-observer biases are apparent. Actors tend to make external attributions, blaming their failures on unfavorable situational factors, while observers are more likely to attribute the same failures to the actors' personal shortcomings. Thus, if you fail an exam, you may place the blame on the poorly constructed test items, lousy teaching, distractions in the hallway, or a bad week at work (all external attributions). However, an observer is more likely to attribute your failure to your lack of ability or lack of study (both internal attribu-

Web Link 16.2



Y? The National Forum on People's Differences Did you ever want to ask a sensitive question of someone who was different from you—another race or religion or sexual orientation—but were too embarrassed or shy? In a cyber-forum with clear rules for courteous and respectful dialogue, newspaper writer and editor Philip J. Milano allows visitors to share differences openly and frankly and to learn about topics that are often kept quiet.

tions). In explaining success, the usual actor-observer differences are reversed to some degree. Thus, if you get a high exam score, you'll probably make an internal attribution and point to your ability or your hard work, whereas observers are more likely to assume that the test was easy.

Culture and Attributional Tendencies

Do the patterns of attribution observed in subjects from Western societies transcend culture? More research is needed, but the preliminary evidence suggests not. Some interesting cultural disparities have emerged in research on attribution processes.

According to Harry Triandis (1989, 1994, 2001), cultural differences in *individualism* versus *collectivism* influence attributional tendencies as well as other aspects of social behavior. As noted in Chapter 12, *individualism* involves putting personal goals ahead of group goals and defining one's identity in terms of personal attributes rather than group memberships. In contrast, *collectivism* involves putting group goals ahead of personal goals and defining one's identity in terms of the groups one belongs to (such as one's family, tribe, work group, social class, caste, and so on). In comparison to individualistic cultures, collectivist cultures place a higher priority on shared values and resources, cooperation, mutual interdependence, and concern for how one's actions will affect other group members. Childrearing patterns in collectivist cultures emphasize the importance of obedience, reliability, and proper behavior, whereas individualistic cultures emphasize the development of independence, self-esteem, and self-reliance.

A variety of factors influence whether societies cherish individualism as opposed to collectivism. Among other things, increases in a culture's affluence, education, urbanization, and social mobility tend to foster more individualism (Triandis, 1994). Many contemporary societies are in transition, but generally speaking, North American and Western European cultures tend to be individualistic, whereas Asian, African, and Latin American cultures tend to be collectivistic (Hofstede, 1980, 1983, 2001) (see Figure 16.5).

How does individualism versus collectivism relate to patterns of attribution? The evidence suggests that collectivist cultures may promote different attributional biases than individualistic cultures. For example, people from collectivist societies appear to be less prone to the *fundamental attribution error* than those from individualistic societies (Choi, Nisbett, &

Hofstede's rankings of national cultures' individualism		
Individualistic cultures	Intermediate cultures	Collectivist cultures
1. United States	19. Israel	37. Hong Kong
2. Australia	20. Spain	38. Chile
3. Great Britain	21. India	40. Singapore
4. Canada	22. Argentina	40. Thailand
4. Netherlands	22. Japan	40. West Africa region
6. New Zealand	24. Iran	42. El Salvador
7. Italy	25. Jamaica	43. South Korea
8. Belgium	26. Arab region	44. Taiwan
9. Denmark	26. Brazil	45. Peru
10. France	28. Turkey	46. Costa Rica
11. Sweden	29. Uruguay	47. Indonesia
12. Ireland	30. Greece	47. Pakistan
13. Norway	31. Philippines	49. Colombia
14. Switzerland	32. Mexico	50. Venezuela
15. West Germany	34. East Africa region	51. Panama
16. South Africa	34. Portugal	52. Ecuador
17. Finland	34. Yugoslavia	53. Guatemala
18. Austria	36. Malaysia	

Figure 16.5

Individualism versus collectivism around the world. Hofstede (1980, 1983, 2001) used survey data from over 100,000 employees of a large, multinational corporation to estimate the emphasis on individualism versus collectivism in 50 nations and 3 regions. His large, diverse international sample remains unequaled to date. In the figure, cultures are ranked in terms of how strongly they embraced the values of individualism. As you can see, Hofstede's estimates suggest that North American and Western European nations tend to be relatively individualistic, whereas more collectivism is found in Asian, African, and Latin American countries.

Source: Adapted from Hofstede, G. (2001). *Culture's consequences* (2nd Ed., p. 215). Thousand Oaks, CA: Sage. Copyright © 2001 Sage Publications. Adapted by permission of Dr. Geert Hofstede.

Norenzayan, 1999; Triandis, 2001). In Western cultures, people are viewed as autonomous individuals who are responsible for their actions. Endorsing beliefs such as "You can do anything you put your mind to" or "You have no one to blame but yourself," Westerners typically explain behavior in terms of people's personality traits and unique abilities. In contrast, collectivists, who value interdependence and obedience, are more likely to assume that one's behavior reflects adherence to group norms.

Although the *self-serving bias* has been documented in a variety of cultures, it is particularly prevalent in individualistic, Western societies, where an emphasis on competition and high self-esteem motivates people to try to impress others, as well as themselves (Mezulis et al., 2004). In contrast, Japanese subjects exhibit a *self-effacing bias* in explaining success (Aki-moto & Sanbonmatsu, 1999; Markus & Kitayama, 1991), as they tend to attribute their successes to help they receive from others or to the ease of the task, while downplaying the importance of their ability. When they fail, Japanese subjects tend to be more self-critical than subjects from individualistic cultures (Heine & Renshaw, 2002). It is not that self-enhancement motives are absent in collectivist cultures. Cultural disparities in attributional bias reflect



Recognizing Bias in Social Cognition

Check your understanding of bias in social cognition by identifying various types of errors that are common in person perception and attribution. Imagine that you're a nonvoting student member of a college committee at Southwest State University that is hiring a new political science professor. As you listen to the committee's discussion, you hear examples of (a) the illusory correlation effect, (b) stereotyping, (c) the fundamental attribution error, and (d) defensive attribution. Indicate which of these is at work in the excerpts from committee members' deliberations below. The answers are in Appendix A.

- _____ 1. "I absolutely won't consider the fellow who arrived 30 minutes late for his interview. Anybody who can't make a job interview on time is either irresponsible or hopelessly disorganized. I don't care what he says about the airline messing up his reservations."
- _____ 2. "You know, I was very, very impressed with the young female applicant, and I would love to hire her, but every time we add a young woman to the faculty in liberal arts, she gets pregnant within the first year." The committee chairperson, who has heard this line from this professor before replies, "You always say that, so I finally did a systematic check of what's happened in the past. Of the last 14 women hired in liberal arts, only one has become pregnant within a year."
- _____ 3. "The first one I want to rule out is the guy who's been practicing law for the last ten years. Although he has an excellent background in political science, I just don't trust lawyers. They're all ambitious, power-hungry, manipulative cutthroats. He'll be a divisive force in the department."
- _____ 4. "I say we forget about the two candidates who lost their faculty slots in the massive financial crisis at Western Polytechnic last year. I know it sounds cruel, but they brought it on themselves with their fiscal irresponsibility over at Western. Thank goodness we'll never let anything like that happen around here. As far as I'm concerned, if these guys couldn't see that crisis coming, they must be pretty dense."

the fact that people from individualist and collectivist cultures cherish and value different traits (Sedikides, Gaertner, & Toguchi, 2003). People from individualistic cultures exhibit attributional biases (such as the self-serving bias) that help them to feel independent, competent, and self-reliant. In contrast, people from collectivist cultures display attributional biases that help them to feel loyal, cooperative, and respectful. People from both types of cultures show distortions in attribution that are intended to enhance their feelings of self-esteem, but the distortions are different because self-esteem is derived from different virtues.

REVIEW OF KEY POINTS

- Attributions are inferences about the causes of events and behavior. Individuals make attributions to understand their social world. Attributions can be classified as internal or external. Internal attributions ascribe behavior to personal dispositions and traits, whereas external attributions locate the cause of behavior in the environment.
- Weiner's model proposes that attributions for success and failure should be analyzed in terms of the stability of causes, as well as along the internal-external dimension. Observers favor internal attributions to explain another's behavior (the fundamental attribution error), while actors favor external attributions to explain their own behavior.
- In defensive attribution, people unfairly blame victims for their misfortune (with internal attributions) to reduce their own feelings of vulnerability. The self-serving bias is the tendency to attribute one's good outcomes to personal factors and one's bad outcomes to situational factors.
- Cultures vary in their emphasis on individualism as opposed to collectivism, and these differences appear to influence attributional tendencies. The fundamental attribution error and the self-serving bias in attribution may be by-products of Western cultures' individualism.

> Close Relationships: Liking and Loving

PREVIEW QUESTIONS

- To what extent are good looks, similarity, reciprocity, and ideals important in interpersonal attraction?
- How do theorists distinguish among different types of love?
- How are attachment patterns related to intimate relations?
- How does culture influence patterns of mating?
- How have mating strategies been shaped by evolution?

"I just don't know what she sees in him. She could do so much better for herself. I suppose he's a nice guy, but they're just not right for each other." Can't you imagine Muffy's friends making these comments in discussing her relationship with Jake? You've probably heard similar remarks on many occasions. These comments illustrate people's interest in analyzing the dynamics of attraction. **Interpersonal attraction refers to positive feelings toward another.** Social psychologists use this term broadly to encompass a variety of experiences, including liking, friendship, admiration, lust, and love. In this section, we'll analyze key factors that influence attraction and examine some theoretical perspectives on the mystery of love.

Key Factors in Attraction

Many factors influence who is attracted to whom. Here we'll discuss factors that promote the development of liking, friendship, and love. Although these are different types of attraction, the interpersonal dynamics at work in each are largely similar.

Physical Attractiveness

Although people often say that "beauty is only skin deep," the empirical evidence suggests that most people don't really believe that homily (Fitness, Fletcher, & Overall, 2003). The importance of physical attractiveness was demonstrated in a study in which unacquainted men and women were sent off on a

“get-acquainted” date (Sprecher & Duck, 1994). The investigators were mainly interested in how communication might affect the process of attraction, but to put this factor in context they also measured subjects’ perceptions of their date’s physical attractiveness and similarity to themselves. They found that the quality of communication during the date did have some effect on females’ interest in friendship, but the key determinant of romantic attraction for both sexes was the physical attractiveness of the other person. Many other studies have demonstrated the singular prominence of physical attractiveness in the initial stage of dating and have shown that it continues to influence the course of commitment as dating relationships evolve (Hendrick & Hendrick, 1992). In the realm of romance, being physically attractive appears to be more important for females than males (Regan, 2003). For example, in a study of college students (Speed & Gangestad, 1997), the correlation between romantic popularity (assessed by peer ratings) and physical attractiveness was higher for females (.76) than for males (.47). Not surprisingly, those who are handsome or beautiful know that they are attractive (Marcus & Miller, 2003).

Although people prefer physically attractive partners in romantic relationships, they may consider their own level of attractiveness in pursuing dates. What people want in a partner may be different from what they are willing to settle for (Regan, 1998). **The matching hypothesis proposes that males and females of approximately equal physical attractiveness are likely to select each other as partners.** The matching hypothesis is supported by evidence that married couples tend to be very similar in level of physical attractiveness (Feingold, 1988b). Interestingly, people expect that individuals who are similar in attractiveness will be more satisfied as couples and less likely to break up (Garcia & Khersonsky, 1996).

Similarity Effects

Is it true that “birds of a feather flock together,” or do “opposites attract”? Research provides far more support for the former than the latter. Married and dating couples tend to be similar in age, race, religion, social class, education, intelligence, physical attractiveness, values, and attitudes (Kalmijn, 1998; Watson et al., 2004). Similarity in personality appears to be modest at best (Luo & Klohnen, 2005). Similarity is also seen among friends. For instance, adult friends tend to be relatively similar in terms of income, education, occupational status, ethnicity, and religion (Blieszner & Adams, 1992).

The most obvious explanation for these correlations is that similarity causes attraction. Laboratory experiments on *attitude similarity*, conducted by Donn



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Byrne and his colleagues, suggest that similarity *does* cause attraction (Byrne, 1997; Byrne, Clore, & Smeaton, 1986). However, research also suggests that attraction can foster similarity (Anderson, Keltner, & John, 2003). For example, Davis and Rusbult (2001) found that dating partners gradually modify their attitudes in ways that make them more congruent, a phenomenon they called *attitude alignment*. Moreover, people in stable, satisfying intimate relationships tend to subjectively overestimate how similar they and their partners are (Murray et al., 2002). Wanting to believe that they have found a kindred spirit, they tend to assume that their partners are mirrors of themselves.

Reciprocity Effects

People often attempt to gain others’ liking by showering them with praise and flattery. However, we’ve

According to the matching hypothesis, males and females who are similar in physical attractiveness are likely to be drawn together. This type of matching may also influence the formation of friendships.

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all heard that “flattery will get you nowhere.” What does the research show? The evidence suggests that flattery will get you somewhere, with some people, some of the time. In interpersonal attraction, **reciprocity involves liking those who show that they like you**. In general, research indicates that we tend to like those who show that they like us and that we tend to see others as liking us more if we like them. Thus, it appears that liking breeds liking and loving promotes loving (Sprecher, 1998). Reciprocating attraction generally entails providing friends and intimate partners with positive feedback that results in a *self-enhancement* effect—in other words, you help them feel good about themselves (Sedikides & Strube, 1997). However, studies suggest that people are also interested in *self-verification*—that is, they seek feedback that matches and supports their self-concepts (Bosson & Swann, 2001).

Romantic Ideals

In the realm of romance, people want their partner to measure up to their ideals. These ideals spell out the personal qualities that one hopes to find in a partner, such as warmth, good looks, loyalty, high status, a sense of humor, and so forth. According to Simpson, Fletcher, and Campbell (2001), people routinely evaluate how close their intimate partners come to matching these ideal standards, and these evaluations influence how relationships progress. Consistent with this theory, research shows that the more closely individuals’ perceptions of their partners match their ideals, the more satisfied they tend to be with their relationship—both in the early stages of dating (Fletcher, Simpson, & Thomas, 2000) and in stable, long-term relationships (Fletcher et al., 1999). Moreover, the size of the discrepancy between ideals and perceptions predicts whether a dating relationship will continue or dissolve (Fletcher et al., 2000).

Of course, these evaluations of how one’s partner compares to one’s ideals are subjective, leaving room for distortion. When people are highly invested in a relationship they can reduce the discrepancy between their ideals and their perceptions either by lowering their standards or by making charitable evaluations of their partners. Research suggests that the latter strategy is more common. For example, in a study of 180 couples, Murray, Holmes, and Griffin (1996) found that most participants viewed their partners more favorably than the partners viewed themselves. Individuals’ perceptions of their romantic partners seemed to reflect their ideals for a partner more than reality. Moreover, the data showed that people were happier in their relationship when they idealized their partners and when their partners idealized them. Another

study found that individuals who are satisfied with their romantic relationships tend to focus on their partners’ virtues and to minimize and rationalize their partners’ faults (Murray & Holmes, 1999). This line of research suggests that small, positive illusions about one’s partner may foster happier and more resilient romantic relationships (Murray, 2001). That said, when people come to important choice points in their relationships, they are often motivated to be more objective about their partner’s strengths and weaknesses (Gagne & Lydon, 2004).

Perspectives on the Mystery of Love

Love has proven to be an elusive subject of study. It’s difficult to define, difficult to measure, and often difficult to understand. Nonetheless, psychologists have begun to make some progress in their study of love. Let’s look at their theories and research.

Passionate and Companionate Love



Two early pioneers in research on love were Elaine Hatfield (formerly Walster) and Ellen Berscheid (Berscheid, 1988; Berscheid & Walster, 1978; Hatfield & Rapson, 1993). They have proposed that romantic relationships are characterized by two kinds of love: passionate love and companionate love. **Passionate love is a complete absorption in another that includes tender sexual feelings and the agony and ecstasy of intense emotion. Companionate love is warm, trusting, tolerant affection for another whose life is deeply intertwined with one’s own.** Passionate and companionate love *may* coexist, but they don’t necessarily go hand in hand. Research suggests that, as a general rule, companionate love is more strongly related to relationship satisfaction than passionate love (Fehr, 2001).

The distinction between passionate and companionate love has been further refined by Robert Sternberg (1988a), who suggests that love has three facets rather than just two. He subdivides companionate love into intimacy and commitment. **Intimacy refers to warmth, closeness, and sharing in a relationship. Commitment is an intent to maintain a relationship in spite of the difficulties and costs that may arise.** Sternberg has mapped out the probable relations between the passage of time and the three components of love, as shown in **Figure 16.6**. Like Hatfield and Berscheid, he suspects that passion reaches its zenith in the early phases of love and then erodes. He believes that intimacy and commitment increase with time, although at different rates.



Image Not Available



ELLEN BERSCHIED

“The emotion of romantic love seems to be distressingly fragile. As a 16th-century sage poignantly observed, ‘the history of a love affair is the drama of its fight against time.’”



Image Not Available



ELAINE HATFIELD

“Passionate love is like any other form of excitement. By its very nature, excitement involves a continuous interplay between elation and despair, thrills and terror.”

Research suggests that commitment is a crucial facet of love that is predictive of relationship stability. For example, declining commitment is associated with an increased likelihood of infidelity in dating relationships (Drigotas, Safstrom, & Gentilia, 1999). In another study of dating couples who were followed for four years, Sprecher (1999) found that participants' feelings of commitment were more predictive of whether they broke up than their ratings of their overall love. Interestingly, the participants who broke up indicated that their love had remained reasonably stable, but their commitment and satisfaction had declined.



Love as Attachment

In another groundbreaking analysis of love, Cindy Hazan and Phillip Shaver (1987) looked not at the components of love but at similarities between love and *attachment relationships* in infancy. We noted in our chapter on human development (Chapter 11) that infant-caretaker bonding, or attachment, emerges in the first year of life. Early attachments vary in quality, and *most* infants tend to fall into one of three groups, which depend in part on parents' caregiving styles (Ainsworth et al., 1978). A majority of infants develop a *secure attachment*. However, some are very anxious when separated from their caretaker, a syndrome called *anxious-ambivalent attachment*. A third group of infants, characterized by *avoidant attach-*

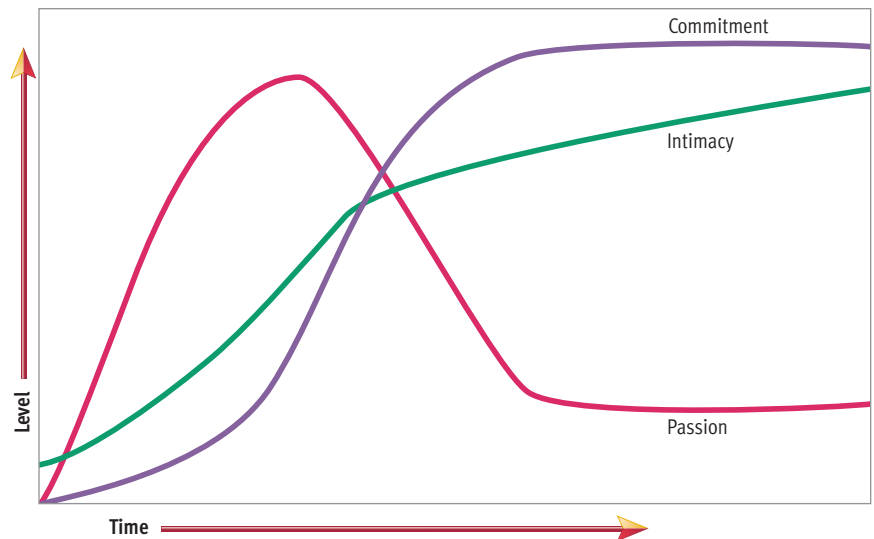


Figure 16.6

Sternberg's view of love over time. In his theory of love, Robert Sternberg (1988a) hypothesizes that the various elements of love progress in different ways over the course of time. According to Sternberg, passion peaks early in a relationship, whereas intimacy and commitment typically continue to build gradually. (Graphs adapted from Trotter, 1986)

ment, never bond very well with their caretaker (see **Figure 16.7**).

According to Hazan and Shaver, romantic love is an attachment process, and people's intimate relationships in adulthood follow the same form as their attachments in infancy. According to their theory, a

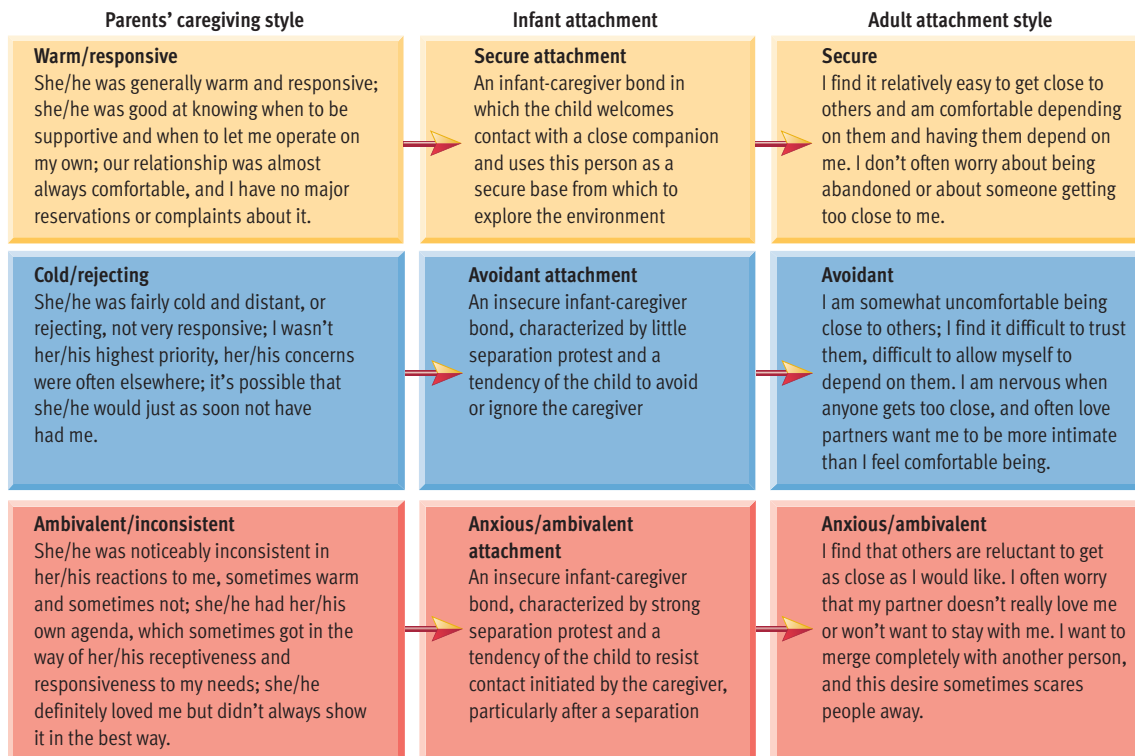


Figure 16.7

Infant attachment and romantic relationships. According to Hazan and Shaver (1987), people's romantic relationships in adulthood are similar in form to their attachment patterns in infancy, which are determined in part by parental caregiving styles. The theorized relations between parental styles, attachment patterns, and intimate relations are outlined here. (Data for parental caregiving styles and adult attachment styles based on Hazan and Shaver, 1986, 1987; infant attachment patterns adapted from Shaffer, 1985)



Phillip R. Shaver's Homepage

Phillip Shaver of the University of California, Davis, has conducted pioneering and highly influential research on adult attachment style and intimate relationships. His homepage provides a link to his Adult Attachment Lab, where visitors can learn about early and current work and find links to other relevant sites.

person who had an anxious-ambivalent attachment in infancy will tend to have romantic relations marked by anxiety and ambivalence in adulthood. In other words, people relive their early bonding with their parents in their adult romantic relationships.

Hazan and Shaver's (1987) initial survey study provided striking support for their theory. They found that adults' love relationships could be sorted into groups that paralleled the three patterns of attachment seen in infants. *Secure adults* (56% of the subjects) found it relatively easy to get close to others, described their love relations as trusting, rarely worried about being abandoned, and reported the fewest divorces. *Anxious-ambivalent adults* (20% of the subjects) reported a preoccupation with love accompanied by expectations of rejection and described their love relations as volatile and marked by jealousy. *Avoidant adults* (24% of the subjects) found it difficult to get close to others and described their love relations as lacking intimacy and trust. Consistent with their theory, Hazan and Shaver (1987) found that the percentage of adults falling into each category was roughly the same as the percentage of infants in each comparable category—a finding that was subsequently replicated with a nationally representative sample of American adults (Mickelson, Kessler, & Shaver, 1997). Also, subjects' recollections of their childhood relations with their parents were consistent with the idea that people relive their infant attachment experiences in adulthood.

Understandably, Hazan and Shaver's theory has attracted considerable interest. In fact, it has generated thousands of studies on the effects of attachment style. For example, research has shown that securely attached individuals have more committed, satisfying, interdependent, well-adjusted, and longer-lasting relationships compared to people with either anxious-ambivalent or avoidant attachment styles (Feeney, 1999). Moreover, studies have shown that attachment patterns are reasonably stable over time (Fraley, 2002) and that people with different attachment styles are predisposed to think, feel, and behave differently in their relationships (Collins & Allard, 2001). For example, anxious-ambivalent people tend to report more intense emotional highs and lows in their romantic relationships. They also report having more conflicts with their partners, that these conflicts are especially stressful, and that these conflicts often have a negative impact on how they feel about their relationship (Campbell et al., 2005). In a similar vein, attachment anxiety promotes *excessive reassurance seeking*—the tendency to persistently ask for assurances from partners that one is worthy of love (Shaver, Schachner & Mikulincer, 2005).

Attachment style is also related to the motivations that underlie people's sexual interactions. People high in attachment anxiety report that they tend to have sex to reduce their feelings of insecurity and to enhance the closeness in their relationships, whereas avoidant individuals tend to engage in more casual sex in an effort to impress their peer group (Schachner & Shaver, 2004). Reactions to romantic breakups also tend to vary depending on attachment style. People who are high in attachment anxiety have much more difficulty than others in dealing with the dissolution of romantic relationships. They report greater emotional and physical distress, greater preoccupation with the former partner, more attempts to regain the lost partner, more angry and vengeful behavior, and more maladaptive coping responses, such as using alcohol and drugs to cope with the loss (Davis, Shaver, & Vernon, 2003).

Studies have further suggested that attachment patterns may have far-reaching repercussions that extend into many aspects of people's lives besides their romantic relationships. For instance, people with secure attachments tend to have high self-esteem and to be relatively well adjusted. In contrast, people with avoidant or anxious-ambivalent attachments tend to be overrepresented in groups suffering from depression, eating disorders, and other types of psychopathology (Crowell, Fraley, & Shaver, 1999). Attachment security promotes compassionate feelings and values and more helping behavior when people are in need (Mikulincer & Shaver, 2005). Researchers have also found correlations between attachment styles and gender roles (Schwartz, Waldo, & Higgins, 2004), religious beliefs (Kirkpatrick, 2005), attitudes about work (Shaver & Hazan, 1993, 1994), health habits (Huntsinger & Luecken, 2004), styles of coping with stress (Howard & Medway, 2004), and vulnerability to burnout (Pines, 2004). Thus, Hazan and Shaver's innovative ideas about the long-term effects of infant attachment experiences have triggered an avalanche of thought-provoking research.

Culture and Close Relationships

Relatively little cross-cultural research has been conducted on the dynamics of close relationships. The limited evidence suggests both similarities and differences between cultures in romantic relationships (Hendrick & Hendrick, 2000; Schmitt, 2005). For the most part, similarities have been seen when research has focused on what people look for in prospective mates. As we discussed in Chapter 10, David Buss (1989, 1994a) has collected data on mate preferences

in 37 divergent cultures and found that people all over the world value mutual attraction, kindness, intelligence, emotional stability, dependability, and good health in a mate. Buss also found that gender differences in mating priorities are nearly universal, with males placing more emphasis on physical attractiveness and females putting a higher priority on social status and financial resources.

Cultures vary, however, in their emphasis on love—especially passionate love—as a prerequisite for marriage. Love as the basis for marriage is an 18th-century invention of Western culture (Stone, 1977). As Hatfield and Rapson (1993) note, “Marriage-for-love represents an ultimate expression of individualism” (p. 2). In contrast, marriages arranged by families and other go-betweens remain common in cultures high in collectivism, including India (Gupta, 1992), Japan (Iwao, 1993), and China (Xiaoghe & Whyte, 1990). This practice is declining in some societies as a result of Westernization, but in collectivist societies people contemplating marriage still tend to think in terms of “What will my parents and other people say?” rather than “What does my heart say?” (Triandis, 1994). Studies show that attitudes about love in collectivist societies reflect these cultural priorities. For example, in comparison to Western participants, subjects from Eastern countries report that romantic love is less important for marriage (Levine et al., 1995; Medora et al., 2002).

An Evolutionary Perspective on Attraction

Evolutionary psychologists have a great deal to say about heterosexual attraction. For example, they assert that physical appearance is an influential determinant of attraction because certain aspects of good looks can be indicators of sound health, good genes, and high fertility, all of which can contribute to reproductive potential (Soler et al., 2003; Sugiyama, 2005). Consistent with this analysis, recent research has found that some standards of attractiveness are more consistent across cultures than previously believed (Sugiyama, 2005). For example, *facial symmetry* seems to be a key element of attractiveness in highly diverse cultures (Fink & Penton-Voak, 2002). Facial symmetry is thought to be valued because a host of environmental insults and developmental abnormalities are associated with physical asymmetries, which may serve as markers of relatively poor genes or health (Jones et al., 2001). Another facet of appearance that may transcend culture is *women's waist-to-hip ratio*. Around the world, men seem to prefer women with a moderately low waist-to-hip ratio (in comparison



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to other women in that society), which appears to be a meaningful correlate of females' reproductive potential (Hughes & Gallup, 2003; Sugiyama, 2005).

The most thoroughly documented findings on the evolutionary bases of heterosexual attraction are those on gender differences in humans' mating preferences. Consistent with the notion that humans are programmed by evolution to behave in ways that enhance their reproductive fitness, evidence indicates that men generally are more interested than women in seeking youthfulness and physical attractive-

Marriages based on romantic love are the norm in Western cultures, whereas arranged marriages prevail in collectivist cultures.

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ness in their mates because these traits should be associated with greater reproductive potential (see Chapter 10). On the other hand, research shows that women place a greater premium on prospective mates' ambition, social status, and financial potential because these traits should be associated with the ability to invest material resources in children (Shackelford, Schmitt, & Buss, 2005; Li et al., 2002). The degree to which these trends transcend history and culture was driven home by a recent study that examined the mate preferences apparent in 658 traditional folktales drawn from the ancient oral traditions of 48 different cultures (Gottschall et al., 2004). The analyses showed that the characters in these extremely old and diverse stories showed the same gender differences seen in contemporary research: Male characters tended to place a greater emphasis on potential mates' physical attractiveness, while female characters showed more interest in potential mates' wealth and social status.

Does the gender gap in mating priorities influence the tactics people actually use in pursuing romantic relationships? Research suggests that the answer is yes. Buss (1988) asked 208 newlywed individuals to describe the things they did when they first met their spouse, and during the remainder of their courtship, to make themselves more appealing to their partner. He found that men were more likely than women to emphasize their material resources by doing such things as flashing lots of money, buying nice gifts, showing off expensive possessions, and bragging about their importance at work (see **Figure 16.8**). In contrast, women were more likely than men to work at enhancing their appearance by dieting, wearing stylish clothes, trying new hairstyles, and getting a tan.

The tactics used by both sexes may include efforts at deception. Research shows that many men and women would be willing to lie about their personality, income, past relationships, and career skills to impress a prospective date who was attractive (Rowatt, Cunningham, & Druen, 1999). Consistent with evolutionary theory, women report that they are most upset when men exaggerate their social status, their financial resources, or the depth of their romantic commitment to the woman, whereas men are most upset when women conceal a history of "promiscuity" (Haselton et al., 2005). Females anticipate more deception from prospective dates than males do (Keenan et al., 1997). Perhaps this is the reason women tend to underestimate the strength of men's relationship commitment (Haselton & Buss, 2000). Men do not appear to show a similar bias, but they do show a tendency to overestimate women's sexual interest. These cognitive biases seem to be designed to reduce the probability that ancestral women would consent to sex and then be abandoned and to minimize the likelihood that ancestral men would overlook sexual opportunities (Buss, 2001).

Deception lies at the heart of *mate poaching*, a phenomenon that has recently attracted the interest of evolutionary psychologists. Mate poaching occurs when someone tries to attract another person who is already in a relationship. Although it presents some extra challenges and risks, this strategy is not rare, as 50%–60% of undergraduates report that they have attempted to poach someone (Schmitt & Buss, 2001). Mate poaching has probably occurred throughout history and is universally seen across cultures, although its prevalence varies some from one culture to another (Schmitt et al., 2004). Men are somewhat more likely than women to make poaching attempts, but the gap is modest and poaching by women is common (Schmitt et al., 2004). The tactics employed in poaching efforts overlap considerably with the

Figure 16.8
Similarities and differences between the sexes in tactics of attraction.

Buss (1988) asked newlywed subjects to rate how often they had used 23 tactics of attraction to make themselves more appealing to their partner. The tactics used by one sex significantly more often than the other are listed in the first two sections of the figure. Although there were significant differences between the sexes, there were also many similarities. The 11 tactics used most frequently by each sex (those above the median) are bold-faced, showing considerable overlap between males and females in the tactics they use most. (Note: Higher means in the data reflect higher frequency of use, but the numbers do not indicate frequency per day or week.)

Source: Adapted from Buss, D. M. (1988). The evolution of human intrasexual competition: Tactics of mate attraction. *Journal of Personality and Social Psychology*, 54, 616–628. Copyright © 1988 by the American Psychological Association. Adapted by permission of the publisher and author.

Tactics of attraction	Mean frequency (N = 102)	Mean frequency (N = 106)
<i>Tactics used significantly more by males</i>	<i>Men</i>	<i>Women</i>
Display resources	0.67	0.44
Brag about resources	0.73	0.60
Display sophistication	1.18	0.88
Display strength	0.96	0.44
Display athleticism	1.18	0.94
Show off	0.70	0.47
<i>Tactics used significantly more by females</i>	<i>Men</i>	<i>Women</i>
Wear makeup	0.02	1.63
Keep clean and groomed	2.27	2.44
Alter appearance—general	0.39	1.27
Wear stylish clothes	1.22	2.00
Act coy	0.54	0.73
Wear jewelry	0.25	2.21
Wear sexy clothes	0.68	0.91
<i>Tactics for which no significant sex differences were found</i>	<i>Men</i>	<i>Women</i>
Act provocative	0.77	0.90
Flirt	2.13	2.09
Keep hair groomed	2.20	2.31
Increase social exposure	0.89	0.90
Act nice	1.77	1.86
Display humor	2.42	2.28
Act promiscuous	0.30	0.21
Act submissive	1.24	1.11
Dissemble (feign agreement)	1.26	1.09
Touch	2.26	2.16

normal tactics of attraction, except the tactics are more likely to be executed in a disguised and secretive manner. Poaching is a two-way street, as people often try to entice others into poaching them by expressing boredom about their current relationship, complaining about their partner, or asking for “advice” about their relationship (Schmitt & Shackelford, 2003).

> REVIEW OF KEY POINTS

- People tend to like and love others who are physically attractive. The matching hypothesis asserts that people who are similar in physical attractiveness are more likely to be drawn together than those who are not.
- Byrne’s research suggests that similarity causes attraction, although attitude alignment may also be at work. Reciprocity involves liking those who show that they like you. In intimate relationships, romantic ideals influence the progress of relationships. Romantic partners often idealize each other.
- Berscheid and Hatfield distinguished between passionate and companionate love. Sternberg built on their distinction by dividing companionate love into intimacy and commitment.
- Hazan and Shaver’s theory suggests that love relationships in adulthood mimic attachment patterns in infancy. People tend to be secure, avoidant, or anxious-ambivalent in their romantic relationships. Those who are secure tend to have more-committed, satisfying relationships. People high in attachment anxiety tend to have sex to reduce their insecurity and tend to have more difficulty than others with romantic breakups. Attachment style is related to many aspects of behavior.
- The characteristics that people seek in prospective mates and gender differences in mating priorities are much the same around the world. However, cultures vary considerably in their emphasis on passionate love as a prerequisite for marriage.
- According to evolutionary psychologists, certain aspects of good looks influence attraction because they are indicators of reproductive fitness. Consistent with evolutionary theory, men tend to seek youthfulness and attractiveness in their mates, whereas women emphasize prospective mates’ financial potential and willingness to invest material resources in children.
- People’s courtship tactics vary by sex in ways that make evolutionary sense. These tactics may include deception. Females anticipate more deception than males do. Mate poaching is common and appears to be universal across cultures.

> Attitudes: Making Social Judgments

In our chapter-opening story, Muffy’s friends exhibited decidedly negative attitudes about working-class men. Their example reveals a basic feature of attitudes: they’re evaluative. Social psychology’s interest in attitudes has a much longer history than its interest in attraction. Indeed, in its early days social psychology was defined as the study of attitudes. In this section we’ll discuss the nature of attitudes, efforts to change attitudes through persuasion, and theories of attitude change.

What are attitudes? **Attitudes are positive or negative evaluations of objects of thought.** “Objects of thought” may include social issues (capital punishment or gun control, for example), groups (liberals, farmers), institutions (the Lutheran church, the Supreme Court), consumer products (yogurt, computers), and people (the president, your next-door neighbor).

Components and Dimensions of Attitudes

Social psychologists have traditionally viewed attitudes as being made up of three components: a cognitive component, an affective component, and a behavioral component. However, it gradually became apparent that many attitudes do not include all three

components (Fazio & Olson, 2003), so it is more accurate to say that *attitudes may include up to three types of components*. The *cognitive component* of an attitude is made up of the beliefs that people hold about the object of an attitude. The *affective component* of an attitude consists of the *emotional feelings* stimulated by an object of thought. The *behavioral component* of an attitude consists of *predispositions to act* in certain ways toward an attitude object. **Figure 16.9** on the next page provides concrete examples of how someone’s attitude about gun control might be divided into its components.

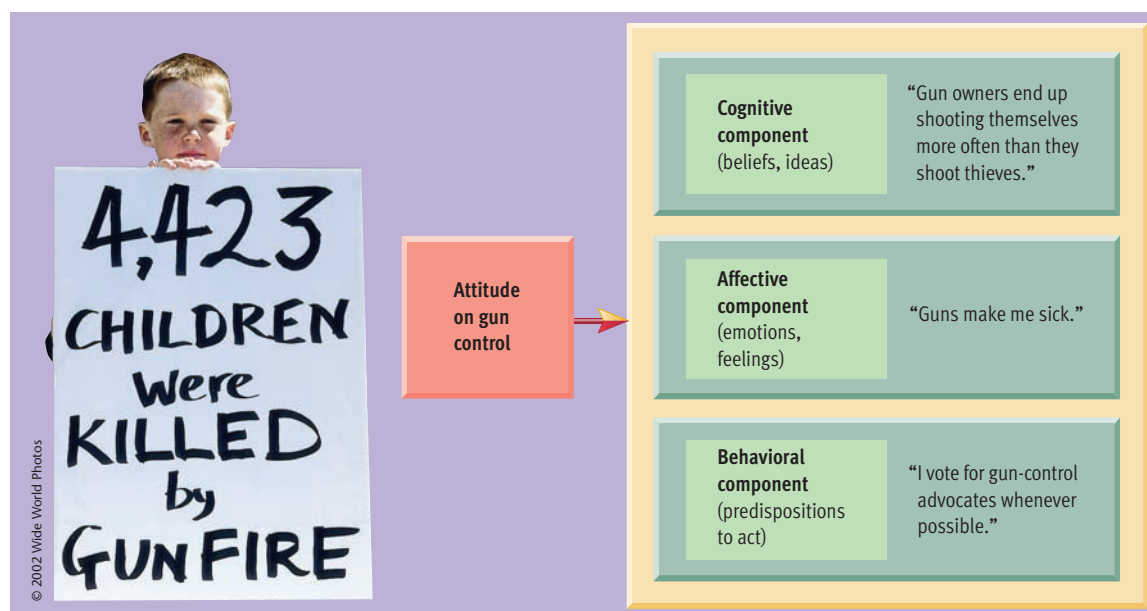
Attitudes vary along several crucial dimensions, including their *strength*, *accessibility*, and *ambivalence* (Olson & Maio, 2003). Definitions of *attitude strength* differ, but strong attitudes are generally seen as ones that are firmly held (resistant to change), that are durable over time, and that have a powerful impact on behavior (Petty, Wheeler, & Tormala, 2003). The *accessibility* of an attitude refers to how often one thinks about it and how quickly it comes to mind. Highly accessible attitudes are quickly and readily available (Fabrigar, MacDonald, & Wegener, 2005). Attitude accessibility is correlated with attitude strength, as highly accessible attitudes *tend* to be strong, but the concepts are distinct and there is no one-to-one correspondence. *Ambivalent attitudes* are conflicted

PREVIEW QUESTIONS

- What are the key components and dimensions of attitudes?
- How well do attitudes predict behavior?
- What factors influence the effectiveness of persuasive efforts?
- How do various theories explain attitude change?

Figure 16.9

The possible components of attitudes. Attitudes may include cognitive, affective, and behavioral components, as illustrated here for a hypothetical person's attitude about gun control.



evaluations that include both positive and negative feelings about an object of thought (Fabrigar, MacDonald, & Wegener, 2005). Like attitude strength, attitude ambivalence has been measured in various ways (Priester & Petty, 2001). Generally speaking, ambivalence increases as the ratio of positive to negative evaluations gets closer to being equal. When ambivalence is high, an attitude tends to be less predictive of behavior and more pliable in the face of persuasion (Armitage & Conner, 2000).

Attitudes and Behavior

In the early 1930s, when prejudice against Asians was common in the United States, Richard LaPiere journeyed across the country with a Chinese couple. He was more than a little surprised when they weren't turned away from any of the restaurants they visited in their travels—184 restaurants in all. About six months after his trip, LaPiere surveyed the same restaurants and asked whether they would serve Chinese customers. Roughly half of the restaurants replied to the survey, and over 90% of them indicated that they would not seat Chinese patrons. Thus, LaPiere (1934) found that people who voice prejudicial attitudes may not behave in discriminatory ways. Since then, theorists have often asked: Why don't attitudes predict behavior better?

Admittedly, LaPiere's study had a fundamental flaw that you may already have detected. The person who seated LaPiere and his Chinese friends may not have been the same person who responded to the mail survey sent later. Nonetheless, numerous follow-up studies, using more sophisticated methods, have re-

peatedly shown that attitudes are mediocre predictors of people's behavior (Ajzen & Fishbein, 2005; McGuire, 1985). That's not to say that attitudes are irrelevant or meaningless. Kraus (1995) reviewed 88 attitude-behavior studies and found that the average correlation between attitudes and behavior was .38. That figure is high enough to justify Eagly's (1992) conclusion that researchers have identified "many conditions under which attitudes are substantial predictors of behavior" (p. 697). But on the whole, social psychologists have been surprised by how often a favorable attitude toward a candidate or product does not translate into a vote or a purchase.

Why aren't attitude-behavior relations more consistent? One consideration is that until recently researchers failed to take variations in *attitude strength*, *accessibility*, and *ambivalence* into account. Accumulating evidence indicates that these factors influence the connection between attitudes and behavior, but they have generally been left uncontrolled in decades of research on attitudes (Olson & Maio, 2003). Another consideration is that attitudes are often measured in a *general, global* way that isn't likely to predict *specific* behaviors (Bohner & Schwarz, 2001). Although you may express favorable feelings about protecting civil liberties (a very general, abstract concept), you may not be willing to give \$100 to the American Civil Liberties Union (a very specific action). Another reason for attitude-behavior inconsistency is that many behaviors occur spontaneously and are not the product of thoughtful deliberation about one's attitudes (Fazio & Olson, 2003).

Finally, inconsistent relations between attitudes and behavior are seen because behavior depends on

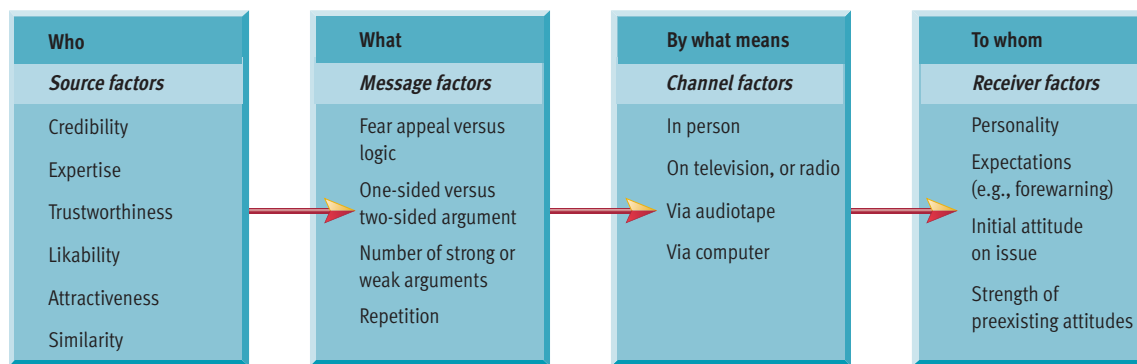


Figure 16.10
Overview of the persuasion process. The process of persuasion essentially boils down to *who* (the source) communicates *what* (the message) *by what means* (the channel) *to whom* (the receiver). Thus, four sets of variables influence the process of persuasion: source, message, channel, and receiver factors. The diagram lists some of the more important factors in each category (including some that are not discussed in the text due to space limitations). (Adapted from Lippa, 1994)

situational constraints—especially your subjective perceptions of how people expect you to behave (Ajzen & Fishbein, 2000, 2005). Attitudes interact with situational norms to shape people’s intentions, which then determine their behavior. Although you may be strongly opposed to marijuana use, you may not say anything when friends start passing a joint around at a party because you don’t want to turn the party into an argument. However, in another situation governed by different norms, such as a class discussion, you may speak out forcefully against marijuana use. If so, you may be trying to change others’ attitudes, the process we’ll discuss next.

Trying to Change Attitudes: Factors in Persuasion

The fact that attitudes aren’t always good predictors of a person’s behavior doesn’t stop others from trying to change those attitudes. Indeed, every day you’re bombarded by efforts to alter your attitudes. To illustrate, let’s trace the events of an imaginary morning. You may not even be out of bed before you start hearing radio advertisements intended to influence your attitudes about specific mouthwashes, computers, athletic shoes, and telephone companies. When you unfurl your newspaper, you find not only more ads but quotes from government officials and special interest groups, carefully crafted to shape your opinions. When you arrive at school, you encounter a group passing out leaflets that urge you to repent your sins and join them in worship. In class, your economics professor champions the wisdom of free markets in international trade. At lunch, the person you’ve been dating argues about the merits of an “open relationship.” Your discussion is interrupted by someone who wants both of you to sign a petition. “Doesn’t it ever let up?” you wonder. When it comes to persuasion, the answer is “no.” As Anthony Pratkanis and Elliot Aronson (2000) put it, we live in the “age of propaganda.” In light of this reality, let’s ex-

amine some of the factors that determine whether persuasion works.

The process of persuasion includes four basic elements: source, receiver, message, and channel (see **Figure 16.10**). **The source is the person who sends a communication, and the receiver is the person to whom the message is sent.** Thus, if you watch a presidential news conference on TV, the president is the source, and you and millions of other viewers are the receivers. **The message is the information transmitted by the source, and the channel is the medium through which the message is sent.** Although the research on communication channels is interesting, we’ll confine our discussion to source, message, and receiver variables, which are most applicable to persuasion.

Source Factors

Occasional exceptions to the general rule are seen, but persuasion tends to be more successful when the source has high *credibility* (Pornpitakpan, 2004). What gives a person credibility? Either expertise or trustworthiness. *Expertise* tends to be more influential when arguments are ambiguous (Chaiken & Maheswaran, 1994). People try to convey their expertise by mentioning their degrees, their training, and their experience or by showing an impressive grasp of the issue at hand.

Expertise is a plus, but *trustworthiness* can be even more important. Many people tend to accept messages from trustworthy sources with little scrutiny (Priester & Petty, 1995, 2003). If you were told that your state needs to reduce corporate taxes to stimulate its economy, would you be more likely to believe it from the president of a huge corporation in your state or from an economics professor from out of state? Probably the latter. Trustworthiness is undermined when a source, such as the corporation president, appears to have something to gain. In contrast, trustworthiness is enhanced when people appear to argue against their own interests (Hunt, Smith, & Kernan, 1985). This effect



Influence at Work

This site offers an intriguing set of materials that explore a wide variety of social influence phenomena, including persuasion, propaganda, brainwashing, and the tactics that cults use in recruiting. The site is maintained by Kelton Rhodes and Robert Cialdini, perhaps the world's leading authority on social influence strategies.

explains why salespeople often make remarks like, "Frankly, my snowblower isn't the best. They have a better brand down the street. Of course, you'll have to spend quite a bit more . . ."

Likability also increases the effectiveness of a persuasive source (Johnson, Maio, & Smith-McLallen, 2005), and some of the factors at work in attraction therefore have an impact on persuasion. Thus, the favorable effect of *physical attractiveness* on likability can make persuasion more effective (Shavitt et al., 1994). We also respond better to sources who share *similarity* with us in ways that are relevant to the issue at hand (Mackie, Worth, & Asuncion, 1990).

Message Factors

If you were going to give a speech to a local community group advocating a reduction in state taxes on corporations, you'd probably wrestle with a number of questions about how to structure your message. Should you look at both sides of the issue, or should you present just your side? Should you use all of the arguments at your disposal, or should you concentrate on the stronger arguments? Should you deliver a low-key, logical speech? Or should you try to strike fear into the hearts of your listeners? These questions are concerned with message factors in persuasion.

Let's assume that you're aware that there are two sides to the taxation issue. On the one hand, you're convinced that lower corporate taxes will bring new companies to your state and stimulate economic growth. On the other hand, you realize that reduced tax revenues may hurt the quality of education and roads in your state (but you think the benefits will outweigh the costs). Should you present a *one-sided argument* that ignores the possible problems for education and road quality? Or should you present a *two-sided argument* that acknowledges concern about education and road quality and then downplays the probable magnitude of these problems? The optimal strategy depends on a variety of considerations, but overall, two-sided arguments tend to be more effective (Petty & Wegener, 1998). Just mentioning that there are two sides to an issue can increase your credibility with an audience.

In presenting your side, should you use every argument you can think of, or should you focus on the stronger points? One study suggests that it is wise to concentrate on your strong arguments (Friedrich et al., 1996). The investigators exposed students to a variety of weak and strong arguments advocating a new senior comprehensive exam at their school. They found that adding strong arguments paid off but that adding weak arguments hurt rather than helped. It appears that weak arguments may actually raise doubts rather than add to your case.

On the other hand, raw repetition of a message does seem to be an effective strategy. The *validity effect* refers to the finding that simply repeating a statement causes it to be perceived as more valid or true. It doesn't matter whether the statement is true, false, or clearly just an opinion; if you repeat something often enough, some people come to believe it (Boehm, 1994).

Persuasive messages frequently attempt to arouse fear. Opponents of nuclear power scare us with visions of meltdowns. Antismoking campaigns emphasize the threat of cancer, and deodorant ads highlight the risk of embarrassment. You could follow their lead and argue that if corporate taxes aren't reduced, your state will be headed toward economic ruin and massive unemployment. *Do appeals to fear work?* Yes—if they are successful in arousing fear. Research reveals that many messages intended to induce fear fail to do so. However, studies involving a wide range of issues (nuclear policy, auto safety, dental hygiene, and so on) have shown that messages that are effective in arousing fear tend to increase persuasion (Ruiter, Abraham, & Kok, 2001). Fear appeals are most likely to work when your listeners view the dire consequences that you describe as exceedingly unpleasant, fairly probable if they don't take your advice, and avoidable if they do (Das, de Wit, & Stroebe, 2003).

Receiver Factors

What about the receiver of the persuasive message? Are some people easier to persuade than others? Undoubtedly, but researchers have not found any personality traits that are reliably associated with susceptibility to persuasion (Petty & Wegener, 1998). Other factors, such as the forewarning a receiver gets about a persuasive effort and the receiver's initial position on an issue, generally seem to be more influential than the receiver's personality.

An old saying suggests that "to be forewarned is to be forearmed." The value of *forewarning* applies to targets of persuasive efforts (Wood & Quinn, 2003). When you shop for a new TV, you *expect* salespeople to work at persuading you, and to some extent this forewarning reduces the impact of their arguments. Considerations that stimulate counterarguing in the receiver tend to increase resistance to persuasion (Jain, Buchanan, & Maheswaran, 2000).

A receiver's resistance to persuasion will depend in part on the nature of the attitude or belief that the source is trying to change. Obviously, resistance is greater when you have to advocate a position that is incompatible with the receiver's existing attitudes or beliefs. In general, people display a *disconfirmation bias* in evaluating arguments (Edwards & Smith, 1996). Arguments that are in conflict with one's prior atti-

tudes are scrutinized longer and subjected to more skeptical analysis than arguments that are consistent with one's prior beliefs.

Furthermore, studies show that *stronger attitudes are more resistant to change* (Eagly & Chaiken, 1998). Strong attitudes may be tougher to alter because they tend to be embedded in networks of beliefs and values that might also require change (Erber, Hodges, & Wilson, 1995). Finally, *resistance can promote resistance*. That is, when people successfully resist persuasive efforts to change specific attitudes, they often become more certain about those attitudes (Tormala & Petty, 2002, 2004).

Our review of source, message, and receiver variables has shown that attempting to change attitudes through persuasion involves a complex interplay of factors—and we haven't even looked beneath the surface yet. How do people acquire attitudes in the first place? What dynamic processes within people produce attitude change? We turn to these theoretical issues next.

Theories of Attitude Formation and Change



Many theories have been proposed to explain the mechanisms at work in attitude change, whether or not it occurs in response to persuasion. We'll look at four theoretical perspectives: learning theory, dissonance theory, self-perception theory, and the elaboration likelihood model.

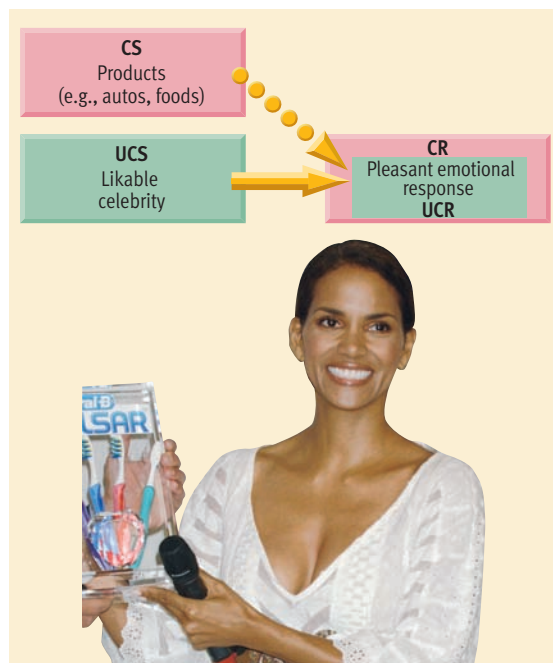
Learning Theory



We've seen repeatedly that *learning theory* can help explain a wide range of phenomena, from conditioned fears to the acquisition of sex roles to the development of personality traits. Now we can add attitude formation and change to our list.

The affective, or emotional, component in an attitude can be created through a special subtype of *classical conditioning*, called *evaluative conditioning* (Olson & Fazio, 2001, 2002). As we discussed in Chapter 6, *evaluative conditioning* consists of efforts to transfer the emotion attached to a UCS to a new CS (Kruglanski & Stroebe, 2005; Schimmack & Crites, 2005). Advertisers routinely try to take advantage of evaluative conditioning by pairing their products with stimuli that elicit pleasant emotional responses, such as extremely attractive models, highly likable spokespersons, and cherished events, such as the Olympics (Till & Priluck, 2000). This conditioning process is diagrammed in **Figure 16.11**.

Operant conditioning may come into play when you openly express an attitude, such as "I believe that husbands should do more housework." Some people



© 2005 AP/Wide World Photos

Figure 16.11
Classical conditioning of attitudes in advertising. Advertisers routinely pair their products with likable celebrities in the hope that their products will come to elicit pleasant emotional responses. As discussed in Chapter 6, this special type of classical conditioning is called *evaluative conditioning*. See the Critical Thinking Application in Chapter 6 for a more in-depth discussion of this practice.

may endorse your view, while others may jump down your throat. Agreement from other people generally functions as a reinforcer, strengthening your tendency to express a specific attitude (Bohner & Schwarz, 2001). Disagreement often functions as a form of pun-

concept check 16.3



Understanding Attitudes and Persuasion

Check your understanding of the possible components of attitudes and the elements of persuasion by analyzing hypothetical political strategies. Imagine you're working on a political campaign and you're invited to join the candidate's inner circle in strategy sessions, as staff members prepare the candidate for upcoming campaign stops. During the meetings, you hear various strategies discussed. For each strategy below, indicate which component of voters' attitudes (cognitive, affective, or behavioral) is being targeted for change, and indicate which element in persuasion (source, message, or receiver factors) is being manipulated. The answers are in Appendix A.

1. "You need to convince this crowd that your program for regulating nursing homes is sound. Whatever you do, don't acknowledge the two weaknesses in the program that we've been playing down. I don't care if you're asked point blank. Just slide by the question and keep harping on the program's advantages."
2. "You haven't been smiling enough lately, especially when the TV cameras are rolling. Remember, you can have the best ideas in the world, but if you don't seem likable, you're not gonna get elected. By the way, I think I've lined up some photo opportunities that should help us create an image of sincerity and compassion."
3. "This crowd is already behind you. You don't have to alter their opinions on any issue. Get right to work convincing them to contribute to the campaign. I want them lining up to give money."



LEON FESTINGER

"Cognitive dissonance is a motivating state of affairs. Just as hunger impels a person to eat, so does dissonance impel a person to change his opinions or his behavior."

ishment, which may gradually weaken your commitment to your viewpoint.

Another person's attitudes may rub off on you through *observational learning* (Oskamp, 1991). If you hear your uncle say, "Republicans are nothing but puppets of big business" and your mother heartily agrees, your exposure to your uncle's attitude and your mother's reinforcement of your uncle may influence your attitude toward the Republican party. Studies show that parents and their children tend to have similar political attitudes (Sears, 1975). Observational learning presumably accounts for much of this similarity. The opinions of teachers, coaches, co-workers, talk-show hosts, rock stars, and so forth are also likely to sway people's attitudes through observational learning.

Dissonance Theory

Leon Festinger's *dissonance theory* assumes that inconsistency among attitudes propels people in the direction of attitude change. Dissonance theory burst



into prominence in 1959 when Festinger and J. Merrill Carlsmith published a famous study of counterattitudinal behavior. Let's look at their findings and at how dissonance theory explains them.

Festinger and Carlsmith (1959) had male college students come to a laboratory, where they worked on excruciatingly dull tasks such as turning pegs repeatedly. When a subject's hour was over, the experimenter confided that some participants' motivation was being manipulated by telling them that the task was interesting and enjoyable before they started it. Then, after a moment's hesitation, the experimenter asked if the subject could help him out of a jam. His usual helper was delayed and he needed someone to testify to the next "subject" (really an accomplice) that the experimental task was interesting. He offered to pay the subject if he would tell the person in the adjoining waiting room that the task was enjoyable and involving.

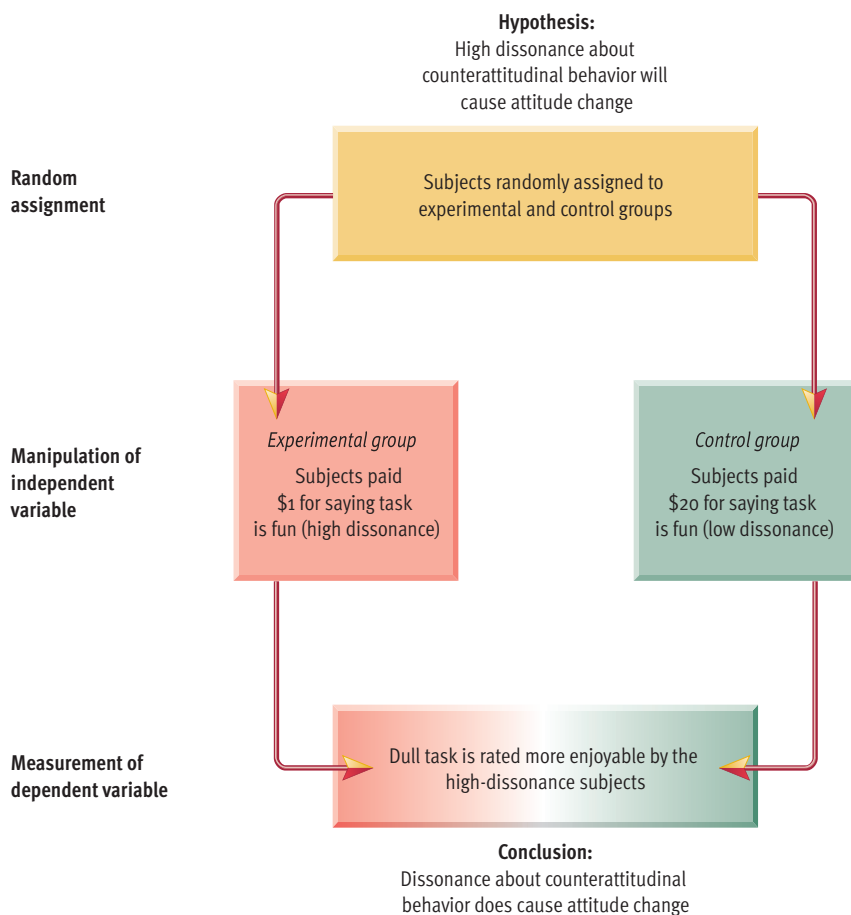
This entire scenario was enacted to coax participants into doing something that was inconsistent with their true feelings—that is, to engage in *counterattitudinal behavior*. Some participants received a token payment of \$1 for their effort, while others received a more substantial payment of \$20 (an amount equivalent to about \$80–\$90 today, in light of inflation). Later, a second experimenter inquired about the subjects' true feelings regarding the dull experimental task. **Figure 16.12** summarizes the design of the Festinger and Carlsmith study.

Who do you think rated the task more favorably—the subjects who were paid \$1 or those who were paid \$20? Both common sense and learning theory would predict that the subjects who received the greater reward (\$20) should come to like the task more. In reality, however, the subjects who were paid \$1 exhibited more favorable attitude change—just as Festinger and Carlsmith had predicted. Why? Dissonance theory provides an explanation.

According to Festinger (1957), *cognitive dissonance exists when related cognitions are inconsistent—that is, when they contradict each other*. Cognitive dissonance is thought to create an unpleasant state of tension that motivates people to reduce their dissonance—usually by altering their cognitions. In the study by Festinger and Carlsmith, the subjects' contradictory cognitions were "The task is boring" and "I told someone the task was enjoyable." The subjects who were paid \$20 for lying had an obvious reason for behaving inconsistently with their true attitudes, so these subjects experienced little dissonance. In contrast, the subjects paid \$1 had no readily apparent justification for their lie and experienced high dissonance. To reduce it, they tended to persuade themselves that the task was more enjoyable than they had

Figure 16.12

Design of the Festinger and Carlsmith (1959) study. The sequence of events in this landmark study of counterattitudinal behavior and attitude change is outlined here. The diagram omits a third condition (no dissonance), in which subjects were not induced to lie. The results in the non-dissonance condition were similar to those found in the low-dissonance condition.



originally thought. Thus, dissonance theory sheds light on why people sometimes come to believe their own lies.

Cognitive dissonance is also at work when people turn attitudinal somersaults to justify efforts that haven't panned out, a syndrome called *effort justification*. Aronson and Mills (1959) studied effort justification by putting college women through a "severe initiation" before they could qualify to participate in what promised to be an interesting discussion of sexuality. In the initiation, the women had to read obscene passages out loud to a male experimenter. After all that, the highly touted discussion of sexuality turned out to be a boring, taped lecture on reproduction in lower animals. Subjects in the severe initiation condition experienced highly dissonant cognitions ("I went through a lot to get here" and "This discussion is terrible"). How did they reduce their dissonance? Apparently by changing their attitude about the discussion, since they rated it more favorably than subjects in two control conditions. Effort justification may be at work in many facets of everyday life. For example, people who wait in line for an hour or more to get into an exclusive restaurant often praise the restaurant afterward even if they have been served a mediocre meal.

Dissonance theory has been tested in hundreds of studies with mixed, but largely favorable, results. The dynamics of dissonance appear to underlie many important types of attitude changes (Draycott & Dabbs, 1998; Keller & Block, 1999; Petty et al., 2003). Research has largely supported Festinger's claim that dissonance involves genuine psychological discomfort and even physiological arousal (Visser & Cooper, 2003; Devine et al., 1999). However, dissonance effects are not among the most reliable phenomena in social psychology. Researchers have had difficulty specifying the conditions under which dissonance will occur, and it has become apparent that people can reduce their dissonance in quite a variety of ways besides changing their attitudes (Olson & Stone, 2005; Visser & Cooper, 2003).

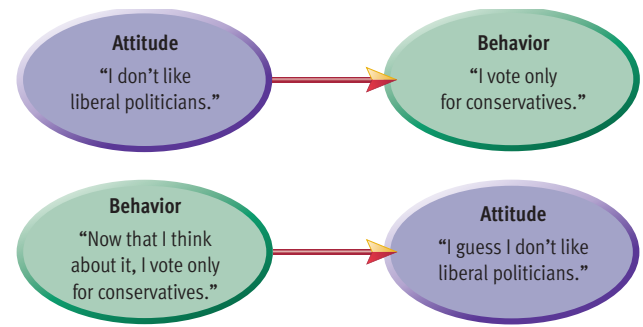
Self-Perception Theory

After taking a close look at studies of counter-attitudinal behavior, Daryl Bem (1967) concluded that self-perception, rather than dissonance, explains why people sometimes come to believe their own lies. According to Bem's *self-perception theory*, people often *infer* their attitudes from their behavior. Thus, Bem argued that in the study by Festinger and Carlsmith (1959), the subjects paid \$1 probably thought to themselves, "A dollar isn't enough money to get me to lie, so I must have found the task enjoyable."

This thinking isn't much different from what dissonance theory would predict. Both theories suggest

Traditional view
Attitudes determine behavior

Bem's self-perception theory
Behavior determines attitudes



that people often think, "If I said it, it must be true." But the two theories propose that similar patterns of thought unfold for entirely different reasons. According to dissonance theory, subjects think along these lines because they're struggling to reduce tension caused by inconsistency among their cognitions. According to self-perception theory, subjects are engaged in normal attributional efforts to better understand their own behavior. Bem originally believed that most findings explained by dissonance were really due to self-perception. However, studies eventually showed that self-perception is at work primarily when subjects do not have well-defined attitudes regarding the issue at hand (Olson & Roese, 1995). Although self-perception theory did not replace dissonance theory, Bem's work demonstrated that attitudes are sometimes inferred from one's own behavior (Olson & Stone, 2005; see **Figure 16.13**).

Figure 16.13

Bem's self-perception theory. The traditional view is that attitudes determine behavior. However, Bem stood conventional logic on its head when he proposed that behavior often determines (or causes people to draw inferences about) their attitudes. Subsequent research on attribution has shown that sometimes people *do* infer their attitudes from their behavior.

Elaboration Likelihood Model

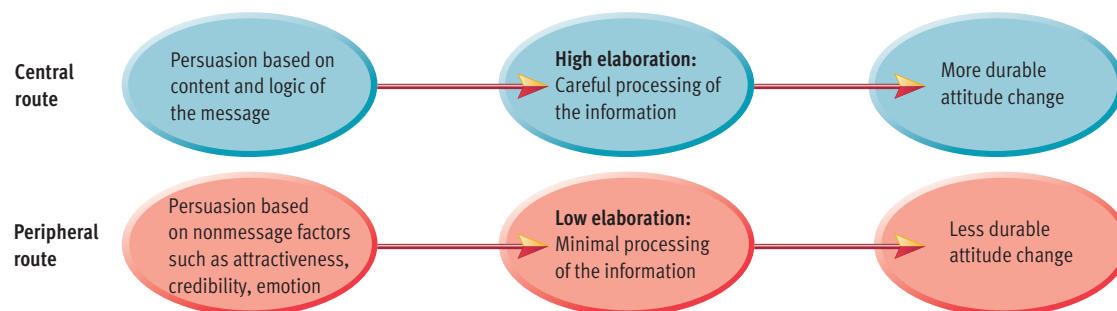
The *elaboration likelihood model* of attitude change, originally proposed by Richard Petty and John Cacioppo (1986), asserts that there are two basic "routes" to persuasion (Petty & Wegener, 1999). The *central route* is taken when people carefully ponder the content and logic of persuasive messages. The *peripheral route* is taken when persuasion depends on nonmessage factors, such as the attractiveness and credibility of the source, or on conditioned emotional responses (see **Figure 16.14** on the next page). For example, a politician who campaigns by delivering carefully researched speeches that thoughtfully analyze complex issues is following the central route to persuasion. In contrast, a politician who depends on marching bands, flag waving, celebrity endorsements, and emotional slogans is following the peripheral route.

Both routes can lead to persuasion. However, according to the elaboration likelihood model, the durability of attitude change depends on the extent to which people elaborate on (think about) the contents of persuasive communications. Studies suggest that the central route to persuasion leads to more en-



Figure 16.14

The elaboration likelihood model. According to the elaboration likelihood model (Petty & Cacioppo, 1986), the central route to persuasion leads to more elaboration of message content and more enduring attitude change than the peripheral route to persuasion.



during attitude change than the peripheral route and that attitudes changed through central processes predict behavior better than attitudes changed through peripheral processes (Kruglanski & Stroebe, 2005; Petty & Wegener, 1998).

➤ REVIEW OF KEY POINTS

- Attitudes may be made up of cognitive, affective, and behavioral components. Attitudes vary along the dimensions of strength, accessibility, and ambivalence. Attitudes and behavior aren't as consistent as one might assume for a variety of reasons.
- A source of persuasion who is credible, expert, trustworthy, likable, and physically attractive tends to be relatively effective in stimulating attitude change.
- Although there are some situational limitations, two-sided arguments and fear arousal are effective elements in per-

suasive messages. Repetition is helpful, but adding weak arguments to one's case may hurt more than help.

- Persuasion is more difficult when a receiver is forewarned, when the sender advocates a position that is incompatible with the receiver's existing attitudes, or when strong attitudes are targeted.
- Attitudes may be shaped through classical conditioning, operant conditioning, and observational learning. Festinger's dissonance theory asserts that inconsistent attitudes cause tension and that people alter their attitudes to reduce cognitive dissonance.
- Dissonance theory has been used to explain attitude change following counterattitudinal behavior and efforts that haven't panned out. Some of these results can be explained by self-perception theory, which posits that people may infer their attitudes from their behavior.
- The elaboration likelihood model of persuasion holds that the central route to persuasion tends to yield longer-lasting attitude change than the peripheral route.

➤ Conformity and Obedience: Yielding to Others

PREVIEW QUESTIONS

- How did Asch study conformity, and what did he learn?
- How did Milgram study obedience, and what did he learn?
- Why were Milgram's findings so controversial?
- How well do American findings on conformity and obedience generalize to other cultures?
- How did the Stanford Prison Simulation demonstrate the power of the situation?

A number of years ago, the area that I lived in experienced a severe flood that required the mobilization of the National Guard and various emergency services. At the height of the crisis, a young man arrived at the scene of the flood, announced that he was from an obscure state agency that no one had ever heard of, and proceeded to take control of the emergency. City work crews, the fire department, local police, municipal officials, and the National Guard followed his orders with dispatch for several days, evacuating entire neighborhoods—until an official thought to check and found out that the man was just someone who had walked in off the street. The imposter, who had had small armies at his beck and call for several days, had no training in emergency services, just a history of unemployment and psychological problems.

After news of the hoax spread, people criticized red-faced local officials for their compliance with the imposter's orders. However, many of the critics probably would have cooperated in much the same way if they had been in the officials' shoes. For most people, willingness to obey someone in authority is the

rule, not the exception. In this section, we'll analyze the dynamics of social influence at work in conformity and obedience.

Conformity



If you keep a well-manicured lawn, are you exhibiting conformity? According to social psychologists, it depends on whether your behavior is the result of group pressure. **Conformity occurs when people yield to real or imagined social pressure.** For example, if you maintain a well-groomed lawn only to avoid complaints from your neighbors, you're conforming to social pressure. However, if you maintain a nice lawn because you genuinely prefer a nice lawn, that's *not* conformity.

In the 1950s, Solomon Asch (1951, 1955, 1956) devised a clever procedure that reduced ambiguity about whether subjects were conforming, allowing him to investigate the variables that govern conformity. Let's re-create one of Asch's (1955) classic experiments, which have become the most widely repli-

cated studies in the history of social psychology (Markus, Kitayama, & Heiman, 1996). The subjects are male undergraduates recruited for a study of visual perception. A group of seven subjects are shown a large card with a vertical line on it and are then asked to indicate which of three lines on a second card matches the original “standard line” in length (see Figure 16.15). All seven subjects are given a turn at the task, and they announce their choice to the group. The subject in the sixth chair doesn’t know it, but everyone else in the group is an accomplice of the experimenter, and they’re about to make him wonder whether he has taken leave of his senses.

The accomplices give accurate responses on the first two trials. On the third trial, line number 2 clearly is the correct response, but the first five “subjects” all say that line number 3 matches the standard line. The genuine subject is bewildered and can’t believe his ears. Over the course of 15 trials, the accomplices all give the same incorrect response on 12 of them. How does the real subject respond? The line judgments are easy and unambiguous. So, if the participant consistently agrees with the accomplices, he isn’t making honest mistakes—he’s conforming.

Averaging across all 50 participants, Asch (1955) found that the young men conformed on 37% of the trials. The subjects varied considerably in their tendency to conform, however. Of the 50 participants, 13 never caved in to the group, while 14 conformed on more than half the trials. One could argue that the results show that people confronting a unanimous majority generally tend to *resist* the pressure to conform, but given how clear and easy the line judgments were, most social scientists viewed the findings as a dramatic demonstration of humans’ propensity to conform (Levine, 1999).

In subsequent studies, Asch (1956) found that *group size* and *group unanimity* are key determinants

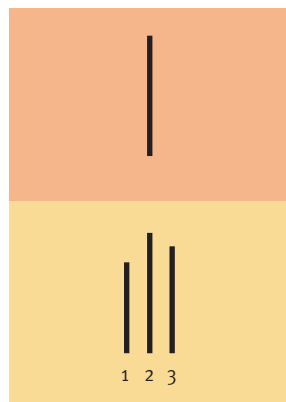


Figure 16.15
Stimuli used in Asch's conformity studies. Subjects were asked to match a standard line (top) with one of three other lines displayed on another card (bottom). The task was easy—until experimental accomplices started responding with obviously incorrect answers, creating a situation in which Asch evaluated subjects' conformity.

Source: Adapted from Asch, S. (1955). Opinion and social pressure. *Scientific American*, 193 (5), 31–35. Based on illustrations by Sara Love. Copyright © 1955 by Scientific American, Inc. All rights reserved.

of conformity. To examine the impact of group size, Asch repeated his procedure with groups that included from 1 to 15 accomplices. Little conformity was seen when a subject was pitted against just one person, but conformity increased rapidly as group size went up to 4, and then leveled off (see Figure 16.16). Thus, Asch reasoned that as groups grow larger, conformity increases—up to a point, a conclusion that has been echoed by other researchers (Cialdini & Trost, 1998).

However, group size made little difference if just one accomplice “broke” with the others, wrecking their unanimous agreement. The presence of another dissenter lowered conformity to about one-quarter of its peak, even when the dissenter made *inaccurate* judgments that happened to conflict with the majority view. Apparently, the subjects just needed to hear someone else question the accuracy of the group's perplexing responses. The importance of unanimity in fostering conformity has been replicated in subsequent research (Nemeth & Chiles, 1988).

Obedience



Obedience is a form of compliance that occurs when people follow direct commands, usually from someone in a position of authority. To a surprising extent, when an authority figure says, “Jump!” many people simply ask, “How high?”

Milgram's Studies



Stanley Milgram wanted to study this tendency to obey authority figures. Like many other people after



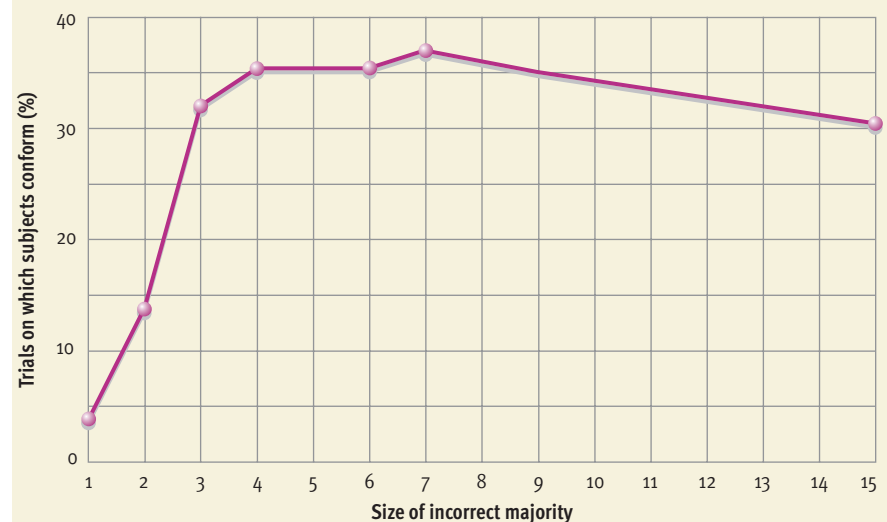
SOLOMON ASCH

“That we have found the tendency to conformity in our society so strong that reasonably intelligent and well-meaning young people are willing to call white black is a matter of concern.”

Figure 16.16

Conformity and group size. This graph shows the percentage of trials on which participants conformed as a function of group size in Asch's research. Asch found that conformity became more frequent as group size increased up to about four, and then the amount of conformity leveled off.

Source: Adapted from Asch, S. (1955). Opinion and social pressure. *Scientific American*, 193 (5), 31–35. Based on illustrations by Sara Love. Copyright © 1955 by Scientific American, Inc. All rights reserved.



World War II, he was troubled by how readily the citizens of Germany had followed the orders of dictator Adolf Hitler, even when the orders required morally repugnant actions, such as the slaughter of millions of Jews. Milgram, who had worked with Solomon Asch, set out to design a standard laboratory procedure for the study of obedience, much like Asch's procedure for studying conformity. The clever experiment that Milgram devised became one of the most

famous and controversial studies in the annals of psychology. It has been hailed as a "monumental contribution" to science and condemned as "dangerous, dehumanizing, and unethical research" (Ross, 1988). Decades after the research was conducted, it still generates spirited debate (Berkowitz, 1999; Lutsky, 1995). Because of its importance, it's our Featured Study for this chapter.

FEATURED Study

Source: Milgram, S. (1963). Behavioral study of obedience. *Journal of Abnormal and Social Psychology*, 67, 371–378.

"I Was Just Following Orders"

"I was just following orders." That was the essence of Adolf Eichmann's defense when he was tried for his war crimes, which included masterminding the Nazis' attempted extermination of European Jews. Milgram wanted to determine the extent to which people are willing to follow authorities' orders. In particular, he wanted to identify the factors that lead people to follow commands that violate their ethics, such as commands to harm an innocent stranger.

Method

The participants were a diverse collection of 40 men from the local community, recruited through advertisements to participate in a study at Yale University. When a subject arrived at the lab, he met the experimenter and another subject, a likable, 47-year-old accountant, who was actually an accomplice of the experimenter.

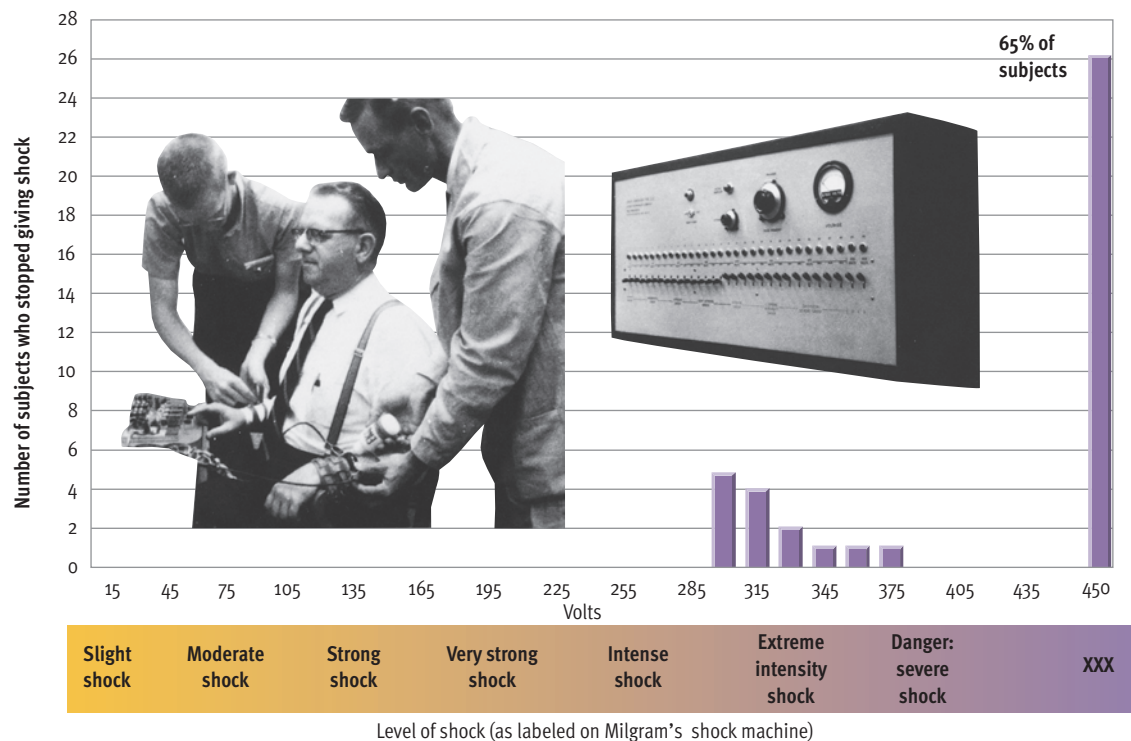
The "subjects" were told that the study would concern the effects of punishment on learning. They drew slips of paper from a hat to get their assignments, but the drawing was fixed so that the real subject always became the "teacher" and the accomplice the "learner."

The participant then watched as the learner was strapped into an electrified chair through which a shock could be delivered to the learner whenever he made a mistake on the task (left photo in Figure 16.17). The subject was told that the shocks would be painful but "would not cause tissue damage," and he was then taken to an adjoining room that housed the shock generator that he would control in his role as the teacher. This elaborate apparatus (right photo in Figure 16.17) had 30 switches designed to administer shocks varying from 15 to 450 volts, with labels ranging from "Slight shock" to "Danger: severe shock" and "XXX." Although the

Figure 16.17

Milgram's experiment on obedience. The photo on the left shows the "learner" being connected to the shock generator during one of Milgram's experimental sessions. The photo on the right shows the fake shock generator used in the study. The surprising results of the Milgram (1963) study are summarized in the bar graph. Although subjects frequently protested, the vast majority (65%) delivered the entire series of shocks to the learner.

Source: Photos copyright © 1965 by Stanley Milgram. From the film *Obedience*, distributed by The Pennsylvania State University. Reprinted by permission of Alexandra Milgram.



apparatus looked and sounded realistic, it was a fake, and the learner was never shocked.

As the “learning experiment” proceeded, the accomplice made many mistakes that necessitated shocks from the teacher, who was instructed to increase the shock level after each wrong answer. At “300 volts,” the learner began to pound on the wall between the two rooms in protest and soon stopped responding to the teacher’s questions. At this point, participants ordinarily turned to the experimenter for guidance. The experimenter, a 31-year-old male in a gray lab coat, firmly indicated that no response was the same as a wrong answer and that the teacher should continue to give stronger and stronger shocks to the now silent learner. If the participant expressed unwillingness to continue, the experimenter responded sternly with one of four pre-arranged prods, such as, “It is absolutely essential that you continue.”

When a participant refused to obey the experimenter, the session came to an end. The dependent variable was the maximum shock the participant was willing to administer before refusing to cooperate. After each session, the true purpose of the study was explained to the subject, who was reassured that the shock was fake and the learner was unharmed.

Results

No participant stopped cooperating before the learner reached the point of pounding on the wall, but 5 quit at that point. As the graph in **Figure 16.17** shows, only 14 out of 40 subjects defied the experimenter before the full series of shocks was completed. Thus, 26 of the 40 subjects (65%) administered all 30 levels of shock. Although they tended to obey the experimenter, many participants voiced and displayed considerable distress about harming the learner. The horrified subjects groaned, bit their lips, stuttered, trembled, and broke into a sweat, but they continued administering the shocks.

After his initial demonstration, Milgram (1974) tried about 20 variations on his experimental procedure, looking for factors that influence participants’ obedience. In one variation, Milgram moved the study away from Yale’s campus to see if the prestige of the university was contributing to the subjects’ obedience. When the study was run in a seedy office building by the “Research Associates of Bridgeport,” only a small decrease in obedience was observed (48% of the subjects gave all the shocks).

In another version of the study, Milgram borrowed a trick from Asch’s conformity experiments and set up teams of three teachers that included two more accomplices. When they drew lots, the real subject was always selected to run the shock apparatus in consultation with his fellow teachers. When both accomplices accepted the experimenter’s orders to continue shocking the learner, the pressure increased obe-

Discussion

Based on these results, Milgram concluded that obedience to authority is even more common than he or others had anticipated. Before the study was conducted, Milgram had described it to 40 psychiatrists and had asked them to predict how much shock subjects would be willing to administer to their innocent victims. Most of the psychiatrists had predicted that fewer than 1% of the subjects would continue to the end of the series of shocks!

In interpreting his results, Milgram argued that strong pressure from an authority figure can make decent people do indecent things to others. Applying this insight to Nazi war crimes and other travesties, Milgram asserted that some sinister actions may not be due to actors’ evil character so much as to situational pressures that can lead normal people to engage in acts of treachery and violence. Thus, he arrived at the disturbing conclusion that given the right circumstances, anyone might obey orders to inflict harm on innocent strangers.

Comment

In itself, obedience is not necessarily bad or wrong. Social groups of any size depend on obedience to function smoothly. Life would be chaotic if orders from police, parents, physicians, bosses, generals, and presidents were routinely ignored. However, Milgram’s study suggests that many people are overly willing to submit to the orders of someone in command.

If you’re like most people, you’re probably confident that you wouldn’t follow an experimenter’s demands to inflict harm on a helpless victim. But the empirical findings indicate that you’re probably wrong. After many replications, the results are deplorable, but clear: Most people can be coerced into engaging in actions that violate their morals and values. This finding is disheartening, but it sharpens our understanding of moral atrocities, such as the Nazi persecutions of Jews.

dience a bit. However, if an accomplice defied the experimenter and supported the subject’s objections, obedience declined dramatically (only 10% of the subjects gave all the shocks), just as conformity had dropped rapidly when dissent surfaced in Asch’s conformity studies. Dissent from another “teacher” turned out to be one of the few variations that reduced participants’ obedience appreciably. As a whole, Milgram was surprised at how high subjects’ obedience remained as he changed various aspects of his experiment.

The Ensuing Controversy

Milgram’s study evoked a controversy that continues through today. Some critics argued that Milgram’s results couldn’t be generalized to apply to the real world (Baumrind, 1964; Orne & Holland, 1968). They maintained that participants went along only because they



STANLEY MILGRAM

“The essence of obedience is that a person comes to view himself as the instrument for carrying out another person’s wishes, and he therefore no longer regards himself as responsible for his actions.”

Web Link 16.5



Stanley Milgram

This site provides a wealth of accurate information about the work of Stanley Milgram, arguably one of the most controversial and creative social psychologists in the field’s history. The site is maintained by Thomas Blass, a psychology professor at the University of Maryland (Baltimore County), who has published many articles and books on the life and work of Milgram.



knew it was an experiment and “everything must be okay.” Or they argued that subjects who agree to participate in a scientific study *expect to obey* orders from an experimenter. Milgram (1964, 1968) replied by arguing that if subjects had thought “everything must be okay,” they wouldn’t have experienced the enormous distress that they clearly showed.

As for the idea that research participants expect to follow an experimenter’s commands, Milgram pointed out that so do real-world soldiers and bureaucrats who are accused of villainous acts performed in obedience to authority. “I reject Baumrind’s argument that the observed obedience doesn’t count because it occurred where it is appropriate,” said Milgram (1964). “That is precisely why it *does* count.” Overall, the evidence supports the generalizability of Milgram’s results, which were consistently replicated for many years, in diverse settings, with a variety of subjects and procedural variations (Blass, 1999; Miller, 1986).

Critics also questioned the ethics of Milgram’s procedure (Baumrind, 1964; Kelman, 1967). They noted that without prior consent, subjects were exposed to extensive deception that could undermine their trust in people and to severe stress that could leave emotional scars. Moreover, most participants also had to confront the disturbing fact that they caved in to the experimenter’s commands to inflict harm on an innocent victim.

Milgram’s defenders argued that the brief distress experienced by his subjects was a small price to pay for the insights that emerged from his obedience studies. Looking back, however, many psychologists seem to share the critics’ concerns about the ethical implications of Milgram’s work. His procedure is questionable by contemporary standards of research ethics, and no replications of his obedience study have been conducted in the United States since the mid-1970s (Blass, 1991)—a bizarre epitaph for what may be psychology’s best-known experiment.

Cultural Variations in Conformity and Obedience

Are conformity and obedience unique to American culture? By no means. The Asch and Milgram experiments have been repeated in many societies, where they have yielded results roughly similar to those seen in the United States. Thus, the phenomena of conformity and obedience seem to transcend culture.

The replications of Milgram’s obedience study have largely been limited to industrialized nations similar to the United States. Comparisons of the results of these studies must be made with caution be-

cause the composition of the samples and the experimental procedures have varied somewhat. But many of the studies have reported even higher obedience rates than those seen in Milgram’s American samples. For example, obedience rates of over 80% have been reported for samples from Italy, Germany, Austria, Spain, and Holland (Smith & Bond, 1994). Thus, the surprisingly high level of obedience observed by Milgram does not appear to be peculiar to the United States.

The Asch experiment has been repeated in a more diverse range of societies than the Milgram experiment. Like many other cultural differences in social behavior, variations in conformity appear to be related to the degree of *individualism versus collectivism* seen in a society. Various theorists have argued that collectivistic cultures, which emphasize respect for group norms, cooperation, and harmony, probably encourage more conformity than individualistic cultures (Schwartz, 1990) and have a more positive view of conformity (Kim & Markus, 1999). As Matsumoto (1994) puts it, “To conform in American culture is to be weak or deficient somehow. But this is not true in other cultures. Many cultures foster more collective, group-oriented values, and concepts of conformity, obedience, and compliance enjoy much higher status” (p. 162). Consistent with this analysis, studies *have* found higher levels of conformity in collectivistic cultures than in individualistic cultures (Bond & Smith, 1996; Smith, 2001).

The Power of the Situation: The Stanford Prison Simulation

The research of Asch and Milgram provided dramatic demonstrations of the potent influence that situational factors can have on social behavior. The power of the situation was underscored once again, about a decade after Milgram’s obedience research, in another landmark study conducted by Philip Zimbardo, who, ironically, was a high school classmate of Milgram’s. Zimbardo and his colleagues designed the Stanford Prison Simulation to investigate why prisons tend to become abusive, degrading, violent environments (Haney, Banks, & Zimbardo, 1973; Zimbardo et al., 1973). Like Milgram, Zimbardo wanted to see how much the power of the situation would shape the behavior of normal, average subjects.

The participants were college students recruited for a study of prison life through a newspaper ad. After giving 70 volunteers an extensive battery of tests and interviews, the researchers chose 24 students who ap-



© Philip Zimbardo. Reproduced with permission



© AFP/Getty Images

The recent Abu Ghraib prison scandal in Iraq has sparked renewed interest in the Stanford Prison Simulation. Some of the photos taken of the abuse at Abu Ghraib (right) are stunningly similar to photos from the Stanford study (left). For instance, in both cases, the guards “dehumanized” their prisoners by placing bags over their heads.

peared to be physically healthy and psychologically stable to be the subjects. A coin flip determined which of them would be “guards” and which would be “prisoners” in a simulated prison setup at Stanford University. The prisoners were “arrested” at their homes, handcuffed, and transported to a mock prison on the Stanford campus. Upon arrival, they were ordered to strip, sprayed with a delousing agent, given prison uniforms (smocks), assigned numbers as their identities, and locked up in iron-barred cells. The subjects assigned to be guards were given khaki uniforms, billy clubs, whistles, and reflective sunglasses. They were told that they could run their prison in whatever way they wanted except that they were not allowed to use physical punishment.

What happened? In short order, confrontations occurred between the guards and prisoners, and the guards quickly devised a variety of sometimes cruel strategies to maintain total control over their prisoners. Meals, blankets, and bathroom privileges were selectively denied to some prisoners to achieve control. The prisoners were taunted, humiliated, called demeaning names, and forced to beg for opportunities to go to the bathroom. Pointless, petty rules were strictly enforced and difficult prisoners were punished with hard labor (doing pushups and jumping jacks, cleaning toilets with their bare hands). The guards harassed the prisoners by waking them up in the middle of the night to assemble and count off. And the guards creatively turned a 2-foot by 2-foot closet into a “hole” for solitary confinement of rebellious prisoners. Although there was some variation among the guards, collectively they became mean, malicious, and abusive in fulfilling their responsibilities.

How did the prisoners react? A few showed signs of emotional disturbance and had to be released early, but they mostly became listless, apathetic, and demoralized. The study was designed to run two weeks, but Zimbardo decided that he needed to end it prematurely after just six days because he was concerned about the rapidly escalating abuse and degradation of the prisoners. The subjects were debriefed, offered counseling, and sent home.

How did Zimbardo and his colleagues explain the stunning transformations of their subjects? First, they attributed the participants’ behavior to the enormous influence of social roles. **Social roles are widely shared expectations about how people in certain positions are supposed to behave.** We have role expectations for salespeople, waiters, ministers, medical patients, students, bus drivers, tourists, flight attendants, and, of course, prison guards and prisoners. The participants had a rough idea of what it meant to act like a guard or a prisoner and they were gradually consumed by their roles (Haney & Zimbardo, 1998). Second, the researchers attributed their subjects’ behavior to the compelling power of situational factors. Before the study began, the tests and interviews showed no measureable differences in personality or character between those randomly assigned to be guards versus prisoners. The stark differences in their behavior had to be due to the radically different situations that they found themselves in. As Haney and Zimbardo (1998, p. 719) put it, the study “demonstrated the power of situations to overwhelm people and elicit from them unexpectedly cruel, yet ‘situationally appropriate’ behavior.” As a result, Zimbardo, like Milgram before him, concluded that situational



Image Not Available

PHIL ZIMBARDO

“But in the end, I called off the experiment not because of the horror I saw out there in the prison yard, but because of the horror of realizing that I could have easily traded places with the most brutal guard or become the weakest prisoner full of hatred at being so powerless.”

Web Link 16.6



Stanford Prison Experiment

The Stanford Prison Simulation is one of psychology's most renowned studies.

At this site, Phil Zimbardo provides a fascinating slide show explaining the study in depth. The site also includes discussion questions, reflections on the study 30 years after it was conducted, and links to a host of related materials. The links include recent writings by Zimbardo that analyze the Abu Ghraib prison scandal.

pressures can lead normal, decent people to behave in sinister, repugnant ways.

The results of the Stanford Prison Simulation were eye-opening, to say the least. Within a short time, subjects with no obvious character flaws became tyrannical, sadistic, brutal guards. If this transformation can occur so swiftly in a make-believe prison, one can only imagine how the much stronger situational forces in real prisons readily promote abusive behavior. Although the Stanford Prison Simulation was conducted over 30 years ago, renewed interest in the study was sparked by the recent Abu Ghraib prison scandal in Iraq. American military personnel with little or no experience in running prisons were found to have engaged in "sadistic, blatant, and wanton criminal abuses" of their Iraqi prisoners (Hersh, 2004). Some of the photos taken of the abuse at Abu Ghraib are eerily reminiscent of photos from the Stanford simulation. The U.S. government blamed these horrific abuses on "a few bad apples" who were presumed to be pathological or morally deficient, writing off the incident as an aberration. Yet the evidence from the Stanford Prison Simulation clearly suggests otherwise. Phil Zimbardo (2004, 2005) argues, and has testified as an expert witness, that it is far more likely that situational pressures led normal, average Americans to commit morally reprehensible abuses. This explanation does *not* absolve the brutal guards of responsibility for their behavior. However, Zimbardo emphasizes that making scapegoats out of a handful of guards does not solve the real problem, which lies

in the system. He maintains that abuses in prisons are more likely than not and can only be reduced if authorities provide extensive training and strong supervision for guards, enact explicit sanctions for abuses, and maintain clear accountability in the chain of command.

REVIEW OF KEY POINTS

- Conformity involves yielding to social pressure. Asch found that subjects often conform to the group, even when the group reports inaccurate judgments on a simple line-judging task. Conformity becomes more likely as group size increases, up to a group size of four, then levels off. If a small group isn't unanimous, conformity declines rapidly.
- In Milgram's landmark study of obedience to authority, adult men drawn from the community showed a remarkable tendency, despite their misgivings, to follow orders to shock an innocent stranger. Milgram concluded that situational pressures can make decent people do indecent things.
- Critics asserted that Milgram's results were not generalizable to the real world and that his methods were unethical. The generalizability of Milgram's findings has stood the test of time, but his work also helped to stimulate stricter ethical standards for research.
- The Asch and Milgram experiments have been replicated in many cultures. These replications have uncovered modest cultural variations in the propensity to conform or to obey an authority figure.
- The Stanford Prison Simulation demonstrated that social roles and other situational pressures can exert tremendous influence over social behavior. Like Milgram, Zimbardo showed that situational forces can lead normal people to exhibit surprisingly callous, abusive behavior.

Behavior in Groups: Joining with Others

PREVIEW QUESTIONS

- What is the bystander effect?
- What processes contribute to reduced individual productivity in larger groups?
- What is group polarization?
- What are the antecedent conditions and symptoms of group-think?

Social psychologists study groups as well as individuals, but exactly what is a group? Are all the divorced fathers living in Baltimore a group? Are three strangers moving skyward in an elevator a group? What if the elevator gets stuck? How about four students from your psychology class who study together regularly? A jury deciding a trial? The Boston Celtics? The U.S. Congress? Some of these collections of people are groups and others aren't. Let's examine the concept of a group to find out which of these collections qualify.

In social psychologists' eyes, **a group consists of two or more individuals who interact and are interdependent**. The divorced fathers in Baltimore aren't likely to qualify on either count. Strangers sharing an elevator might interact briefly, but they're not interdependent. However, if the elevator got stuck and they had to deal with an emergency together, they could suddenly become a group. Your psychology

classmates who study together are a group, as they interact and depend on each other to achieve shared goals. So do the members of a jury, a sports team such as the Celtics, and a large organization such as the U.S. Congress. Historically, most groups have interacted on a face-to-face basis, but advances in telecommunications are changing that reality. In the era of the Internet, people can interact, become interdependent, and develop a group identity without ever meeting in person (Bargh & McKenna, 2004; McKenna & Bargh, 1998).

Groups vary in many ways. Obviously, a study group, the Celtics, and Congress are very different in terms of size, purpose, formality, longevity, similarity of members, and diversity of activities. Can anything meaningful be said about groups if they're so diverse? Yes. In spite of their immense variability, groups share certain features that affect their functioning.

Among other things, most groups have *roles* that allocate special responsibilities to some members, *norms* about suitable behavior, a *communication structure* that reflects who talks to whom, and a *power structure* that determines which members wield the most influence (Forsyth, 1999).

Thus, when people join together in a group, they create a social organism with unique characteristics and dynamics that can take on a life of its own. One of social psychology's enduring insights is that in a given situation you may behave quite differently when you're in a group than when you're alone. To illustrate this point, let's look at some interesting research on helping behavior.

Behavior Alone and in Groups: The Case of the Bystander Effect

Imagine that you have a precarious medical condition and that you must go through life worrying about whether someone will leap forward to provide help if the need ever arises. Wouldn't you feel more secure when around larger groups? After all, there's "safety in numbers." Logically, as group size increases, the probability of having a "good Samaritan" on the scene increases. Or does it?

We've seen before that human behavior isn't necessarily logical. When it comes to helping behavior, many studies have uncovered an apparent paradox called the *bystander effect*: **People are less likely to provide needed help when they are in groups than when they are alone.** Evidence that your probability of getting help *declines* as group size increases was first described by John Darley and Bibb Latané (1968), who were conducting research on the determinants of helping behavior. In the Darley and Latané study, students in individual cubicles connected by an intercom participated in discussion groups of three sizes. (The separate cubicles allowed the researchers to examine each individual's behavior in a group context, a technique that minimizes confounded variables in individual-group comparisons.) Early in the discussion, a student who was an experimental accomplice hesitantly mentioned that he was prone to seizures. Later in the discussion, the same accomplice feigned a severe seizure and cried out for help. Although a majority of subjects sought assistance for the student, the tendency to seek help *declined* with increasing group size.

Similar trends have been seen in many other experiments, in which over 6000 subjects have had opportunities to respond to apparent emergencies, including fires, asthma attacks, faintings, crashes, and

flat tires, as well as less pressing needs to answer a door or to pick up objects dropped by a stranger (Latané & Nida, 1981). Many of the experiments have been highly realistic studies conducted in subways, stores, and shopping malls, and many have compared individuals against groups in face-to-face interaction. Pooling the results of this research, Latané and Nida (1981) estimated that subjects who were alone provided help 75% of the time, whereas subjects in the presence of others provided help only 53% of the time. They concluded that the only significant limiting condition on the bystander effect is that it is less likely to occur when the need for help is unambiguous.

What accounts for the bystander effect? A number of factors may be at work. Bystander effects are most likely in ambiguous situations because people look around to see whether others think there's an emergency. If everyone hesitates, their inaction suggests that there's no real need for help. The *diffusion of responsibility* that occurs in a group is also important. If you're by yourself when you encounter someone in need of help, the responsibility to provide help rests squarely on your shoulders. However, if other people are present, the responsibility is divided among you, and you may all say to yourselves, "Someone else will help." A reduced sense of responsibility may contribute to other aspects of behavior in groups, as we'll see in the next section.

Group Productivity and Social Loafing

Have you ever driven through a road construction project—at a snail's pace, of course—and become irritated because so many workers seem to be just standing around? Maybe the irony of the posted sign "Your tax dollars at work" made you imagine that they were all dawdling. And then again, perhaps not. Individuals' productivity often *does* decline in larger groups (Karau & Williams, 1993). This fact is unfortunate, as many important tasks can only be accomplished in groups. Group productivity is crucial to committees, sports teams, firefighting crews, sororities, study groups, symphonies, and work teams of all kinds, from the morning crew in a little diner to the board of directors of a Fortune 500 company.

Two factors appear to contribute to reduced individual productivity in larger groups. One factor is *reduced efficiency* resulting from the *loss of coordination* among workers' efforts. As you put more people on a yearbook staff, for instance, you'll probably create more and more duplication of effort and increase how often group members end up working at cross purposes.

Web Link 16.7



Group Dynamics

Donelson Forsyth of Virginia Commonwealth University maintains this excellent site devoted to the dynamics of group interaction. Topics of interest include group structure, group cohesiveness, influence in groups, conflict in groups, and the history of research on groups. The site also houses a rich set of links to organizations that study groups.

The second factor contributing to low productivity in groups involves *effort* rather than efficiency. **Social loafing** is a reduction in effort by individuals when they work in groups as compared to when they work by themselves. To investigate social loafing, Latané and his colleagues (1979) measured the sound output produced by subjects who were asked to cheer or clap as loud as they could. So they couldn't see or hear other group members, subjects were told that the study concerned the importance of sensory feedback and were asked to don blindfolds and put on headphones through which loud noise was played. This maneuver permitted a simple deception: Subjects were led to believe that they were working alone or in a group of two or six, when in fact individual output was actually measured.

When participants *thought* that they were working in larger groups, their individual output declined. Since lack of coordination could not affect individual output, the subjects' decreased sound production had to be due to reduced effort. Latané and his colleagues also had the same subjects clap and shout in genuine groups of two and six and found an additional decrease in production that was attributed to loss of coordination. **Figure 16.18** shows how social loafing and loss of coordination combined to reduce productivity as group size increased.

The social-loafing effect has been replicated in numerous studies in which subjects have worked on a variety of tasks, including cheering, pumping air, swimming in a relay race, solving mazes, evaluating editorials, and brainstorming for new ideas (Karau & Williams, 1995; Levine & Moreland, 1998). Social loafing and the bystander effect appear to share a common cause: diffusion of responsibility in groups (Comer, 1995; Latané, 1981). As group size increases, the responsibility for getting a job done is divided

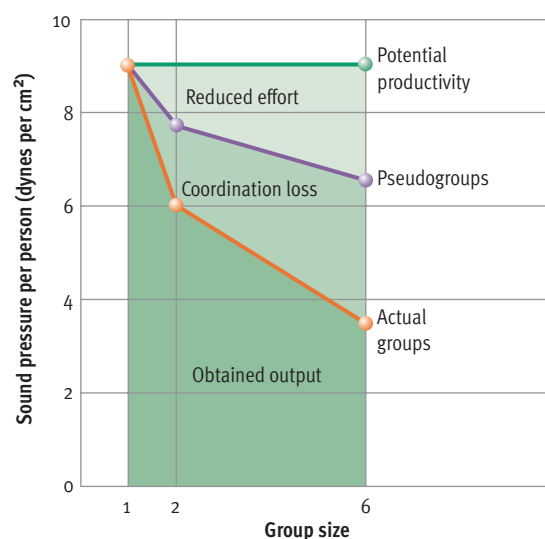


Figure 16.18

The effect of loss of coordination and social loafing on group productivity. The amount of sound produced per person declined noticeably when people worked in actual groups of two or six (orange line). This decrease in productivity reflects both loss of coordination and social loafing. Sound per person also declined when subjects merely thought they were working in groups of two or six (purple line). This smaller decrease in productivity is due to social loafing.

Source: Adapted from Latané, B., Williams, K., & Harkins, S. (1979). Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology*, 37, 822-832. Copyright © 1979 by the American Psychological Association. Adapted by permission of the publisher and author.

among more people, and many group members ease up because their individual contribution is less recognizable. Thus, social loafing occurs in situations where individuals can "hide in the crowd" (Karau & Williams, 1993).

Social loafing is *not* inevitable. For example, people with high achievement motivation are less likely to exhibit social loafing than those who are low in achievement motivation (Hart et al., 2004). Social loafing is also less likely when group members are convinced that individual performance is crucial to group performance and that excellent group performance will lead to valued outcomes (Shepperd & Taylor, 1999). And social loafing is reduced when people work in smaller and more cohesive groups (Liden et al., 2004). Cultural factors may also influence the likelihood of social loafing. Studies with subjects from Japan, China, and Taiwan suggest that social loafing may be less prevalent in collectivistic cultures, which place a high priority on meeting group goals and contributing to one's ingroups (Karau & Williams, 1995; Smith, 2001).

Decision Making in Groups

Productivity is not the only issue that commonly concerns groups. When people join together in groups,

concept check 16.4



Scrutinizing Common Sense

Check your understanding of the implications of research in social psychology by indicating whether the commonsense assertions listed below have been supported by empirical findings. Do the trends in research summarized in this chapter indicate that the following statements are true or false? The answers are in Appendix A.

- _____ 1. Generally, in forming their impressions of others, people don't judge a book by its cover.
- _____ 2. When it comes to attraction, birds of a feather flock together.
- _____ 3. In the realm of love, opposites attract.
- _____ 4. If you're the target of persuasion, to be forewarned is to be forearmed.
- _____ 5. When you need help, there's safety in numbers.

they often have to make decisions about what the group will do and how it will use its resources. Whether it's your study group deciding what type of pizza to order, a jury deciding on a verdict, or Congress deciding on whether to pass a bill, groups make decisions.

Evaluating decision making is often more complicated than evaluating productivity. In many cases, the "right" decision may not be readily apparent. Who can say whether your study group ordered the right pizza or whether Congress passed the right bills? Nonetheless, social psychologists have discovered some interesting tendencies in group decision making. We'll take a brief look at *group polarization* and *groupthink*.

Group Polarization

Who leans toward more cautious decisions: individuals or groups? Common sense suggests that groups will work out compromises that cancel out members' extreme views. Hence, the collective wisdom of the group should yield relatively conservative choices. Is common sense correct? To investigate this question, Stoner (1961) asked individual subjects to give their recommendations on tough decisions and then asked the same subjects to engage in group discussion to arrive at joint recommendations. When Stoner compared individuals' average recommendation against their group decision generated through discussion, he found that groups arrived at *riskier* decisions than individuals did. Stoner's finding was replicated in other studies (Pruitt, 1971), and the phenomenon acquired the name *risky shift*.

However, investigators eventually determined that groups can shift either way, toward risk or caution, depending on which way the group is leaning to begin with (Friedkin, 1999). A shift toward a more extreme position, an effect called *polarization*, is often the result of group discussion (Tindale, Kameda, & Hinsz, 2003). Thus, **group polarization occurs when group discussion strengthens a group's dominant point of view and produces a shift toward a more extreme decision in that direction** (see Figure 16.19). Group polarization does *not* involve widening the gap between factions in a group, as its name might suggest. In fact, group polarization can contribute to consensus in a group, as we'll see in our discussion of groupthink.

Groupthink

In contrast to group polarization, which is a normal process in group dynamics, groupthink is more like a "disease" that can infect decision making in groups. **Groupthink occurs when members of a cohesive group emphasize concurrence at the expense of**

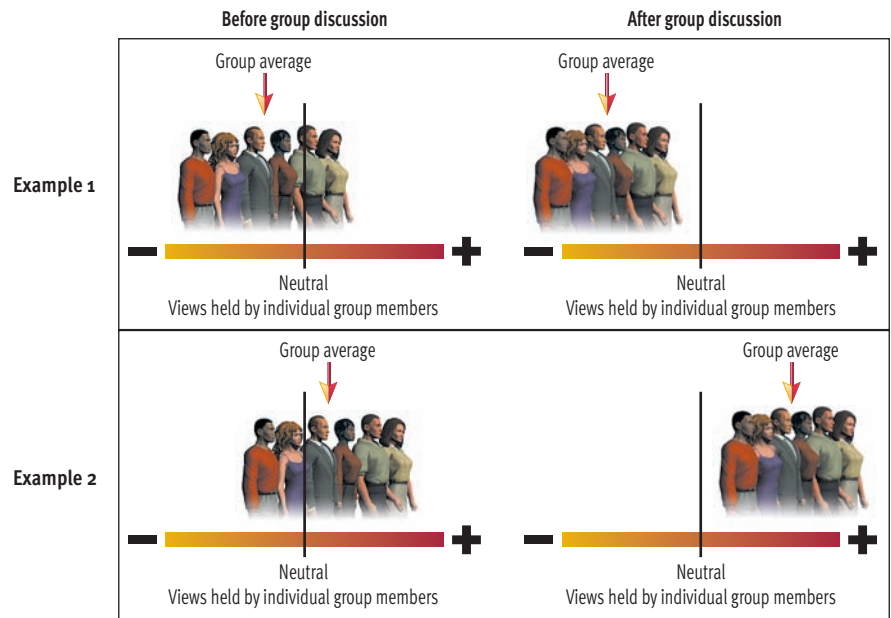


Figure 16.19

Group polarization. Two examples of group polarization are diagrammed here. The positions of the people on the horizontal scales reflect their positive or negative attitudes regarding an idea before and after group discussion. In the first example (top) a group starts out mildly opposed to an idea, but after discussion sentiment against the idea is stronger. In the second example (bottom), a group starts out with a favorable disposition toward an idea, and this disposition is strengthened by group discussion.

critical thinking in arriving at a decision. As you might imagine, groupthink doesn't produce very effective decision making. Indeed, groupthink can lead to major blunders that may look incomprehensible after the fact. Irving Janis (1972) first described groupthink in his effort to explain how President John F. Kennedy and his advisers could have miscalculated so badly in deciding to invade Cuba at the Bay of Pigs in 1961. The attempted invasion failed miserably and, in retrospect, seemed remarkably ill-conceived.

Applying his many years of research and theory on group dynamics to the Bay of Pigs fiasco, Janis devel-

Many types of groups have to arrive at collective decisions. The social dynamics of group decisions are complicated, and a variety of factors can undermine effective decision making.

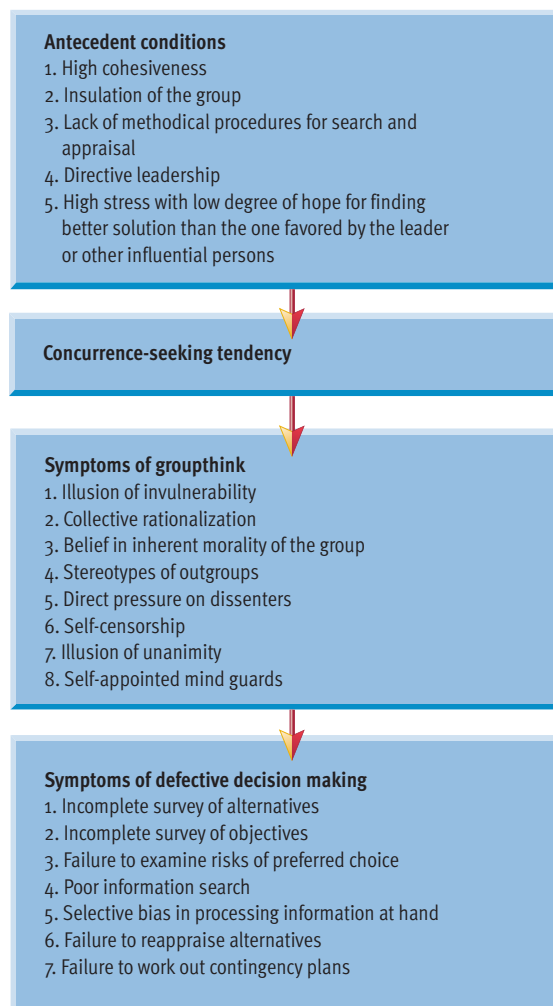


Figure 16.20

Overview of Janis's model of groupthink.

The antecedent conditions, symptoms, and resultant effects of groupthink postulated by Janis (1972) are outlined here. His model of groupthink has been very influential, but practical difficulties have limited research on the theory. The antecedent conditions outlined here do not always lead to groupthink.

Source: Adapted from Janis, I. L., & Mann, L. (1977). *Decision making: A psychological analysis of conflict, choice and commitment*. New York: Free Press. Adapted with permission of The Free Press, a Division of Simon & Schuster. Copyright © 1977 by The Free Press.



oped a model of groupthink, which is summarized in **Figure 16.20**. When groups get caught up in groupthink, members suspend their critical judgment and the group starts censoring dissent as the pressure to conform increases. Soon, everyone begins to think alike. Moreover, “mind guards” try to shield the group from information that contradicts the group’s view.

If the group’s view is challenged from outside, victims of groupthink tend to think in simplistic “us versus them” terms. Members begin to overestimate the ingroup’s unanimity, and they begin to view the outgroup as the enemy. Groupthink also promotes incomplete gathering of information. Like individuals, groups often display a confirmation bias, as they tend to seek and focus on information that supports their initial views (Schulz-Hardt et al., 2000).

Recent research has uncovered another factor that may contribute to groupthink—individual members often fail to share information that is unique to them (Postmes, Spears, & Cihangir, 2001). Sound decision making depends on group members combining their information effectively (Winquist & Larson, 1998).

However, when groups discuss issues, they have an interesting tendency to focus mainly on the information that the members already share as opposed to exchanging information unique to individual members (Stasser, Vaughn, & Stewart, 2000).

What causes groupthink? According to Janis, a key precondition is high group cohesiveness. **Group cohesiveness refers to the strength of the liking relationships linking group members to each other and to the group itself.** Members of cohesive groups are close-knit, are committed, have “team spirit,” and are loyal to the group. Cohesiveness itself isn’t bad. It can facilitate group productivity (Mullen & Copper, 1994) and help groups achieve great things. But Janis maintains that the danger of groupthink is greater when groups are highly cohesive. Groupthink is also more likely when a group works in relative isolation, when the group’s power structure is dominated by a strong, directive leader, and when the group is under stress to make a major decision (see **Figure 16.20**). Under these conditions, group discussions can easily lead to group polarization, strengthening the group’s dominant view.

A relatively small number of experiments have been conducted to test Janis’s theory, because the antecedent conditions thought to foster groupthink—such as high decision stress, strong group cohesiveness, and dominating leadership—are difficult to create effectively in laboratory settings (Aldag & Fuller, 1993). The studies that have been conducted have yielded mixed results in that high cohesiveness and strong leadership do not *necessarily* produce groupthink (Kerr & Tindale, 2004). Thus, the evidence on groupthink consists mostly of retrospective case studies of major decision-making fiascos (Eaton, 2001). In light of this situation, Janis’s model of groupthink should probably be characterized as an innovative, sophisticated, intuitively appealing theory that needs to be subjected to much more empirical study (Esser, 1998).

➤ REVIEW OF KEY POINTS

- People who help someone in need when they are alone are less likely to provide help when a group is present. This phenomenon, called the bystander effect, occurs primarily because a group creates diffusion of responsibility.
- Individuals’ productivity often declines in larger groups because of loss of coordination and because of social loafing. Social loafing seems to be due mostly to diffusion of responsibility and may be less prevalent in collectivist cultures.
- Group polarization occurs when discussion leads a group to shift toward a more extreme decision in the direction the group was already leaning. In groupthink, a cohesive group suspends critical judgment in a misguided effort to promote agreement in decision making.

> Reflecting on the Chapter's Themes

Our discussion of social psychology has provided a final embellishment on three of our seven unifying themes. One of these is the value of psychology's commitment to empiricism—that is, its reliance on systematic observation through research to arrive at conclusions. The second theme that stands out is the importance of cultural factors in shaping behavior, and the third is the extent to which people's experience of the world is highly subjective. Let's consider the virtues of empiricism first.

It's easy to question the need to do scientific research on social behavior, because studies in social psychology often seem to verify common sense. While most people wouldn't presume to devise their own theory of color vision, question the significance of REM sleep, or quibble about the principal causes of schizophrenia, everyone has beliefs about the nature of love, how to persuade others, and people's willingness to help in times of need. Thus, when studies demonstrate that credibility enhances persuasion, or that good looks facilitate attraction, it's tempting to conclude that social psychologists go to great lengths to document the obvious, and some critics say, "Why bother?"

You saw why in this chapter. Research in social psychology has repeatedly shown that the predictions of logic and common sense are often wrong. Consider just a few examples. Even psychiatric experts failed to predict the remarkable obedience to authority uncovered in Milgram's research. The bystander effect in helping behavior violates cold-blooded mathematical logic. Dissonance research has shown that after a severe initiation, the bigger

the letdown, the more favorable people's feelings are. These principles defy common sense. Thus, research on social behavior provides dramatic illustrations of why psychologists put their faith in empiricism.

Our coverage of social psychology also demonstrated once again that, cross-culturally, behavior is characterized by both variance and invariance. Thus, we saw substantial cultural differences in patterns of attribution, the role of romantic love in marriage, attitudes about conformity, the tendency to obey authority figures, and the likelihood of social loafing. Although basic social phenomena such as stereotyping, attraction, obedience, and conformity probably occur all over the world, cross-cultural studies of social behavior show that research findings based on American samples may not generalize precisely to other cultures.

Research in social psychology is also uniquely well suited for making the point that people's view of the world is highly personal and subjective. In this chapter we saw how physical appearance can color perception of a person's ability or personality, how social schemas can lead people to see what they expect to see in their interactions with others, how pressure to conform can make people begin to doubt their senses, and how groupthink can lead group members down a perilous path of shared illusions.

The subjectivity of social perception will surface once again in our Applications for the chapter. The Personal Application focuses on prejudice, a practical problem that social psychologists have shown great interest in, whereas the Critical Thinking Application examines aspects of social influence.



Empiricism



Cultural Heritage



Subjectivity of Experience

PERSONAL Application

Understanding Prejudice

Answer the following "true" or "false."

- ___ 1 Prejudice and discrimination amount to the same thing.
- ___ 2 Stereotypes are always negative or unflattering.
- ___ 3 Ethnic and racial groups are the only widespread targets of prejudice in modern society.

- ___ 4 People see members of their own in-group as being more alike than the members of outgroups.

James Byrd Jr., a 49-year-old black man, was walking home from a family gathering in the summer of 1998 when he was offered a ride by three white men, one of whom he

knew. Shortly thereafter, pieces of Byrd's savagely beaten body were found strewn along a rural road in Texas. Apparently, he had been beaten, then shackled by his ankles to the back of the truck and dragged to death over 2 miles of road. Police say that Byrd was targeted simply because he was black. Thankfully, such tragic events are relatively

rare in the United States. Nonetheless, they remind us that prejudice and discrimination still exist.

Prejudice is a major social problem. It harms victims' self-concepts, suppresses their potential, creates enormous stress in their lives, and promotes tension and strife between groups (Dion, 2003). The first step toward reducing prejudice is to understand its roots. Hence, in this Application, we'll try to achieve a better understanding of why prejudice is so common. Along the way, you'll learn the answers to the true-false questions at the beginning of this application.

Prejudice and discrimination are closely related concepts, and the terms have become nearly interchangeable in popular use. Social scientists, however, prefer to define their terms precisely, so let's clarify which is which.

Prejudice is a negative attitude held toward members of a group. Like many other attitudes, prejudice can include three components (see **Figure 16.21**): beliefs ("Indians are mostly alcoholics"), emotions ("I despise Jews"), and behavioral dispositions ("I wouldn't hire a Mexican"). Racial prejudice receives the lion's share of publicity, but prejudice is *not* limited to ethnic groups. Women, homosexuals, the aged, the dis-

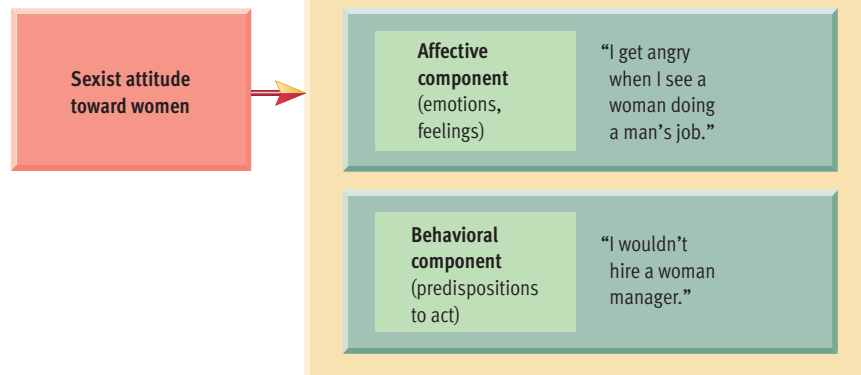


Figure 16.21

The three potential components of prejudice as an attitude. Attitudes can consist of up to three components. The tricomponent model of attitudes, applied to prejudice against women, would view sexism as negative beliefs about women (cognitive component) that lead to a feeling of dislike (affective component), which in turn leads to a readiness to discriminate against women (behavioral component).

abled, and the mentally ill are also targets of widespread prejudice. Thus, many people hold prejudicial attitudes toward one group or another, and many have been victims of prejudice.

Prejudice may lead to **discrimination, which involves behaving differently, usually unfairly, toward the members of a group.** Prejudice and discrimination tend to go hand in hand, but as LaPiere's (1934) pioneering study of discrimination in restaurant seating showed, attitudes and behavior do not necessarily correspond (Hogg & Abrams, 2003; see **Figure 16.22**). In our discussion, we'll concentrate primarily on the attitude of prejudice. Let's begin by looking at processes in person perception that promote prejudice.



Members of many types of groups are victims of prejudice. Besides racial minorities, others that have been stereotyped and discriminated against include gays and lesbians, women, the homeless, and those who are overweight.

Stereotyping and Subjectivity in Person Perception



Perhaps no factor plays a larger role in prejudice than **stereotypes**. That's not to say that stereotypes are inevitably negative. For instance, it's hardly insulting to assert that Americans are ambitious or that the Japanese are industrious. Unfortunately, many people do subscribe to derogatory stereotypes of various ethnic groups. Although studies suggest that negative racial stereotypes have diminished over the last 50 years,

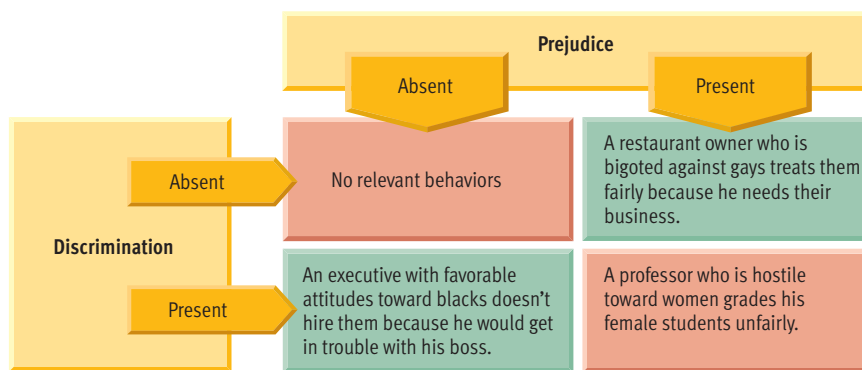


Figure 16.22

Relationship between prejudice and discrimination. As these examples show, prejudice can exist without discrimination and discrimination without prejudice. In the green cells, there is a disparity between attitude and behavior.

they're not a thing of the past (Madon et al., 2001; Mellor, 2003). According to a variety of investigators, modern racism has merely become more subtle (Devine, Plant, & Blair, 2001; Dovidio & Gaertner, 1999, 2000). Many people carefully avoid overt expressions of prejudicial attitudes but covertly continue to harbor negative views of racial minorities. These people endorse racial equality as an abstract principle but often oppose concrete programs intended to promote equality, on the grounds that discrimination is no longer a problem (Wright & Taylor, 2003). Recent studies suggest that modern sexism has become subtle in much the same way as racism (Swim & Campbell, 2001).

Research indicates that stereotypes are so pervasive and insidious they often operate automatically (Amodio et al., 2004; Fiske, 2000). Prejudicial stereotypes are highly accessible cognitive schemas that can be activated automatically, even in people who truly renounce prejudice. Thus, a man who rejects prejudice against homosexuals may still feel uncomfortable sitting next to a gay male on a bus, even though he regards his reaction as inappropriate.

Unfortunately, stereotypes are highly resistant to change. When people encounter members of a group that they view with prejudice who deviate from the stereotype of that group, they often discount this evidence by assuming that the atypical group members constitute a distinct subtype of that group, such as wealthy African Americans or conservative homosexuals (Kunda & Oleson, 1995,

1997). Consigning deviants to a subtype that is viewed as unrepresentative of the group allows people to preserve their stereotype of the group.

Stereotypes also persist because the *subjectivity* of person perception makes it likely that people will see what they expect to see when they actually come into contact with groups that they view with prejudice (Dunning & Sherman, 1997). For example, Duncan (1976) had white subjects watch and evaluate interaction on a TV monitor that was supposedly live (it was actually a videotape) and varied the race of a person who gets into an argument and gives another person a slight shove. The shove was coded as "violent behavior" by 73% of the subjects when the actor was black but by only 13%

of the subjects when the actor was white. As we've noted before, people's perceptions are highly subjective. Because of stereotypes, even "violence" may lie in the eye of the beholder.

Memory biases are also tilted in favor of confirming people's prejudices (Ybarra, Stephan, & Schaberg, 2000). For example, if a man believes that "women are not cut out for leadership roles," he may dwell with delight on his female supervisor's mistakes and quickly forget about her achievements. Thus, the *illusory correlation effect* can contribute to the maintenance of prejudicial stereotypes (Berndsen et al., 2002).

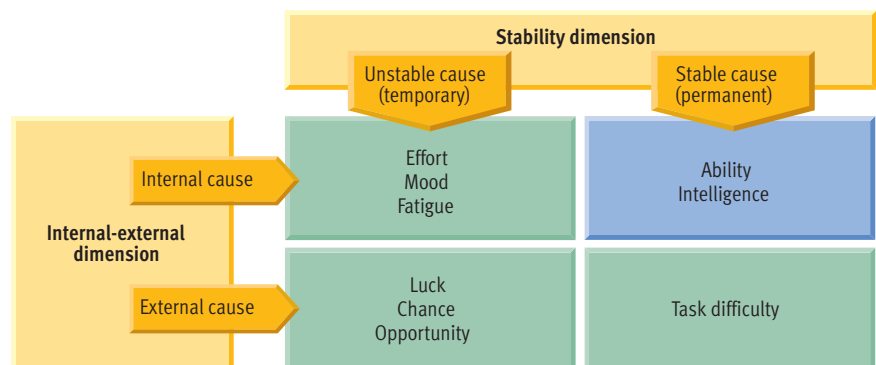
Biases in Attribution



Attribution processes can also help perpetuate stereotypes and prejudice (Maass, 1999). Research taking its cue from Weiner's (1980) model of attribution has shown that people often make *biased attributions for success and failure*. For example, men and women don't get equal credit for their successes (Swim & Sanna, 1996). Observers often discount a woman's success by attributing it to good luck, sheer effort, or the ease of the task (except on traditional feminine tasks). In comparison, a man's success is more likely to be attributed to his outstanding ability (see Figure 16.23). These biased patterns of attribution help sustain the stereotype that men are more competent than women. Similar patterns of bias have been seen in attri-

Figure 16.23

Bias in the attributions used to explain success and failure by men and women. Attributions about the two sexes often differ. For example, men's successes tend to be attributed to their ability and intelligence (blue cell), whereas women's successes tend to be attributed to hard work, good luck, or low task difficulty (green cells). These attributional biases help to perpetuate the belief that men are more competent than women.



butional explanations of ethnic minorities' successes and failures (Jackson, Sullivan, & Hodge, 1993; Kluegel, 1990). Generally, when minorities experience stereotype-inconsistent success, their success is discounted by attributing it to external factors or to unstable, internal causes.

Recall that the *fundamental attribution error* is a bias toward explaining events by pointing to the actor's personal characteristics as causes (internal attributions). Research suggests that people are particularly likely to make this error when evaluating targets of prejudice (Hewstone, 1990). Thus, when people take note of ethnic neighborhoods dominated by crime and poverty, the personal qualities of the residents are blamed for these problems, whereas other explanations emphasizing situational factors (job discrimination, poor police service, and so on) are downplayed or ignored. The old saying "They should be able to pull themselves up by their bootstraps" is a blanket dismissal of how situational factors may make it especially difficult for minorities to achieve upward mobility.

Defensive attribution, which involves unjustly blaming victims of misfortune for their adversity, can also contribute to prejudice. A prominent example in recent years has been the assertion by some people that homosexuals brought the AIDS crisis on themselves and so deserve their fate (Anderson, 1992). By blaming AIDS on gays' alleged character flaws, heterosexuals may be unknowingly seeking to reassure themselves that they're immune to a similar fate.

Forming and Preserving Prejudicial Attitudes



If prejudice is an attitude, where does it come from? Many prejudices appear to be handed down as a legacy from parents (Ponterotto & Pedersen, 1993). Prejudicial attitudes can be found in children as young as ages 4 or 5 (Aboud & Amato, 2001). Research suggests that parents' racial attitudes often influence their children's racial attitudes (Sinclair, Dunn, & Lowery, 2004). This transmission of prejudice across generations presumably

depends to some extent on *observational learning*. For example, if a young boy hears his father ridicule homosexuals, his exposure to his father's attitude is likely to affect his attitude about gays. If the young boy then goes to school and makes disparaging remarks about gays that are reinforced by approval from peers, his prejudice will be strengthened through *operant conditioning*. Of course, prejudicial attitudes are not acquired only through direct experience. Stereotypic portrayals of various groups in the media can also foster prejudicial attitudes (Herrett-Skjellum & Allen, 1996; Williams & Giles, 1998).

Competition Between Groups

One of the oldest and simplest explanations for prejudice is that competition between groups can fuel animosity. If two groups compete for scarce resources, such as good jobs and affordable housing, one group's gain is the other's loss. *Realistic group conflict theory* asserts that intergroup hostility and prejudice are a natural outgrowth of fierce competition between groups.

A classic study at Robbers' Cave State Park in Oklahoma provided support for this theory many years ago (Sherif et al., 1961). The subjects were 11-year-old white boys attending a three-week summer camp at the park, who did not know that the camp counselors were actually researchers (their parents knew). The boys were randomly assigned to one of two groups. During the first week, the boys got to know the other members of their own group through typical camp activities and developed a group identity, choosing to call themselves the Rattlers and the Eagles. In the second week, the Rattlers and Eagles were put into a series of competitive situations, such as a football game, a treasure hunt, and a tug of war, with trophies and other prizes at stake. As predicted by realistic group conflict theory, hostile feelings quickly erupted between the two groups, as food fights broke out in the mess hall, cabins were ransacked, and group flags were burned.

If competition between innocent groups of children pursuing trivial prizes can foster hostility, you can imagine what is likely to

happen when adults from very different backgrounds battle for genuinely important resources. Research has repeatedly shown that conflict over scarce resources can fuel prejudice and discrimination (Bourhis & Gagnon, 2001). Even the mere *perception* of competition can breed prejudice (Zarate et al., 2004).

Dividing the World into Ingroups and Outgroups



As noted in the main body of the chapter, when people join together in groups, they sometimes divide the social world into "us versus them," or *ingroups versus outgroups*. As you might anticipate, people tend to evaluate outgroup members less favorably than ingroup members (Krueger, 1996; Reynolds, Turner, & Haslam, 2000). People also tend to think simplistically about outgroups. They tend to see diversity among the members of their own group but to overestimate the homogeneity of the outgroup (Oakes, 2001). At a simple, concrete level, the essence of this process is captured by the statement "They all look alike." The illusion of homogeneity in the outgroup makes it easier to sustain stereotypic beliefs about its members (Rothbart, 2001). This point disposes of our last unanswered question from the list that opened the Application. Just in case you missed one of the answers, the statements were all false.

Threats to Social Identity

According to the *social identity perspective*, self-esteem depends on both one's *personal* identity and one's *social* identity (Tajfel & Turner, 1979; Turner et al., 1987). *Social identity* refers to the pride individuals derive from their membership in various groups, such as ethnic groups, religious denominations, occupational groups, neighborhoods, country clubs, and so forth. The theory further proposes that self-esteem can be undermined by either threats to personal identity (you didn't get called for that job interview) or social identity (your football team loses a big game). Threats to both personal and so-

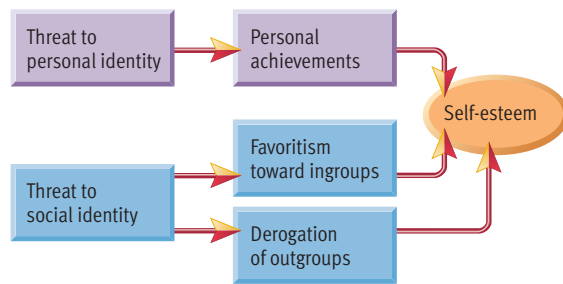


Figure 16.24
Threats to social identity and prejudice. According to Tajfel (1982) and Turner (1987), individuals have both a personal identity (based on a unique sense of self) and a social identity (based on group memberships). When social identity is threatened, people are motivated to restore self-esteem by either showing favoritism to ingroup members or derogating members of outgroups. These tactics contribute to prejudice and discrimination. (Adapted from Brehm & Kassin, 1993)

cial identity may motivate efforts to restore self-esteem, but threats to social identity are more likely to provoke responses that foster prejudice and discrimination.

When social identity is threatened, individuals may react in two key ways to bolster it (see **Figure 16.24**). One common response is to show *ingroup favoritism*—for example, tapping an ingroup member for a job opening or rating the performance of an ingroup member higher than that of an outgroup member (Capozza & Brown, 2000). A second common reaction is to engage in *outgroup derogation*—in other words, to “trash” outgroups that are perceived as threatening. Outgroup derogation is more likely when people identify especially strongly with the threatened ingroup (Levin et al, 2003; Schmitt

& Maes, 2002). When people derogate an outgroup, they tend to feel superior as a result, and this feeling helps affirm their self-worth (Fein & Spencer, 1997). These unfortunate reactions are *not* inevitable, but threats to social identity represent yet another dynamic process that can foster prejudice (Turner & Reynolds, 2001).

Our discussion has shown that a plethora of processes conspire to create and maintain personal prejudices against a diverse array of outgroups. Most of the factors at work reflect normal, routine processes in social behavior. Thus, it is understandable that most people—whether privileged or underprivileged, minority members or majority members—probably harbor some prejudicial atti-

tudes. Our analysis of the causes of prejudice may have permitted you to identify prejudices of your own or their sources. Perhaps it’s wishful thinking on my part, but an enhanced awareness of your personal prejudices may help you become a little more tolerant of the endless diversity seen in human behavior. If so, that alone would mean that my efforts in writing this book have been amply rewarded.

➤ REVIEW OF KEY POINTS

- Prejudice is supported by selectivity and memory biases in person perception and stereotyping. Stereotypes are highly resistant to change.
- Attributional biases, such as the tendency to assume that others’ behavior reflects their dispositions, can contribute to prejudice. The tendency to attribute others’ failures to personal factors and the tendency to derogate victims can also foster prejudice.
- Negative attitudes about groups are often acquired through observational learning and strengthened through operant conditioning. Realistic group conflict theory posits that competition between groups fosters prejudice.
- The propensity to see outgroups as homogenous serves to strengthen prejudice. Threats to social identity can lead to ingroup favoritism and outgroup derogation.

CRITICAL THINKING Application

Whom Can You Trust? Analyzing Credibility and Influence Tactics

You can run, but you cannot hide. This statement aptly sums up the situation that exists when it comes to persuasion and social influence. There is no way to successfully evade the constant, pervasive, omnipresent efforts of others to shape your attitudes and behavior. In this Application we will address two topics that can enhance your resistance to manipulation. First, we will outline some ideas that can be useful in evaluating the credibility of a persuasive source. Second, we will describe some widely used social influence strategies that it pays to know about.

Evaluating Credibility

The salesperson at your local health food store swears that a specific herb combination improves memory and helps people stay healthy. A popular singer touts a psychic hotline, where the operators can “really help” with the important questions in life. Speakers at a “historical society” meeting claim that the Holocaust never happened. These are just a few real-life examples of how people are always attempting to persuade the public to believe something. In these examples, the “something” people are expected to believe runs counter to the conventional or scientific view, but who is to say who is right? After all, people are entitled to their own opinions, aren’t they?

Yes, people *are* entitled to their own opinions, but that does not mean that all opinions are equally valid. Some opinions are just plain wrong, and others are highly dubious. Every person is not equally believable. In deciding what to believe, it is important to carefully examine the evidence presented and the logic of the argument that supports the conclusion (see the Critical Thinking Application for Chapter 10). You also need to decide *whom* to believe, a task that requires assessing the *credibility* of the source of the

information. Following are a few questions that can provide guidance in this decision-making process.

Does the source have a vested interest in the issue at hand? If the source is likely to benefit in some way from convincing you of something, you need to take a skeptical attitude. In the examples provided here, it is easy to see how the sales clerk and popular singer will benefit if you buy the products they are selling, but what about the so-called historical society? How would members benefit by convincing large numbers of people that the Holocaust never happened? Like the sales clerk and singer, they are also selling something, in this case a particular view of history that they hope will influence future events in certain ways. Someone does *not* have to have a financial gain at stake to have a vested interest in an issue. Of course, the fact that these sources have a vested interest does not necessarily mean that the information they are providing is false or that their arguments are invalid. But a source’s credibility does need to be evaluated with extra caution when the person or group has something to gain.

What are the source’s credentials? Does the person have any special training, an advanced degree, or any other basis for claiming special knowledge about the topic? The usual training for a sales clerk or singer does not include how to assess research results in medical journals or claims of psychic powers. The Holocaust deniers are more difficult to evaluate. Some of them have studied history and written books on the topic, but the books are mostly self-published and few of these “experts” hold positions at reputable universities where scholars are subject to peer evaluation. That’s *not* to say that legitimate credentials ensure a source’s credibility. A number of popular diets that are widely regarded by nutritional experts as worthless, if not hazardous, have been created and mar-

keted by genuine physicians (Drewnowski, 1995; Dwyer, 1995). Of course, these physicians have a *vested interest* in the diets, as they have made millions of dollars from them.

Is the information grossly inconsistent with the conventional view on the issue? Just being different from the mainstream view certainly does *not* make a conclusion wrong. But claims that vary radically from most other information on a subject should raise a red flag that leads to careful scrutiny. Bear in mind that charlatans and hucksters are often successful because they typically try to persuade people to believe things that they want to believe. Wouldn’t it be great if we could effortlessly enhance our memory, foretell the future, eat all we want and still lose weight, and earn hundreds of dollars per hour working at home? And wouldn’t it be nice if the Holocaust never happened? It pays to be wary of wishful thinking.

What was the method of analysis used in reaching the conclusion? The purveyors of miracle cures and psychic advice inevitably rely on anecdotal evidence. But you have already learned about the perils and unreliability of anecdotal evidence (see Chapter 2). One method frequently used by charlatans is to undermine the credibility of conventional information by focusing on trivial inconsistencies. This is one of the many strategies used by the people who argue that the Holocaust never occurred. They question the credibility of thousands of historical documents, photographs, and artifacts, and the testimony of countless people, by highlighting small inconsistencies among historical records relating to trivial matters, such as the number of people transported to a concentration camp in a specific week, or the number of bodies that could be disposed of in a single day (Shermer, 1997). Some inconsistencies are exactly what one should expect based on piecing together multiple accounts

from sources working with different portions of incomplete information. But the strategy of focusing on trivial inconsistencies is a standard method for raising doubts about credible information. For example, this strategy was used brilliantly by the defense attorneys in the O. J. Simpson murder trial.

Recognizing Social Influence Strategies

It pays to understand social influence strategies because advertisers, salespeople, and fundraisers—not to mention our friends and neighbors—frequently rely on them to manipulate our behavior. Let's look at four basic strategies: the foot-in-the-door technique, misuse of the reciprocity norm, the lowball technique, and feigned scarcity.

Door-to-door salespeople have long recognized the importance of gaining a *little* cooperation from sales targets (getting a “foot in the door”) before hitting them with the real sales pitch. **The foot-in-the-door technique involves getting people to agree to a small request to increase the chances that they will agree to a larger request later.** This technique is widely used in all walks of life. For example, groups seeking donations often ask people to simply sign a petition first.

In an early study of the foot-in-the-door technique (Freedman & Fraser, 1966), the large request involved asking homemakers whether a team of six men doing consumer research could come into their home to classify *all* their household products. Only 22% of the control subjects agreed to this outlandish request. However, when the same request was made three days after a small request (to answer a few questions about soap preferences), 53% of the participants agreed to the large request. Why does the foot-in-the-door technique work? According to Burger (1999), quite a variety of processes contribute to its effectiveness, including people's tendency to try to behave consistently (with their initial response) and their reluctance to renege on their sense of commitment to the person who made the initial request.

Most of us have been socialized to believe in the **reciprocity norm—the rule that we**

should pay back in kind what we receive from others. Robert Cialdini (2001) has written extensively about how the reciprocity norm is used in social influence efforts. For example, groups seeking donations routinely send address labels, key rings, and other small gifts with their pleas. Salespeople using the reciprocity principle distribute free samples to prospective customers. When they return a few days later, most of the customers feel obligated to buy some of their products. The reciprocity rule is meant to promote fair exchanges in social interactions. However, when people manipulate the reciprocity norm, they usually give something of minimal value in the hopes of getting far more in return (Howard, 1995).

The lowball technique is even more deceptive. The name for this technique derives from a common practice in automobile sales, in which a customer is offered a terrific bargain on a car. The bargain price gets the customer to commit to buying the car. Soon after this commitment is made, however, the dealer starts revealing some hidden costs. Typically, the customer learns that options assumed to be included in the original price are actually going to cost extra, or that a promised low loan rate has “fallen through” leading to a higher car payment. Once they have committed to buying a car, most customers are unlikely to cancel the deal. Thus, **the lowball technique involves getting someone to commit to an attractive proposition before its hidden costs are revealed.** Car dealers aren't the only ones who use this technique. For instance, a friend might ask whether you want to spend a week with him at his charming backwoods cabin. After



Advertisers often try to artificially create scarcity to make their products seem more desirable.

you accept this seemingly generous proposition, he may add, “Of course there's some work for us to do. We need to repair the pier, paint the exterior, and . . .” Lowballing is a surprisingly effective strategy (Cialdini & Trost, 1998).

A number of years ago, Jack Brehm (1966) demonstrated that telling people they can't have something only makes them want it more. This phenomenon helps explain why companies often try to create the impression that their products are in scarce supply. Scarcity threatens your freedom to choose a product, thus creating an increased desire for the scarce commodity. Advertisers frequently feign scarcity to drive up the demand for products. Thus, we constantly see ads that scream “limited supply available,” “for a limited time only,” “while they last,” and “time is running out.” Like genuine scarcity, feigned scarcity *can* enhance the desirability of a commodity (Highhouse et al., 1998; Lynn, 1992).

Table 16.1 Critical Thinking Skills Discussed in This Application

Skill	Description
Judging the credibility of an information source	The critical thinker understands that credibility and bias are central to determining the quality of information and looks at factors such as vested interests, credentials, and appropriate expertise.
Recognizing social influence strategies	The critical thinker is aware of manipulative tactics such as the foot-in-the-door and lowball techniques, misuse of the reciprocity norm, and feigned scarcity.

CHAPTER 16 *Recap*

Key Ideas

Person Perception: Forming Impressions of Others

- People tend to attribute desirable characteristics to those who are good looking. Perceptions of people are also influenced by their style of nonverbal expressiveness.
- Stereotypes are widely held social schemas that lead people to expect that others will have certain characteristics because of their membership in a specific group. In interacting with others, stereotypes may lead people to see what they expect to see and to overestimate how often they see it.

Attribution Processes: Explaining Behavior

- Internal attributions ascribe behavior to personal traits, whereas external attributions locate the cause of behavior in the environment. Weiner's model proposes that attributions for success and failure be analyzed in terms of the stability of causes as well as along the internal-external dimension.
- Observers favor internal attributions to explain another's behavior (the fundamental attribution error), while actors favor external attributions to explain their own behavior. Cultures vary in their emphasis on individualism as opposed to collectivism, and these differences appear to influence attributional tendencies.

Close Relationships: Liking and Loving

- People tend to like and love others who are similar, who reciprocate expressions of affection, and who are physically attractive. In intimate relationships, romantic ideals influence the progress of relationships.
- Berscheid and Hatfield have distinguished between passionate and companionate love. Sternberg builds on their distinction by dividing companionate love into intimacy and commitment. Hazan and Shaver's theory suggests that love relationships in adulthood mimic attachment patterns in infancy.
- The characteristics that people seek in prospective mates are much the same around the world. However, cultures vary considerably in their emphasis on passionate love as a prerequisite for marriage.
- According to evolutionary psychologists, certain aspects of good looks influence attraction because they are indicators of reproductive fitness. Consistent with evolutionary theory, gender differences in mating preferences appear to transcend culture. People's courtship tactics vary by sex in ways that make evolutionary sense. These tactics may include deception. Mate poaching is common and appears to be universal across cultures.

Attitudes: Making Social Judgments

- Attitudes may be made up of cognitive, affective, and behavioral components. Attitudes vary in strength, accessibility, and ambivalence. Attitudes and behavior aren't as consistent as one might assume.
- A source of persuasion who is credible, expert, trustworthy, likable, and physically attractive tends to be relatively effective. Two-sided arguments, repetition, and fear arousal are effective elements in persuasive messages.
- Attitudes may be shaped through classical conditioning, operant conditioning, and observational learning. Festinger's dissonance theory asserts that inconsistent attitudes cause tension and that people alter their attitudes to reduce cognitive dissonance.
- Self-perception theory posits that people may infer their attitudes from their behavior. The elaboration likelihood model of persuasion holds that the central route to persuasion tends to yield longer-lasting attitude change than the peripheral route.

Conformity and Obedience: Yielding to Others

- Asch found that conformity becomes more likely as group size increases, up to a group size of four, and then levels off. If a small group isn't unanimous, conformity declines rapidly.
- In Milgram's study of obedience, subjects showed a remarkable tendency to follow orders to shock an innocent stranger. The generalizability of Milgram's findings has stood the test of time, but his work also helped to stimulate stricter ethical standards for research.
- The Asch and Milgram experiments have been replicated in many cultures. These replications have uncovered modest cultural variations in the propensity to conform or to obey an authority figure.
- The Stanford Prison Simulation demonstrated that social roles and other situational pressures can exert tremendous influence over social behavior.

Like Milgram, Zimbardo showed that situational forces can lead normal people to exhibit surprisingly callous, abusive behavior.

Behavior in Groups: Joining with Others

- The bystander effect occurs primarily because a group creates diffusion of responsibility. Individuals' productivity often declines in larger groups because of loss of coordination and because of social loafing.
- Group polarization occurs when discussion leads a group to shift toward a more extreme decision in the direction the group was already leaning. In groupthink, a cohesive group suspends critical judgment in a misguided effort to promote agreement in decision making.

Reflecting on the Chapter's Themes

- Our study of social psychology illustrated the value of empiricism, the cultural limits of research based on American samples, and the subjectivity of perception.

PERSONAL APPLICATION • Understanding Prejudice

- Prejudice is supported by selectivity and memory biases in person perception and stereotyping. Stereotypes are highly resistant to change. Attributional biases, such as the tendency to assume that others' behavior reflects their dispositions, can contribute to prejudice.
- Negative attitudes about groups are often acquired through observational learning and strengthened through operant conditioning. Realistic group conflict theory posits that competition between groups fosters prejudice. The propensity to see outgroups as homogenous serves to strengthen prejudice. Threats to social identity can lead to ingroup favoritism and outgroup derogation.

CRITICAL THINKING APPLICATION • Whom Can You Trust? Analyzing Credibility and Influence Tactics

- Useful criteria in judging credibility include whether a source has vested interests or appropriate credentials. One should also consider the method of analysis used in reaching conclusions and why information might not coincide with conventional wisdom.
- To resist manipulative efforts, it helps to be aware of social influence tactics, such as the foot-in-the-door technique, misuse of the reciprocity norm, the lowball technique, and feigned scarcity.

Key Terms

Attitudes (p. 649)
Attributions (p. 637)
Bystander effect (p. 663)
Channel (p. 651)
Cognitive dissonance (p. 654)
Collectivism (p. 641)
Commitment (p. 644)
Companionate love (p. 644)
Conformity (p. 656)
Defensive attribution (p. 640)
Discrimination (p. 668)
External attributions (p. 638)
Foot-in-the-door technique (p. 673)
Fundamental attribution error (pp. 638–639)
Group (p. 662)
Group cohesiveness (p. 666)
Group polarization (p. 665)
Groupthink (p. 665)
Illusory correlation (p. 636)
Individualism (p. 641)
Ingroup (p. 637)
Internal attributions (p. 638)
Interpersonal attraction (p. 642)
Intimacy (p. 644)
Lowball technique (p. 673)
Matching hypothesis (p. 643)
Message (p. 651)

Obedience (p. 657)
Outgroup (p. 637)
Passionate love (p. 644)
Person perception (p. 634)
Prejudice (p. 668)
Receiver (p. 651)
Reciprocity (p. 644)
Reciprocity norm (p. 673)
Self-serving bias (p. 640)
Social loafing (p. 664)
Social psychology (p. 633)
Social roles (p. 661)
Social schemas (p. 635)
Source (p. 651)
Stereotypes (p. 635)

Key People

Solomon Asch (pp. 656–657)
Ellen Berscheid (p. 644)
David Buss (pp. 646–648)
Leon Festinger (p. 654)
Elaine Hatfield (p. 644)
Cindy Hazan and Philip Shaver (pp. 645–646)
Fritz Heider (p. 638)
Irving Janis (pp. 665–666)
Stanley Milgram (pp. 657–660)
Bernard Weiner (p. 638)
Philip Zimbardo (pp. 660–662)

CHAPTER 16 Practice Test

1. Stereotypes are:
 - A. special types of schemas that are part of people's shared cultural background.
 - B. widely held beliefs that people have certain characteristics because of their membership in a particular group.
 - C. equivalent to prejudice.
 - D. both a and b.
2. You believe that short men have a tendency to be insecure. The concept of illusory correlation implies that you will:
 - A. overestimate how often short men are insecure.
 - B. underestimate how often short men are insecure.
 - C. overestimate the frequency of short men in the population.
 - D. falsely assume that shortness in men causes insecurity.
3. A father suggests that his son's low marks in school are due to the child's laziness. The father has made a (an) _____ attribution.
 - A. external
 - B. internal
 - C. situational
 - D. high consensus
4. Bob explains his failing grade on a term paper by saying that he really didn't work very hard at it. According to Weiner's model, Bob is making an _____ attribution about his failure.
 - A. internal-stable
 - B. internal-unstable
 - C. external-stable
 - D. external-unstable
5. The fundamental attribution error refers to the tendency of:
 - A. observers to favor external attributions in explaining the behavior of others.
 - B. observers to favor internal attributions in explaining the behavior of others.
 - C. actors to favor external attributions in explaining the behavior of others.
 - D. actors to favor situational attributions in explaining the behavior of others.
6. According to Hazan and Shaver (1987):
 - A. romantic relationships in adulthood follow the same form as attachment relationships in infancy.
 - B. those who had ambivalent attachments in infancy are doomed never to fall in love as adults.
 - C. those who had avoidant attachments in infancy often overcompensate by becoming excessively intimate in their adult love relationships.
 - D. all of the above are the case.
7. Cross-cultural similarities are most likely to be found in which of the following areas?
 - A. what people look for in prospective mates
 - B. the overall value of romantic love
 - C. passionate love as a prerequisite for marriage
 - D. the tradition of prearranged marriages
8. Cognitive dissonance theory predicts that after people engage in counterattitudinal behavior, they will:
 - A. convince themselves they really didn't perform the behavior.
 - B. change their attitude to make it more consistent with their behavior.
 - C. change their attitude to make it less consistent with their behavior.
 - D. do nothing.
9. "I always choose romance novels rather than biographies. I guess I must like romance novels better." This thought process illustrates the premise of _____ theory.
 - A. cognitive dissonance
 - B. learning
 - C. evolutionary
 - D. self-perception
10. The elaboration likelihood model of attitude change suggests that:
 - A. the peripheral route results in more enduring attitude change.
 - B. the central route results in more enduring attitude change.
 - C. only the central route to persuasion can be effective.
 - D. only the peripheral route to persuasion can be effective.
11. The results of Milgram's (1963) study imply that:
 - A. in the real world, most people will refuse to follow orders to inflict harm on a stranger.
 - B. many people will obey an authority figure even if innocent people get hurt.
 - C. most people are willing to give obviously wrong answers when ordered to do so.
 - D. most people stick to their own judgment, even when group members unanimously disagree.
12. According to Latané (1981), social loafing is due to:
 - A. social norms that stress the importance of positive interactions among group members.
 - B. duplication of effort among group members.
 - C. diffusion of responsibility in groups.
 - D. a bias toward making internal attributions about the behavior of others.
13. Groupthink occurs when members of a cohesive group:
 - A. are initially unanimous about an issue.
 - B. stress the importance of caution in group decision making.
 - C. emphasize concurrence at the expense of critical thinking in arriving at a decision.
 - D. shift toward a less extreme position after group discussion.
14. Discrimination:
 - A. refers to a negative attitude toward members of a group.
 - B. refers to unfair behavior toward the members of a group.
 - C. is the same thing as prejudice.
 - D. is all of the above.
15. The foot-in-the-door technique involves asking people to agree to a _____ request first to increase the likelihood that they will comply with a _____ request later.
 - A. large; small
 - B. small; large
 - C. large; large
 - D. large; larger

11 B pp. 635-638	10 B pp. 655-656	5 B pp. 638-639
12 A p. 636	9 D p. 655	4 B pp. 638-639
13 C p. 664	8 B pp. 654-655	3 B p. 638
14 C p. 664	7 A pp. 646-647	2 A p. 636
15 B pp. 658-659	6 A pp. 645-646	1 D p. 635

Answers

PsykJTrek

Go to the PsykJTrek website or CD-ROM for further study of the concepts in this chapter. Both online and on the CD-ROM, PsykJTrek includes dozens of learning modules with videos, animations, and quizzes, as well as simulations of psychological phenomena and a multimedia glossary that includes word pronunciations.



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