

# **“A” Level Sociology**

## **A Resource-Based Learning Approach**

### **Module One: Theory and Methods**

### **Unit M12b: Is Science Scientific(2)?**

**These Notes have been designed to provide you with a knowledge and understanding of the following syllabus area:**

"Examine the nature of science and consider the extent to which sociology may be regarded as scientific".

**The Aims of these Notes are to help you to understand:**

1. The relationship between theory and empirical knowledge.
2. The social context of science.

**The Objectives of these Notes are to help you to understand:**

1. The idea that all observation is theory-dependent.
2. The extent to which a positivist methodology is characteristic of Natural science.
3. The concept of science considered as an ideology.
4. The relationship between science and values.
5. The Realist view of science.

### The Social Context of Science.

In the second part of these Notes we can develop the idea that, whilst "practical demonstrations" of the fact that there is all-too-frequently a **discrepancy** between **reconstructed logics** and **logics-in-use** are important, we need to also understand the basis upon which scientists make their (**frequently subjective**) **interpretations** in the course of their everyday work. To explore this in more detail, we need to understand **two related ideas**:

- **The relationship between theory and observation..**
- **The organisation of knowledge in society.**

We have started to approach this when we referred to the idea of "**science as ideology**" and we can develop this in relation to the concept of "**ideological frameworks**" or "**paradigms**" (pronounced "**para dimes**").

In this respect, for knowledge to exist we have to make **logical connections between ideas** (which, in a nutshell, is the task of **theory**) and, once we do this, we start to **organise knowledge** into an **ideological framework** - a **pattern of ideas** that specifies how various bits and pieces of knowledge relate to one another.

A classic **example** of this might be the idea of "**cause and effect**". In this instance, the relationship between our observations and the framework into which they can be organised is specified by the idea that one phenomenon is the cause of another phenomenon.

To begin with, therefore, let's look at each of the two points noted above in turn:

#### **The relationship between theory and observation:**

As we have repeatedly seen, **positivist empiricism** stresses the idea that knowledge can only be built-up from what we can **observe** through our **senses** and, in this respect, our "**sensory perception**" is held to be more **objective** than other forms of evidence (such as taking things on **trust**, or having **faith** in the truth of something).

**Observation**, therefore, is considered to be the fundamental basis for the construction of **scientific knowledge** since it is the means whereby:

- a. We identify the factors / variables involved in any relationship we wish to explain and,
- b. We confirm / refute the validity of the explanations we produce to explain various theoretical relationships.

<p><b>Question:</b> Briefly define the term "<b>positivist empiricism</b>".</p>
---

In this respect, **Natural science** proceeds on the **assumption** that **natural phenomena** are **governed** by various **laws** and, on this basis, the **task of science** is "simply" that of "opening the shutters" that blind us to the truth. The ability to **discover fundamental truths** about the natural world is **central** to Natural science and it represents a **cornerstone** of the idea that it is **possible** (and **desirable**) for **science** to **separate objective truth** from **subjective opinion**.

However, scientists (both Natural and Social) are not simply engaged in work that is divorced from the social world in which they live and in which scientific knowledge is produced.

"**Doing science**" is **not** something that takes place in an **asocial context** (that is, a **context** that is somehow **divorced** from the **wider world** of norms, values, ideologies, power relationships and so forth). **Scientists** are people who are involved in a particular (albeit very important) **social activity** and, as we need to be aware, any form of social activity involves such things as **norms, values, ideologies** and **power relationships**...

If we think about this for a moment, two things should be evident:

- **Firstly**, when we look at something (like a tree, an elephant, an atom or a particular form of deviance) it is evident that in order to **understand** what we **observe** we have to **already have some idea** (or concept) about **what it is we are observing**. For example, if I say to you,

"Look at the tree",

you must **understand what a tree looks like** and how it differs from, for example, an elephant. In order to "**see**" a tree as a "tree" (that is, to produce some form of **common meaning** for the **label**), you need to have made a **logical connection** between various ideas:

- a tree has a trunk.
- a tree has branches.
- a tree has leaves...

In short, you have to hold, in your mind, a **theory** about **what a tree looks like before** you can "**see**" it as a **tree** (as opposed to an elephant which, whilst it has a trunk, does not have branches and leaves - unless it is a camouflaged elephant that is trying to hide from you...).

**Polyani** (" Personal Knowledge", 1958) expresses the above idea in the statement,

"**All observation is theory-dependent**",

This means that in order to **understand what we are seeing** we must, by definition, **already possess a theory** that **describes** it. In this respect, the development of a **theory** not only **precedes**, logically, any **observation** we are able to make (which is significant enough), **theory and observation are inter-dependent** - we **cannot have one without the other**...

This idea has important ramifications for (positivist) methodology since, if you remember the work we did on the "**Hypothetico-Deductive**" model of science, **Popper** argued that we must **use observation to test** any **theory** we develop - which **implies** that **theory** can be **separated** from **observation**.

What **Polyani** (amongst others) is arguing is that **this is not logically possible**, since any **observations** we make can only be **understood** in terms of the **theoretical context that produces them**. In effect, doubt is being cast on the ability to construct scientific knowledge on the basis of this (positivist).

In Part a of these Notes, I raised the question of whether it was the **methodology** or the **subject matter** of the Natural sciences that allowed **scientists** to produce **valid, verifiable, predictive, knowledge** and, if you think about the **implications** of the above, it appears evident that a **positivist methodology cannot**, by definition, **produce scientific knowledge**.

Rather, **because the subject matter of the Natural sciences does not have consciousness** it **simply appears** that such a **methodology** allows scientists to produce valid knowledge.

- We can **conclude** from this that a positivist methodology is **not appropriate** for either the Natural or Social sciences (and especially not the latter where the subject matter has consciousness).
- **Secondly, the social context of knowledge:**

Any **theory** we develop must have a **social context** since it is something we must have **learned** (and all learning, by definition, has a social context). We can think about the "**social context of science**" in the following terms:

a. As we have just seen, the **interpretation** of what we **see (observe)** is **always based on theories** that **we already hold** and such **theories** must, by definition, **reflect the current levels of knowledge existing in any society** at any given moment in their historical development. **Theories**, in effect, must **develop** out of the **social context** in which **knowledge** is **produced** in any society.

**Interactionist sociologists** have frequently highlighted a similar idea when they claim that **how we define a situation** affects the way we **observe** and **interpret** that situation.

**Question:**

**How is the concept of "definition of a situation" similar to Polyani's point that all observation is theory dependent.**

If this idea is valid, then it follows that **science is not simply** about the "**objective observation of facts**", as such, but about the "**subjective interpretations of the meanings of our observations**" within any given social context. As the philosopher of science **Thomas Kuhn** has argued ("The Structure of Scientific Revolutions", 1962), the **production of knowledge** (be it "scientific" or otherwise) is always **influenced** by such things as **fashions** and **trends**, by **politics** and, most importantly, by **power**. In this respect, **scientists** make (**subjective**) **choices** about **what should and should not be studied, what constitutes valid knowledge, how it is permissible to study the world** and so forth.

To **paraphrase** Max **Weber**, the **logic** of **Kuhn's** argument is that:

- a. The **selection of topics** to study (such as the decision to build more destructive missiles rather than put resources into a cure for Aids) and,
- b. The "**right and proper**" way to produce scientific knowledge,

is **always based** on a **researcher's personal and ethical values**.

As **Weber** notes, **knowledge** in any society is **based** upon the idea of "**what is worthy of being known**" by people in that society, rather than upon some sort of objective uncovering of fundamental truths.

It is not just a "**scientific community**" that **organises knowledge** ("**what is worthy of being known by scientists**") in this way. All "communities" attempt to organise knowledge for their members in terms of a precise and specific "**world view**" (an idea that **Weber** referred-to as a "**Weltanschauung**" - probably because he was German and liked to write in his own language...).

**Christian Fundamentalists**, for example, have a very **specific world view** regarding the development of human beings in relation to "God" - one that is very **different** from the **world view** employed by **modern Western science**.

**Each "scientific community"** organises knowledge for its members in particular ways and this **organisation** itself (the "**social context**" of **knowledge**) is responsible for the way different people **observe** and **interpret** the world.

The organisation of knowledge, for example, may be such as to completely "block out" (treat as **invalid**) any observations / theories that **contradict** the "accepted view" of the natural and / or social world.

For **Kuhn**, therefore, the **social context within which knowledge is produced** (or, as he puts it, the particular **paradigm / ideological framework** within which a scientist works) is the **most important factor** in determining of the sort of **knowledge** that is **produced** by **scientists**. We can demonstrate this idea by a very simple **example**:

If you were living in England in the 11th century (at the time of William the Conqueror for example), your "scientific knowledge" about the world would have told you it was flat. "Science" (in the shape of religious truth) would have "proved" this to you and people's behaviour would reflect this fundamental truth.

However, since you are living in the 20th century, your "scientific knowledge" about the world now tells you that it is round. Science has "proved" this to you.

The **point** of this example is **not** to demonstrate the **superiority** of **modern science** (the best we can actually say is that the latter observation about the shape of the world is "**more plausible**" than the former); rather, it shows how "**scientific knowledge**" can be **shaped** by the **social context** within which that knowledge is produced.

Whilst few people in England would argue with this particular piece of scientific knowledge, this is not to say that fierce **arguments** do not **rage** within the Natural and Social sciences about **what constitutes valid knowledge** about the world.

### The Scientific Ethos

In the next section we are going to look at some aspects of what Robert Merton has called the "**scientific ethos**" (that's why I've used the sub-heading "The Scientific Ethos").

As we have seen, the "**common core of shared values**" apparently **possessed** by the **scientific community** is an important element in:

- **Paradigm creation and maintenance.**
- **Theory testing and falsification.**
- **Controlling the behaviour of scientists** in relation to the **production of valid knowledge.**

Given the underlying theme of these Notes (a critical evaluation of the extent to which Natural scientists actually do what they claim to do when they attempt to produce knowledge), we need to **examine the concept** of a "**scientific ethos**" in a little more detail.

As we have seen, according to **Merton**, a **scientific ethos** is **functional** to both **scientists** and "**society as a whole**". The **question** here, however, is that of how we might **test** this idea - is a scientific ethos functional to both groups or, as we might expect, **only** to the group around which such an ideology develops?

While **Merton's** elaboration of a **scientific ethos** probably **describes** the **scientific process** quite **accurately** in terms of the **accepted ideological framework / paradigm of Western science**, a major **problem** here is that **orthodox science** (scientific work / theory that is accepted as the norm for science) is frequently **confronted** with **theories** that **fall so far outside the generally accepted or orthodox scientific paradigm that they are not treated in accordance with the principles involved in this scientific ethos.**

The point to note here is that frequently theories which arise **outside** the **accepted norm** tend to be treated as **not being worthy of serious consideration**. An example here might be the so-called "**Velikovsky Affair**".

In 1950, **Velikovsky** published a book, called "**Worlds In Collision**", that **challenged the orthodox scientific consensus** relating to **evolution** and **natural development**. Velikovsky's book was, to say the least, highly **speculative** (it involved the use of **literal interpretations of Biblical evidence** - **reinterpreting** such events in terms of **unexplained natural disasters**). It did, however, **broadly conform** to the kind of **scientific ethos** described by **Merton** insofar as **Velikovsky** attempted to present his work for **evaluation / criticism** by his **scientific peers**. **Organised science**, however, **failed to respond** to Velikovsky's challenge...

In place of "**organised scepticism**", **Velikovsky** received **critical abuse** and **no attempt** was made by the scientific community to **refute** Velikovsky's arguments scientifically. Velikovsky's work seems to have fallen so far outside the accepted **evolutionary paradigm of orthodox science** that it **did not qualify for rational consideration**.

The point here is not that Velikovsky was somehow right in what he was saying (along with numerous other writers - **Von Daniken** is a prime example - Velikovsky's ideas do not stand-up to rational examination).

Rather, the important **point** is that we cannot, as scientists, know what is "valid" or "invalid" **without** going through the scientific **evaluation process**. If some theories are considered to be **inherently wrong or misconceived** - because they **fall so far outside what we currently accept as valid scientific knowledge** - and therefore **not worthy of consideration**, it follows that **what counts as "scientific knowledge"** is **whatever scientists themselves define it to be** - and they, at the very least, have an interest in maintaining this definition...

Part of the problem, in the above respect, was evidently the fact that **Velikovsky's arguments did not conform to the Popper's notion of "scientific plausibility"**, basically because it involved the proposal of a **theory that did not admit to the possibility of being falsified** (which, in **Popper's terms**, made it "**non-scientific**").

However, this idea alone **cannot explain** the **rejection** Velikovsky received since it is evident that if we look at the most widely-accepted theoretical orthodoxy in this area - **Darwin's General Theory of Evolution** - this **too fails to pass** the "**Popper test**" of a scientific theory...

In its time, **Darwin's "General Theory"** was a prime example of "**revolutionary science**" insofar as it **rendered implausible** the **existing orthodoxy of knowledge** concerning human and animal development ("**creationism**" - the belief that the natural world was created by God as detailed in the Christian Bible).

In this respect, Darwin's theory has gained **general acceptance** because it **passes** one of **Popper's main tests**, namely it appears to **explain more about the process of human and animal development than any other currently-available theory**. In short, this **theory** is currently **dominant** because it is the most **plausible theory available**.

However, in another respect, **Darwin's** theory **fails** to satisfy **Popper's** claim that, to be considered scientific, **a theory must be capable of being falsified** (which is why Marxism, according to Popper, cannot be considered a scientific theory).

**Darwin's Theory of Evolution cannot be falsified** precisely because it **cannot** be "**tested**" in the way that we might **conventionally** try to test a theory. We **cannot**, for example, **observe evolution** (it is **too slow a process**); scientists, therefore, are dependent upon an **examination of the fossil record**.

In this respect, "**educated guesses**" are made about possible **connections / relationships** between **different fossil types** (and this is itself a **good example** of how **observation is theory-dependent**).

The **observations** made by palaeontologists are clearly **dependent** upon a set of **theoretical prescriptions** that tell such scientists **what** they are looking for - in this instance, **evidence to support a particular theory** (which again seems to go against everything Popper argues...).



Thus, when a "new" fossil is discovered, the palaeontologist attempts to locate it within the paradigm of evolutionary theory. Two possible things derive from this:

- a. If the fossil "fits" into our existing knowledge of evolution, then it is accepted as contributing to the advance of our knowledge concerning evolution (it confirms what we already know).
- b. If the fossil does not fit, however, this is not taken as evidence of the possible falsity of evolutionary theory. Rather, it is taken to be evidence of the incompleteness of evolutionary theory.

In this respect, the theory simply "expands" to encompass observational evidence which does not, "as yet", square with our existing knowledge of evolution (the implication being that the theory of evolution is itself fundamentally sound, it's simply that our knowledge of the process is not yet sufficiently advanced to enable us to satisfactorily explain the fossil discrepancy).

Darwin's theory of evolution is actually a very good example of a Realist methodology at work, since it helps us to produce valid, verifiable, knowledge about the world in a situation that is impossible to analyse positivistically. It is only through the application of a Realist methodology that we can understand the evolutionary process...

**Question:**

Briefly outline how Darwin's theory of evolution might be considered an example of Realist - rather than positivist - science.

The main point here is not that Darwin's theory of evolution is somehow "wrong" (it's not); rather, it is to draw your attention to the fact that:

- a. Scientists can be highly selective about the criteria they use when claiming that Natural science is superior to Social science.
- b. The paradigm under which knowledge is organised is a powerful force in its own right.
- c. The scientist - rather than simply pursue knowledge objectively and "for its own sake" - may be rather more involved in the theoretically-murky areas of subjective interpretation than they always care to admit.

## Realist Science

In this final section we are going to briefly explore some ideas about **the nature of science** (and, by extension, the relationship between a Natural and Social scientific methodology) by developing the theme (already suggested) that the **natural sciences are not "positivist"** in the way that is frequently claimed in sociology textbooks and by sociology teachers. In this respect, we are going to look in more detail at the idea of a **Realist science** and, in so doing, perhaps point the way towards a **methodological convergence** between the **Natural and Social sciences** (at least in terms of Sociology).

In this respect, this final section is an attempt to:

- a. Cast **doubt** upon the intellectual utility of seeing sociological methodology in terms of either "positivism" or "Interpretivism" ("anti-positivism").
- b. Suggest that "positivism" is **not** a methodology that has any current utility in either the Natural sciences or Sociology (it is also open to doubt as to whether it **ever** has had much actual utility within the Natural sciences, at least in the 20th century).
- c. Show how the question "Is Sociology a science?" is one that has contrasted a **mistaken view** of what **science actually is** with a **misunderstanding** of the relationship between methodology and subject matter within the Natural and Social sciences.

For a **Realist** conception of science, the main concern is to theorise the existence of **mechanisms** (or **social processes**) which underlie (and underpin) the observable world (natural and social). In this respect:

- a. **Darwin's General Theory of Evolution** would be an example of a Realist natural science.
- b. **Durkheim's** analysis of **suicide** (when he makes reference to concepts of social integration and social regulation) would be an example of a Realist social science.
- c. **Marx's** analysis of **Capitalism** (and in particular his use of concepts like **class struggle** and **power**) provide another (more explicitly Realist) example within Sociology.

For scientists using a "**Realist methodology**", the **task of science** is **not** to **predict** but to **describe, analyse** and **explain** the **underlying mechanisms** which produce the **appearance of order and regularity** in the world. Just as the natural world exhibits order and regularity on a broad scale, so too does the social world.

Considered in these terms, the **nature of "science"** is **changed** - it is **no-longer** a question of "**positivism**" or "**Interpretivism**", since both of these methodologies are seen to miss the point. Whilst the **former** argues for **precision and prediction** and the **latter** argues that these are **impossibilities** (at least in the **social sciences**), a **Realist science** states, as a general principle, that **unobservable mechanisms** exist to **produce order and regularity**, but that such **mechanisms** are sufficiently **broad** in scope to allow **wide variations** in actual **behaviour** (whether it be the behaviour of people, weather systems or whatever).

In the above respect, **Realist scientists** argue that the **similarities** between the Natural and Social sciences (in terms of the way each appear to be **governed** by **unobservable processes**) are **greater** than the **dissimilarities**. This idea, in effect, attempts to **refute** the idea that the Natural and Social sciences, because of their differing subject matter, need to be studied in fundamentally different ways.

**Summary.**

1. For positivists, empirical knowledge is the only reliable and valid form of knowledge. Positivist methodology is based on the pursuit of objective, rather than subjective, forms of knowledge (facts rather than opinions).
2. "Science" is a methodology that is practiced in a social context that involves concepts of power, ideology, values, norms and so forth.
3. Polyani argues that because all observation is theory-dependent there can be no absolutely valid way of generating knowledge about the social world. We cannot, for example, discover laws of social development.
4. All science, both natural and social, is, according to Kuhn, based upon subjective interpretations rather than objective observation (since, as above, there is no logical way in which people can be completely objective).
5. All forms of science are socially-organised into paradigms (or ideological frameworks - ways of seeing the world based upon our values, subjective interpretations and the like). These paradigms help the scientist to organise and make sense of the things they observe; they are like maps which tell us how to collect valid data, how to interpret that data and so forth.
6. In sociology, some of the main **paradigms** (or, as they are more-usually termed, "theoretical perspectives") are:
  - Structural Functionalism.
  - Marxist Conflict Structuralism.
  - Weberian Conflict theory.
  - Feminism.
  - Interactionism.
7. The concept of valid knowledge is not something that is fixed in time and space (that is, unchanging). On the contrary, "what is worthy of being known" in all branches of science is relative across different societies and within the same society at different times in its historical development.
8. Kuhn argues that we can distinguish between periods of "normal science" (when one paradigm is dominant) and "revolutionary science" (when other paradigms arise to challenge the dominance of another paradigm).
9. Like the concept of science, the concept of a scientific ethos should be considered in terms of its ideological significance.
10. Modern forms of methodology in the social and natural sciences have tended to be Realist in scope; theories are constructed and tested with reference to unobservable phenomena.