

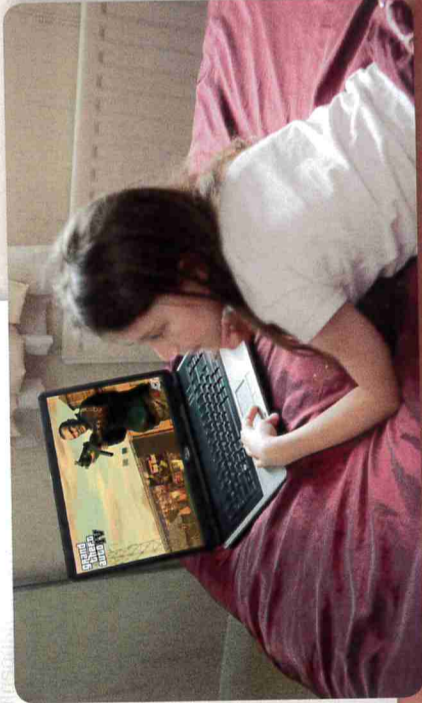


Scientists use laboratory experiments to discover causes. But can we study society in a laboratory?

GETTING STARTED

Scientists often use experiments to test a hypothesis, usually in a laboratory where they can control the experiment. This is possible in the natural sciences due to the nature of the subject matter, such as chemicals, bacteria etc.

- A** Imagine you are conducting an experiment to test the hypothesis that heating water to a temperature of 100°C causes it to boil.
- 1 What factors would you need to control when carrying out this experiment?
  - 2 Will you be able to measure the results of the experiment accurately?
  - 3 If another researcher were to carry out the same experiment, why might we expect them to get the same result?
- B** Imagine you are conducting a laboratory experiment in sociology to investigate the effects of violent video games on children's behaviour.
- 1 In what ways might being studied in a laboratory affect the children's behaviour?
  - 2 What problems could there be in trying to measure their behaviour?
  - 3 What ethical issues might you face in carrying out experiments on children?
- C** Using your answers to A and B, briefly summarise the problems of using laboratory experiments in sociological research. Do such experiments have any advantages?



EXPERIMENTS

In the natural sciences such as chemistry and physics, scientists set out to discover scientific laws of cause and effect. For example, physicists have discovered that an increase in the temperature of a gas will cause it to expand. The method favoured by natural scientists for discovering these laws is the laboratory experiment.

Sociologists have occasionally used the laboratory experiment as a way of studying human behaviour. In fact, however, this is just one of three different types of experimental method that sociologists sometimes use. The others are field experiments and the comparative method.

Laboratory experiments

An example will help to illustrate the basic principle of the experimental method. Suppose we want to discover what causes plants to grow. One way would be to take a set of identical plants and randomly divide them into two groups – an experimental group and a control group. We then treat them differently, as follows:

- **The experimental group:** with this group, we might vary the quantity of nutrients that they received, carefully measuring and recording any changes in the plants' size that we observe.
- **The control group:** with this group, we would keep the quantity of nutrients constant, also measuring and recording any changes in the size of the plants.

On comparing the results, we notice that the plants in the experimental group have grown more rapidly than the plants in the control group after receiving extra nutrients. In other words, we may have discovered a cause-and-effect relationship: nutrients cause growth.

In scientific terms, the nutrient is the independent variable (the causal factor) and the resulting growth is the effect or dependent variable (since it depends on the first variable, nutrition).

The logic of the experimental method is that the scientist manipulates (alters) the variables in which they are interested, in order to discover what effect they have. By following this method, the scientist can establish a cause-and-effect relationship. In turn, this will allow them to predict accurately what will happen in the future under specified conditions. In our example, the scientist will be able to predict what will happen when a certain quantity of nutrient is given to the plants.

Application

In an experiment to see whether mice develop cancer when exposed to cigarette smoke, is the smoke the dependent variable or the independent variable?

Reliability

Once an experiment has been conducted, other scientists can then replicate it. That is, they can repeat it exactly in every detail. The laboratory experiment is therefore highly reliable, producing the same results each time. There are two reasons for this:

- The original experimenter can specify precisely what steps were followed in the original experiment so other researchers can repeat these in future.
- It is a very detached method: the researcher merely manipulates the variables and records the results. The scientist's personal feelings and opinions have no effect on the conduct or outcome of the experiment.

The laboratory experiment therefore has major advantages as the method used to identify cause-and-effect relationships in the natural sciences. For this reason, we might expect positivist sociologists to use laboratory experiments, since they favour a scientific approach. Despite this, however, there are several reasons why such experiments are rarely used in sociology, even by positivists.

Practical problems

Society is a very complex phenomenon. In practice, it would be impossible to identify, let alone control, all the possible variables that might exert an influence on, say, a child's educational achievement or a worker's attitude to work.

Another practical problem is that the laboratory experiment cannot be used to study the past, since by definition it is impossible to control variables that were acting in the past rather than the present.

In addition, laboratory experiments usually only study small samples. This makes it very difficult to investigate large-scale social phenomena such as religions or voting patterns. The small-scale nature of laboratory experiments also reduces their representativeness.

### Ethical problems

There are ethical (moral) objections to conducting experiments on human beings, at least under certain circumstances. These include lack of informed consent, deception and harm to the participants.

**Lack of informed consent** As a general principle, the researcher needs the informed consent of the research participants. However, this may be difficult to obtain from groups such as children or people with learning difficulties who may be unable to understand the nature and purpose of the experiment.

**Deception** It is also generally considered wrong to mislead people as to the nature of the experiment, as Stanley Milgram (1974) did in his famous studies of obedience to authority. Milgram lied to his research participants about the purpose of the research, telling them that they were assisting in an experiment on learning, in which they were ordered by the researcher to administer electric shocks when the learner failed to answer questions correctly.

In reality, however, the purpose of the experiment was to test people's willingness to obey orders to inflict pain. Unbeknown to Milgram's research participants, no electric shocks were actually used. Milgram found that 65 per cent of them were prepared to administer shocks of 450 volts.

**Harm** The experiment may also harm the participants. In Milgram's experiments, many research participants were observed to "sweat, stutter, tremble, groan, bite their lips

### Field experiments

A field experiment has two features that distinguish it from a laboratory experiment:

- It takes place in the subject's natural surroundings rather than in an artificial laboratory environment.
- Those involved are generally not aware that they are the subjects of an experiment, in which case there is no Hawthorne Effect.

The researcher manipulates one or more of the variables in the situation to see what effect it has on the unwitting subjects of the experiment. For example, in Rosenhan's (1973) 'pseudopatients' experiment, researchers presented themselves at 12 California mental hospitals, saying they had been hearing voices. Each was admitted and diagnosed as schizophrenic.

Once in hospital, they ceased to complain of hearing voices and acted normally. Nevertheless, hospital staff treated them all as if they were mentally ill. None was found out.

This suggests that it was not the patients' behaviour that led to them being treated as sick, but the label 'schizophrenic' itself that led staff to treat them in this way.

**Evaluation** Rosenhan's study shows the value of field experiments. They are more 'natural', valid and realistic, and they avoid the artificiality of laboratory experiments. However, the more realistic we make the situation, the less control we have over the variables that might be operating. If so, we cannot be certain that the causes we have identified are the correct ones.

Some critics also argue that field experiments are unethical, since they involve carrying out an experiment on their subjects without their knowledge or consent.

#### Activity Research

Carrying out a field experiment

...go to [www.sociology.uk.net](http://www.sociology.uk.net)

### The comparative method

Unlike other experiments, the comparative method is carried out only in the mind of the sociologist. It is a 'thought experiment' and it does not involve the researcher actually experimenting on real people at all. However, like laboratory and field experiments, it too is designed to discover cause-and-effect relationships. It works as follows:

- Step 1: Identify two groups of people that are alike in all major respects except for the one variable we are interested in.
- Step 2: Then compare the two groups to see if this one difference between them has any effect.

### Durkheim's study of suicide

An example of the comparative method is Emile Durkheim's (1897) classic study of suicide. Durkheim's hypothesis was that low levels of integration of individuals into social groups caused high rates of suicide. He argued that Catholicism produced higher levels of integration than Protestantism. From this, he therefore predicted that Protestants would have a higher suicide rate than Catholics.

Durkheim then tested his prediction by comparing the suicide rates of Catholics and Protestants who were similar in all other important respects (e.g., in terms of where they lived, whether they were married or single etc). His prediction was supported by the official statistics, which showed Catholics to have lower suicide rates.

**Evaluation** In seeking to discover cause-and-effect relationships, the comparative method has three advantages: it avoids artificiality; it can be used to study past events and it poses no ethical problems, such as harming subjects.

However, the comparative method gives the researcher even less control over variables than do field experiments, so we can be even less certain whether a thought experiment really has discovered the cause of something.

#### Activity Webquest

Testing Durkheim's theory of suicide

...go to [www.sociology.uk.net](http://www.sociology.uk.net)

### Topic summary

In laboratory experiments, scientists manipulate variables to discover laws of cause and effect. Although they produce reliable data, experiments suffer from **practical problems** (e.g. they cannot be used to study the past), **ethical** problems of experimenting on humans, and are prone to the **Hawthorne Effect**. **Field experiments** and the **comparative method** are used as alternatives.

and dig their nails into their flesh. Full-blown, uncontrollable seizures were observed for three subjects."

However, supporters of Milgram argue that his experiments can be justified ethically because they alert us to the dangers of blindly obeying authority figures. Moreover, the great majority of his participants (74 per cent) said afterwards that they had learned something of lasting value.

### The Hawthorne Effect

A laboratory is not a normal or natural environment. It is thus likely that any behaviour in these conditions is also unnatural or artificial. If people do not behave in true-to-life ways, the experiment will not produce valid results.

If people know they are being studied, they may behave differently; for example, by trying to second-guess what the researcher wants them to do and acting accordingly. This will ruin the experiment, which depends on the subjects responding to the variables that the researcher introduces into the situation, not to the fact that they are being observed.

This problem has become known as the 'Hawthorne Effect' or 'experimental effect'. In 1927, Elton Mayo began research into factors affecting workers' productivity at the Western Electric Company's Hawthorne plant.

Working with five female volunteer workers who knew he was conducting an experiment, Mayo altered different variables such as lighting, heating, rest breaks and so on to see what effect they had on the volunteers' output.

Surprisingly, not only did output go up when he improved their working conditions, but it continued to rise even when conditions were worsened. Mayo concluded that the workers were not responding to the changes he was making in the experimental variables (such as the lighting), but simply to the fact that they were being studied and wished to please the experimenter.

#### Analysis and Evaluation

Explain why the Hawthorne Effect may lead to invalid data.

### Free will

Interpretivist sociologists argue that humans are fundamentally different from plants, rocks and other phenomena studied by natural scientists. Unlike these objects, we have free will, consciousness and choice.

This means our behaviour cannot be explained in terms of cause and effect. Instead, it can only be understood in terms of the choices we freely make. In this view, the experimental method, with its search for causes, is therefore not an appropriate method for studying human beings.

Given these problems, sociologists have two alternatives to laboratory experiments. These are field experiments and the comparative method or 'thought experiment'.

#### Box 17 Positivism, interpretivism and experiments

Positivists favour the *laboratory* experiment in principle because it achieves their main goal of reliability:

- Careful control over experimental conditions and experimenter detachment produce reliable data because other researchers can replicate the experiment.
- It allows the researcher to identify and measure behaviour patterns quantitatively and to manipulate variables to establish cause-and-effect relationships.

However, positivists nonetheless recognise the shortcomings of laboratory experiments:

- It is often impossible or unethical to control the variables.
  - Their small scale means that results may not be representative or generalisable.
- For these reasons, positivists sometimes use the *comparative method* instead.

Interpretivists reject the laboratory experiment because it fails to achieve their main goal of validity. It is an artificial situation producing unnatural behaviour. Interpretivists favour more naturalistic *field* experiments, but positivists criticise this method for giving us less control over variables.

See Box 12 on page 94 for more about **positivism**, **interpretivism** and **research methods**.