

Experimental Method

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The prime method of inquiry in science is the experiment. The key features are control over variables, careful measurement, and establishing cause and effect relationships.

An experiment is an investigation in which a hypothesis is scientifically tested. In an experiment, an independent variable (the cause) is manipulated and the dependent variable (the effect) is measured; any extraneous variables are controlled.

An advantage is that experiments should be objective. The views and opinions of the researcher should not affect the results of a study. This is good as it makes the data more valid, and less bias.

There are three types of experiments you need to know:

1. Laboratory / Controlled Experiments

This type of experiment is conducted in a well-controlled environment (not necessarily a laboratory), where accurate measurements are possible.

The researcher decides where the experiment will take place, at what time, with which participants, in what circumstances and using a standardized procedure. Participants are randomly allocated to each independent variable group.

An example is Milgram's experiment on obedience or Loftus and Palmer's car crash study.

- **Strength:** It is easier to replicate (i.e. copy) a laboratory experiment. This is because a standardized procedure is used.
- **Strength:** They allow for precise control of extraneous and independent variables. This allows a cause and effect relationship to be established.
- **Limitation:** The artificiality of the setting may produce unnatural behavior that does not reflect real life, i.e. low ecological validity. This means it would not be possible to generalize the findings to a real life setting.
- **Limitation:** Demand characteristics or experimenter effects may bias the results and become confounding variables.

2. Field Experiments

Field experiments are done in the everyday (i.e. real life) environment of the participants. The experimenter still manipulates the independent variable, but in a real-life setting (so cannot really control extraneous variables).

An example is Holfing's hospital study on obedience.

- **Strength:** Behavior in a field experiment is more likely to reflect real life because of its natural setting, i.e. higher ecological validity than a lab experiment.
- **Strength:** There is less likelihood of demand characteristics affecting the results, as participants may not know they are being studied. This occurs when the study is covert.
- **Limitation:** There is less control over extraneous variables that might bias the results. This makes it difficult for another researcher to replicate the study in exactly the same way.

3. Natural Experiments

Natural experiments are conducted in the everyday (i.e. real life) environment of the participants, but here the experimenter has no control over the IV as it occurs naturally in real life.

For example, Hodges and Tizard's attachment research (1989) compared the long term development of children who have been adopted, fostered or returned to their mothers with a control group of children who had spent all their lives in their biological families.

- **Strength:** Behavior in a natural experiment is more likely to reflect real life because of its natural setting, i.e. very high ecological validity.
- **Strength:** There is less likelihood of demand characteristics affecting the results, as participants may not know they are being studied.
- **Strength:** Can be used in situations in which it would be ethically unacceptable to manipulate the independent variable, e.g. researching stress.
- **Limitation:** They may be more expensive and time consuming than lab experiments.
- **Limitation:** There is no control over extraneous variables that might bias the results. This makes it difficult for another researcher to replicate the study in exactly the same way.

Experiment Terminology

Ecological validity

The degree to which an investigation represents real-life experiences.

Experimenter effects

These are the ways that the experimenter can accidentally influence the participant through their appearance or behavior.

Demand characteristics

The clues in an experiment that lead the participants to think they know what the researcher is looking for (e.g. experimenter's body language).

Independent variable (IV)

Variable the experimenter manipulates (i.e. changes) – assumed to have a direct effect on the dependent variable.

Dependent variable (DV)

Variable the experimenter measures. This is the outcome (i.e. result) of a study.

Extraneous variables (EV)

All variables, which are not the independent variable, but could affect the results (DV) of the experiment. EVs should be controlled where possible.

Confounding variables

Variable(s) that have affected the results (DV), apart from the IV. A confounding variable could be an extraneous variable that has not been controlled.

Random Allocation

Randomly allocating participants to independent variable conditions means that all participants should have an equal chance of taking part in each condition.

The principle of random allocation is to avoid bias in the way the experiment is carried out and to limit the effects of participant variables.

Order effects

Changes in participants' performance due to their repeating the same or similar test more than once. Examples of order effects include:

- (i) practice effect: an improvement in performance on a task due to repetition, for example, because of familiarity with the task;
- (ii) fatigue effect: a decrease in performance of a task due to repetition, for example, because of boredom or tiredness.

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