

## Research Methodology

*What is a “science”?*

Science is defined not by its subject matter – rocks (geology), stars (astronomy), or people (psychology and sociology) – but instead by its procedures. Scientists begin with a research question such as “What causes children to behave aggressively?” They develop a hypothesis – an educated guess about a likely cause of aggression – and then test the hypothesis through systematic observation that is designed to prevent bias. This quality of *testing* a hypothesis is very important to science. A hypothesis must be *falsifiable*: tested in such a way that the results could either support or refute the hypothesis. If the results would support the hypothesis no matter how they came out, then the test is not a true scientific test. Falsifiability is the first of two principles that form the foundation of the scientific method. The second principle is *replication*: results must be repeatable under similar conditions in order for us to have confidence in them. If a hypothesis is tested appropriately on multiple occasions and is always supported, then we can have more confidence in that hypothesis. Falsifiability and replication are tools designed to prevent the accumulation of errors. If a hypothesis cannot stand up to repeated testing, then it should be discarded in favor of a stronger hypothesis.

*Research strategies*

Psychologists and sociologists have a wide variety of research strategies that they can use to test a hypothesis. Each strategy is strong in some respects and weak in others. For this reason, hypotheses should be tested using several different research strategies.

*Laboratory experiments.* In psychology, the most common strategy is the laboratory experiment. The goal of laboratory experiments is to make cause-and-effect conclusions. One risk of concluding that one factor (e.g., television violence) causes another factor (e.g., aggression) is the possibility of an alternative cause (e.g., hostile personality). Experiments are designed to reduce the risks of alternative causes using a procedure known as random assignment: people are placed into different groups (i.e., they are “assigned” to conditions) randomly. The two groups are treated exactly the same except for the one variable under investigation. For example, one group might watch a violent TV show and the other might watch a non-violent television program of equal length that had been previously rated as equally exciting. Each person is then measured on the behavior of interest (e.g., aggression). For example, people in each group might be provoked by the experimenter’s assistant and then be given the opportunity to retaliate by getting the assistant fired. Because the researcher’s expectations could influence what they see, a common technique in experiments is to make the researcher “blind” to each person’s group status (whether they were in the violent or non-violent group). Because people are randomly assigned to either the violent or non-violent TV conditions, it is very unlikely that there is any other systematic difference between these groups. As a result, any difference in the aggressiveness of the groups can be attributed to the level of TV violence they were exposed to. That is, differences in aggression must have been *caused* by differences in TV violence.

Of course, any time you measure two groups with a sufficient degree of precision, you will obtain some degree of difference between them. Researchers have developed statistical techniques that enable them to calculate the probability that a difference of a particular size could have occurred just by chance. Generally, only differences that are so large that they occur by chance less than 5% of the time are considered “significant.”

The major advantage of laboratory experiments is that they are the only research strategy that offers researchers confidence in cause-and-effect relationships. This is because they create conditions under which the only possible cause of differences between groups is the one factor that was controlled by the researcher.

A common criticism of laboratory experiments is that behaviors observed in a laboratory may not be representative of behaviors in more natural settings. However, the key issue for psychologists is not whether the physical environment of a laboratory superficially resembles the outside world but whether a person’s psychological experience in the laboratory resembles their psychological experience in more natural settings. For example, in an experiment on destructive obedience, the question is not whether participants feel differently because they are in a laboratory but whether they feel like they are actually hurting someone because of the pressure they are feeling from an authority figure. If these two

components – the experience of causing someone else to suffer and the experience of the pressure to obey an authority – are genuine, then it does not matter where the study takes place.

*Naturalistic observation.* In sociology, a common research strategy is naturalistic observation, in which researchers attempt to observe a phenomenon in its natural setting. For example, Monica Moore (1985) spent time in a bar observing how men and women flirt. She found that flirting is generally initiated by women. A primary goal of naturalistic observation is non-interference: care is taken so that the people being observed do not know they are being observed. The advantage of naturalistic observation is that the behavior that is observed can be assumed to be naturally occurring, not produced in response to the researcher's expectations. The disadvantage is that cause-and-effect conclusions are inappropriate because there is no way to rule out alternative causes.

*Field experiments.* A hybrid of laboratory experiments and naturalistic observation is the field experiment. In a field experiment, the researcher systematically varies some aspect of the environment in a natural setting. For example, a researcher might manipulate the "credibility" of a sign by posting either a large, professional sign or a hand-written, sloppy sign. The researcher would then observe whether people were more obedient in response to the professional sign than the hand-written sign. The advantage of field experiments is that the results can more easily be generalized to natural settings. The disadvantage is that some control is typically sacrificed, compromising the ability to make cause-and-effect conclusions.

*Archival research.* Another approach to research is to avoid using people altogether and instead use documents or records of past behavior: personal advertisements in newspapers, crime statistics from the FBI, etc. The advantage of archival research is that a larger sample can often be obtained than would otherwise be possible (e.g., records of all crimes committed in the U.S.), but the disadvantage is that the researcher is dependent upon the reliability of the original source.

### *Ethics*

Researchers are obligated to protect the welfare and dignity of the people who participate in their studies. In the case of naturalistic observation, researchers are forbidden from observing behaviors in contexts where there is the expectation of privacy (e.g., the bathroom). When records of behavior can be linked to participants' identities (as with videotape), researchers are obligated to inform participants about how widely the records will be shared and to give participants the option to destroy the records.

*Informed consent and deception.* Generally, experiments cannot begin until participants are fully informed about the experimental procedures and then give their consent to participate. The one exception to this rule is the use of deception, in which participants are either misinformed about the nature of the study (told it is about learning when it is really about obedience) or they interact with actors who appear to be fellow participants. Deception is used only when full disclosure about the nature of an experiment would render the experiment useless. For example, you cannot expect people to behave naturally after being told they are in an experiment on lying and stealing. In addition, deception can never be used to conceal any *risk* to participants.

Finally, researchers have an obligation to the scientific community to conduct research in an objective manner and to faithfully report their results. On the rare occasion when a researcher is found to have distorted or manufactured ("fudged") data, he or she is generally fired from their academic position, blacklisted from academic publications, and a retraction of their articles is printed in the journals where they appeared. Like falsifiability and replication, this commitment to maintaining the integrity of the scientific literature is designed to prevent the accumulation of errors.