

Analysis in Research

by Sophia Tutorial



WHAT'S COVERED

This tutorial will cover the topic of research data analysis. Our discussion breaks down as follows:

1. Analysis and Statistical Significance
2. Placebo Effect
3. Self-Fulfilling Prophecy
4. Controlling Analysis

1. Analysis and Statistical Significance

Once a researcher designs an experiment and tests it out with different subjects, the next job is to gather the resulting data from the experiment and analyze it.

The goal of analyzing the information is to determine if the information either supports or refutes the researcher's hypothesis. Remember, a hypothesis is their prediction about what they thought would occur. They also want to see if there's a relationship between the variables that are being studied in the experiment.

To determine if there's a mathematical relationship within the experiment, scientists examine whether the results are statistically significant. **Statistical significance** refers to the likelihood that the variables being studied are related to one another, that one variable causes the other one to happen. In other words, the outcome of the experiment is not the result of chance. The experimenter wants to know if the results would happen normally, without the changes in the independent variables within the experiment. This is also the reason control groups are an important component of an experiment--to make sure that the modified variables of the experiment are the actual cause of the results.

The actual number for statistical significance can vary, depending on the methods being used and the way in which the data is analyzed. However, the general rule of thumb is that if the probability of the statistical significance, or p , is less than 5% ($p < 0.05$), then the results are probably due to chance. This means that the results would just normally occur and are unrelated to any conditions of the experiment.



BIG IDEA

In an experiment, if the probability (p) of the outcome happening by random chance is more than 5%, then the results are statistically significant. This means that the results show the variables are related in some way; in

other words, the experiment was successful.



TERM TO KNOW

Statistical Significance

The likelihood that the variables being studied are related, and that the results of the experiment are not the result of chance

2. Placebo Effect

When analyzing the data, it's also important to consider any other influences that can affect the conclusions drawn. First, researchers need to consider what effects the participants' own beliefs and ideas about the experiment could have on the results.

Recall that studies use control groups, who are given what is called a **placebo**. A placebo is something that resembles the treatment and makes the subjects *think* that they're receiving the treatment, but it actually has no effect in and of itself.

➦ **EXAMPLE** Many times researchers use what is called a sugar pill, which resembles an actual pill, but which actually consists of ingredients that don't have any effect on the body.

Administering this placebo serves to test if a phenomenon known as the **placebo effect** is taking place in the experiment. The placebo effect is when the subject's own expectation that their behavior will be affected by a treatment leads to the results--not the treatment itself. In other words, it's a case where belief leads to results, instead of treatment leading to results.

This idea underlies the concept of mind over body, whereby a person's mind can create physical changes in the body. It's been shown in many different studies that the mind over body phenomenon can actually lead to the results of an experiment, versus any actual efficacy in the treatment.



TERMS TO KNOW

Placebo

A fake pill (such as a sugar pill) or injection (such as a saline injection)

Placebo Effect

Improvement that is not attributed to the experimental condition, that comes from the subject's mental state toward that experimental condition

3. Self-Fulfilling Prophecy

Researcher themselves can also influence the results of an experiment. This is what is called a **self-fulfilling prophecy**. A self-fulfilling prophecy is when the expectation of a result causes the result to occur.

➦ **EXAMPLE** For example, if you expect a child to be bad, then you may treat them differently than you normally would, and as a result, the child will behave badly.

In terms of an experiment, if you think that there is going to be a certain result, or a certain effect on a subject, then you might give them small hints that encourage them to respond in the way that you hope.

➦ **EXAMPLE** For instance, you might give a participant more attention when they're supposed to respond one way. You might be more positive, or your voice might change in a way that influences them to act in the way that you want.



BIG IDEA

As researchers, it is important to keep the phenomena of a self-fulfilling prophecy and the placebo effect in mind, as they can affect how we analyze data from an experiment.



TERM TO KNOW

Self-Fulfilling Prophecy

When the expectation of a result leads to or causes the result to occur

4. Controlling Analysis

Because of the effect that the placebo effect and a self-fulfilling prophecy can have on the results of an experiment, experimenters use different methods to control for them. One method is what is called the double-blind study, or the **double-blind experiment**. This is when subjects are assigned to groups, and neither they nor the experimenter know who is in each group.

IN CONTEXT

Suppose a double-blind experiment is being conducted to test a new drug. The participants are placed into one of two different rooms, and neither they nor the experimenters know which of the rooms contains the actual drug that is being tested. Either somebody unrelated to the study was used to place the drug, or some random method was used to determine who would do what.

In this way, the experimenter doesn't know which group is taking the actual drug, and so they are prevented from collecting the data in a way that leads to a self-fulfilling prophecy. In addition, the participants don't know which one of them is actually going to be taking the drug that's being tested, so a placebo effect should be avoided.

During analysis, all studies consider previous research and information. Researchers build upon each other's work to create a larger body of knowledge about the subject that they're researching. This is why some experimenters use what is called a **meta-analysis**. This is a special kind of analysis where they look at the results of many different studies on the same subject, and they come to broader conclusions. Many broader or far-reaching theories about different subjects within psychology are the result of meta-analysis.



TERMS TO KNOW

Double-Blind Experiment

An experiment where subjects are assigned to groups and neither they nor the experimenter knows who is in experimental and control groups

Meta-Analysis

A particular type of study that looks at the results from many different studies on the same subject to come to broader conclusions



SUMMARY

Today we learned about considerations and best practices in the **analysis** of research data. The goal is analyzing the information is to determine if it supports or refutes the researcher's hypothesis, if there is a relationship between the variables being studied. Researchers need to ascertain their results have **statistical significance**, versus being the result of chance.

It is important for researchers to consider phenomena such as **the placebo effect** and a **self-fulfilling prophecy**, which can affect how data is analyzed. To counteract this, they can use different methods for **controlling analysis**, such as the use of double-blind experiments. Lastly, experimenters use meta-analysis to compare the results of many different studies on the same subject.

Good luck!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR ERICK TAGGART.



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Statistical Significance

The likelihood that the variables being studied are related, and that the results of the experiment are not the result of chance