

# Basic Terminology in Research

by Sophia Tutorial



## WHAT'S COVERED

This tutorial will cover the elements that constitute scientific research in general, and particularly in psychology, by identifying basic research design concepts. Our discussion breaks down as follows:

1. The Scientific Method
  - a. Requirements
2. Levels of Scientific Thought
  - a. Hypothesis
  - b. Theory
  - c. Law

## 1. The Scientific Method

Key to **understanding research** is the concept of the scientific method. The scientific method is a way of discovering and modifying information about the world around us based on different scientific principles and processes. The focus of the scientific method is to determine the causes of different things within our world. We want to know *why* things happen.

Now, the scientific method is different from everyday observations in that many observations that we make every day are based on assumptions. In other words, we might make different kinds of assumptions about who a person is and why they acted in a particular way by observing them, but scientific research has to be empirical, systematic, and must make as few assumptions as possible.



### TERM TO KNOW

#### Understanding Research

Psychologists use research to refine or define theories. Theories led to the development of hypotheses which are then tested through psychological research.

#### 1a. Requirements

There are several specific requirements that apply to the scientific method. Scientific research or scientific

methods must be:

- **Empirical.** This means that research is taken from observations or experimentation. It is objective versus subjective. Observations are not being reported to us; rather, we are specifically observing the object or objects of the research.
- **Measurable.** This means that we have to be able to take some kind of measurement. The research needs to be systematic, meaning it follows a certain series of steps. Now, it doesn't necessarily mean that it needs to be physically measurable, but we have to be able to take a measurement of some amount or degrees, for example.

🔗 **EXAMPLE** For instance, mental processes might be measured by how much or how little are demonstrated.

- **Reasonable.** Scientific research must be rational or logical—it has to make sense.
- **Falsifiable.** The research must be able to be proven to be false. We have to determine if it's true or not.

🔗 **EXAMPLE** Something like the existence of God, for example, that is unable to be proven true or false wouldn't necessarily be under the purview of scientific research. This isn't to say it isn't necessarily true; it's simply not something scientific.

- **Replicable.** We need to be able to duplicate the research. It's not something unique to a specific situation, but rather something that's generally true. Therefore, we can find it to be true in multiple occasions.

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## 2. Levels of Scientific Thought

Within scientific research, there are different levels of scientific thought that you may be somewhat familiar with. However, the way we commonly use them is a bit different from the way that we use them scientifically. Let's explore each level in detail.

### 2a. Hypothesis

Scientific research always begins with a scientific thought, or a **hypothesis**. A hypothesis is a prediction about the effect or a relationship between different variables being measured in the research. Basically, we want to know how these different variables relate to each other.



HINT

Another way of thinking about a hypothesis is that it's an educated guess. A hypothesis is something that we don't necessarily know for sure, but we have some idea about.

Hypotheses are very easy to change and adapt. Sometimes they can be true, and sometimes they can be false, given the research within an experiment.



TERM TO KNOW

#### Hypothesis

A prediction about the effect of or relationship between different things being measured in research; an educated guess

## 2b. Theory

The next level is a **theory**. Many times, people confuse theories with hypotheses. Within scientific research, though, a theory is a summary of multiple hypotheses that are supported by existing data that predicts future outcomes relatively well. In other words, a theory is a series of hypotheses that have stood the test of time, withstanding many different kinds of tests and retests on the same subject.

A theory can be changed--like a hypothesis--but it requires a lot more experimentation and effort. A theory is something that is relatively lasting and that people generally think to be true.



### THINK ABOUT IT

When somebody says a theory like the theory of evolution is just a theory, in fact, it *is* a theory. However, this means more than what you may think. The theory of evolution is something that most scientists take to be actually true. However, it is also an example of a kind of theory that is accepted by scientists, but because it is either too broad of a topic or too difficult to prove with experimentation--because it involves processes that occur over a long period of time or that might be too complex--it doesn't necessarily make it to the next level of scientific thought.



### TERM TO KNOW

#### Theory

A summary of multiple hypotheses supported by existing data that predicts future outcomes

## 2c. Law

The final level within scientific thought is the law. This is something that is proven to be almost universally true and widely accepted through intensive scientific study and research. A law is generally very simple and direct, and it explains things in the shortest possible way.



**EXAMPLE** For example, the law of gravity isn't necessarily complex, although its implications might be and the way you study it might become more complex.

A law is as close to the absolute truth as possible within science, whereas theories can be changed and modified a bit more easily, and hypotheses change and be proven or disproven on a regular basis. It is important to note, though, that laws can still be changed or modified. As with anything in science, nothing is absolutely true, and is subject to new information.



### SUMMARY

There are several basic research design concepts that constitute scientific research, both generally speaking, and relating to scientific research in psychology, in particular. **The scientific method** focuses on the causes behind the different things that occur in our world. It is a way of discovering and modifying information about the world around us based on different scientific principles and processes. Requirements that apply to the scientific method include that it must be: empirical, measurable, reasonable, falsifiable, and replicable.

The different **levels of scientific thought** within scientific research include one, a hypothesis; next, a

theory; and lastly, a law. Hypotheses and theories can change and adapt, though theories require more experimentation and are generally thought to be true. Laws, while they can still be changed or modified, are typically as close to the absolute truth as possible within science.

Good luck!

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



## TERMS TO KNOW

### **Hypothesis**

A prediction about the effect of or relationship between different things being measured in research; an educated guess

### **Theory**

A summary of multiple hypotheses supported by existing data that predicts future outcomes

### **Understanding Research**

Psychologists use research to refine or define theories. Theories led to the development of hypotheses which are then tested through psychological research.