

What is a **THEORY** and what is a **LAW** in science?

By Justin Krejci

There are different uses and definitions for the words theory and law. When discussing topics scientifically, here is a clearer explanation of the way these words are used as well as a couple others for clarity. Do not use or interpret the words theory and law by other definitions as that is dishonest and will only hamper communication, unless your intention is to be obtuse or deceptive.

- **Fact** - Statement that is consistent with reality or can be proven with evidence or tested
 - Mercury is a liquid at room temperature
- **Phenomenon** - An observable fact or event
 - An object or aspect known through the senses rather than by thought or intuition
- **Law** - Describes an observation of a natural phenomenon, sometimes represented mathematically (ie with a formula or equation). A law does not *explain* the natural phenomenon, just *describes* it
 - Law of gravitation
 - Laws of motion
 - Laws of thermodynamics
- **Hypothesis** - A tentative explanation for a phenomenon that does not have significant evidence
 - Explanations for the extinction of dinosaurs (eg a large asteroid hitting Earth)
- **Theory** - An in-depth scientific explanation of a phenomenon
 - A scientifically acceptable general principle or body of principles offered to explain natural phenomena (eg Evolution Theory, Theory of Relativity)
 - A separate usage of theory: The general or abstract principles of a body of fact, a science, or an art (eg Music Theory)

Scientific laws cannot become scientific theories. Scientific theories cannot become scientific laws. They are two different things. A hypothesis is a seed that can become a theory. Changing into a theory is not easy or simple and requires significant time and effort by many to test and prove.

Scientific theories should be considered true without requiring any further testing, though the nature of science and the scientific method allows for theories to be falsifiable through testing. Theories can be superseded by either newer theories that do a better job explaining or can just be removed altogether through extensive and repeated testing. This process of weeding out inaccurate or incomplete theories benefits everyone as a whole as we all gain from the improved accuracy of comprehension.

The common lay usage of the word “theory” is more synonymous with “guess” or even “hypothesis” but this is not accurate when discussing things in a scientific nature as it has a completely different meaning.

In short:

A **law** says, “here is a consistent or predictable behavior or event that is happening”

A **theory** says, “here is how and/or why a behavior or event is happening”