## Description

The body of scientific knowledge is cumulative, and as it grows, our confidence in the classifications, explanations, and theories accumulated over time grows at a corresponding rate. However, there is a thin line between confidence and hubris. Accepting something as “common knowledge” leads to an equally flawed inference of finality that should not be applied. To be fair, a certain amount of confidence in scientific laws and theories is a necessity—we would not get into airplanes and be propelled to thirty thousand feet without complete confidence in the law of gravity and our ability to overcome it with a combination of thrust, drag, lift, and weight. However, we tend to forget that the goal of scientific research is comprehension and being able to explain how the world works.

# What Exactly Is a Theory?

Merriam-Webster defines a theory as: “*an idea or set of ideas that is intended to explain facts or events* .” In the context of scientific research, a theory is a combination of established methods, knowledge, and principles that lead to a logical consequence that can be tested against the empirical data that was used to generate the theory in the first place. Again, the intent is to explain the behavior that is observed. The subsequent testing may or may not validate the proposition, but it definitely does not *prove* anything.

# There Is No Shame in Fallibility

If we look beyond the complex terminology, even more complex mathematical symbology, expensive equipment, and impressive qualifications, science becomes a rigorous testing process. When a particular methodology has been rigorously tested and continues to pass those tests, it will eventually be embraced as good science and become a traditional method. Some methods use logical inference and deduction, and others use empirical data based on observations or controlled experiments. Whatever the chosen methodology, the end result is, at best, a misconception based on the best available data that may well be proven to be completely wrong in the future.

The American philosopher *Charles Sanders Peirce* is credited with coining the term *fallibilism* to represent the position that no beliefs, opinions, or theses are “so well justified or supported by good evidence or apt circumstances that they could not be false.” In other words, no theory will ever reach a conclusive justification.

## The Attribution of Infallibility

When we change our diet or exercise habits in response to the latest scientific study, or passively agree to take what a physician prescribes, we are attributing a degree of infallibility that science has never really claimed. There are now so many different drugs on the market that pharmacists receive additional training to ensure that physicians don’t prescribe conflicting medications in error. Further, discovery and greater comprehension can only be achieved if every assumption is challenged. If there is an inherent inference that any assumption could be completely wrong that should not be regarded



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as a blanket condemnation of scientific research—it should be applauded as an acknowledgment of fallibility.

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