Falsifiability

To be able to test a theory by experience means to be able to predict certain observable or measurable consequences from the theory. For example, from a theory about how physical bodies move in relation to one another, one predicts that a pendulum ought to follow a certain pattern of behavior. One then sets up a pendulum and tests the hypothesis that pendulums behave in the way predicted by the theory. If they do, then the theory is *confirmed*. If pendulums do not behave in the way predicted by the theory, then the theory is *falsified*. (This assumes that the predicted behavior for the pendulum was correctly deduced from your theory and that your experiment was conducted properly.)

The fact that a theory passed an empirical test does not prove the theory, however. The greater the number of severe tests a theory has passed, the greater its degree of confirmation and the more reasonable it is to accept it. However, to confirm is not the same as to prove logically or mathematically. No scientific theory can be proved with absolute certainty.

Furthermore, the more tests which can be made of the theory, the greater its empirical content (Popper, 112, 267). A theory from which very few empirical predictions can be made will be difficult to test and generally will not be very useful. A useful theory is rich or *fecund*, i.e., many empirical predictions can be generated from it, each one serving as another test of the theory. Useful scientific theories lead to new lines of investigation and new models of understanding phenomena that heretofore have seemed unrelated (Kitcher). This feature of fecundity is probably the main difference between the theory of natural selection and the theory of special creation. The theory of special creation has not led to new discoveries, better understanding, or increased understanding of the relatedness of areas within the field of biology or between such fields as biology and psychology. As such, the theory of special creation is nearly useless. And, since the theory is put forth as dogma, it is the antithesis of a scientific theory.

However, even if a theory is very rich and even if it passes many severe tests, it is always possible that it will fail the next test or some other theory will be proposed that explains things even better. Logically speaking, a currently accepted scientific theory could even fail the same tests it has passed many times in the past. Karl Popper calls this characteristic of scientific theories, "falsifiability."

Excerpt from “Becoming a Critical Thinker,” by Robert Todd Carroll