

**Scientific Progress Model of Falsificationism:**

1. Science begins with problems. These problems are only problematic in the light of a theory / hypothesis.
2. Falsifiable hypotheses are suggested for the solution of these problems.
3. Hypotheses are tested. Falsified hypotheses are abandoned.

This test has four dimensions:

- a. To reveal whether there is contradiction in the string  
logical comparison of propositions among themselves.
  - b. A review of the logical form of theory to see if it is empirical - scientific in nature.
  - c. The theory to be tested, if this theory is suitable for other tests, determine if it is important for scientific advances, if proven in order to compare it with other theories.
  - d. Testing the derived results with empirical applications.
4. The theory that comes out of the test without being falsified is subject to more difficult tests.
  5. New problems arise from these tests. These new problems require new hypotheses.

**The Limits of 'Falsificationism' and Criticisms Directed**

Sophisticated falsificationism shifts the focus of attention from a single theory to competing ones.

- a) "Can the theory be falsified?"
- b) "How can it be falsified?"
- c) "Is it falsified?"
- d) "Is the proposed new theory valid enough to replace the theory it challenges?"

Thus, questions (a), (b), (c) leave their places to question (d).

**Theory of Knowledge**  
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Reason:

It is very difficult to determine how falsifiable a single theory is. This is to increase the relative importance of Popper's (c)<sup>1</sup> condition mentioned above.

***ad hoc* Modifications:**

*ad hoc* modification is intra-theoretical changes designed to protect a theory from a threatening falsification. In other words, in theory it is the addition of extra postulate or making changes to the existing postulate. Ad hoc is a Latin phrase meaning literally "to this". In English, it generally signifies a solution designed for a specific problem or task, non-generalizable, and not intended to be able to be adapted to other purposes. In science and philosophy, ad hoc means the addition of extraneous hypotheses to a theory to save it from being falsified. Ad hoc hypotheses compensate for anomalies not anticipated by the theory in its unmodified form.

**Modifications rejected by the falsificationist approach:**

**Category 1:** When we consider the generalization of "bread is nutritious" as a low level theory, it will be explained as follows:

If wheat is grown normally, converted to normal bread and eaten normally by man, then this person will be fed. But in a French village, the theory of "all breads are nutritious" is falsified when wheat is grown normally and converted to bread normally, and many people who eat it are still seriously ill and a few die. (The point to note is that there is no differentiation in the premises of the theory. That is, the condition of converting normally grown wheat into bread in the normal way is preserved.) In this case, a modification can be made: "All of the bread feeds, except for a particular bakery produced in the French village in question." In this way, the theory is saved. The outlier is excluded from the scope of theory covered by in-theory modification. The falsificationist approach rejects this modification because the modified theory (hypothesis) is less falsifiable than the first. This is regression in theory.

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<sup>1</sup> c. The theory to be tested, if this theory is suitable for other tests, determine if it is important for scientific advances, if proven in order to compare it with other theories.

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**Category 2:**

According to Aristotle's understanding of the universe, the celestial region of the heavens (the Moon in the sky and the sky bodies after it) is made of perfect material, and therefore the Moon and other celestial bodies are perfect spheres. When Galileo observed the Moon with the telescope, he saw that the Moon was not a smooth sphere, but a celestial body with a surface filled with mountains and craters. When the observations were repeated for him, the Aristotelian opponent had to admit that the objects on the Moon looked just like Galileo had suggested. The observations, then, falsify the hypothesis that celestial bodies are perfect spheres. However, a defense based on an Aristotelian ad hoc hypothesis was developed: The Aristotelian claimed that on the surface of the Moon is an invisible substance that fills the craters and covers the mountains, so that the Moon sphere is a perfectly smooth sphere. When asked how to identify this substance or discover its existence, the opponent's answer was that there was no method for this discovery.

The falsificationist approach rejects this modification. Because the modified theory has ceased to be testable and therefore falsifiable. Accordingly, it is no longer scientific.

**ACCEPTABLE MODIFICATIONS:**

1. When a change is made in the “Bread is nutritious” hypothesis, “All bread feeds except those made from wheat with a certain mushroom type mixed in”, the theory remains open to new falsification. In other words, this hypothesis is also testable to the first with additional tests. The hypothesis that goes through the tests leads to a more advanced theory as it will lead to learning something new.

2. Nineteenth-century observations about the movements of the planet Uranus have shown that the orbit of Uranus deviates significantly from the line predicted by the Newtonian Theory. These observations seem to provide justification for abandoning the theory for strict falsificationism. But the two scientists have suggested that there is a planet (mass) around Uranus that has not been previously observed / discovered and causes gravity to deviate by applying gravitational force to Uranus.

Based on the difference between the predicted trajectory of Uranus and the observed trajectory, how much gravitation could cause this deviation and the possible location of this mass were calculated and discovered by observing the planet Neptune. This is a progressive modification as it adds a clear addition to testing and causes new discovery.