

# The karl popper concept of falsifiability philosophy essay



**ASSIGN  
BUSTER**

Karl Popper (1902-1994) was an Austro-British philosopher and a professor at the London School of Economics. Popper's popularity stemmed from his attempt to reject the classical observationalist or the inductivist account of scientific method, and instead advancing empirical falsification instead, among others. The thing that troubled Popper was 'when should a theory be ranked as scientific?' or 'is there a criterion for the scientific character or status of a theory?' (Popper 1957 p. 1-2). Popper was concerned about the difference between Science and Pseudo science and not necessarily about the truth of a theory. This is where the philosophy of science as falsification emerged. " Philosophers were accused-rightly, I believe-of ' philosophizing without knowledge of fact', and their philosophies were described as 'mere fancies, even imbecile fancies' (Popper 1952 p. 127).

Popper believed that Science starts with problems rather than with observations and based on the specific problems, it then leads the scientist to then make observations. According to Popper, the scientist's observations are therefore designed to test the extent to which a theory satisfactorily solves the initial problem.

Popper began by attempting to differentiate science from pseudo-science. He states that the growth of scientific knowledge begins with an " imaginative proposal of hypotheses". The scientist must then search for illustrations or situations that falsify or negate the hypothesis. This search for illustrations or situations that negate the hypothesis is falsification. Pseudo-science is science that does not meet scientific standards because it does not conduct experiments. Popper's disapproval with the inductive view resonates mainly from the use of empirical methods and inductive

<https://assignbuster.com/the-karl-popper-concept-of-falsifiability-philosophy-essay/>

explanations to determine what Science is. Popper objected to this stance because a hypothesis must predict a phenomenon and not just offer an explanation. Popper is positive that each hypothesis has a possible contradiction and based on this he is sceptical of accepting observations as being scientific.

Falsifiability or refutability is therefore the logical possibility that a hypothesis could be shown false by a particular observation or experiment. Something being falsifiable does not mean it is false; anymore that breakable means broken. Rather it means that if the statement were false, then its falsehood would be demonstrated. For example, 'all swans are white' is a falsifiable statement since an observation of any different colour swan can falsify this theory.

According to Popper, Falsifiability, particularly testability, is an important concept in science and the philosophy of science. Popper concluded that a hypothesis or theory is "scientific" only if it is, among other things, falsifiable. Therefore, he sees Falsifiability as a necessary (but not sufficient) criterion for scientific ideas. Scientific theories for Popper therefore comprised all those theories that fit the scientific status of a theory in its Falsifiability, refutability or testability.

'Thus the problem which I tried to solve by proposing the criterion of Falsifiability was neither a problem of meaningfulness or significance, nor a problem of truth or acceptability. I called this first problem of mine the "problem of demarcation." The criterion of Falsifiability is a solution to this problem of demarcation, for it says that statements or systems of

statements, in order to be ranked as scientific, must be capable of conflicting with possible, or conceivable, observations.'(Karl Popper, Conjectures and Refutations, London: Routledge and Keagan Paul, 1963, pp. 33-39)

Popper notes however that a theory that is unfalsifiable at a given time may become falsifiable due to the development of technology.

## **VERIFIABILITY AND FALSIFIABILITY**

In the philosophy of science, verificationism (also known as the verifiability theory of meaning) holds that a statement must, in principle, be empirically verifiable for it to be both meaningful and scientific. Popper noticed two different problems, that of meaning and that of demarcation, and had proposed in verificationism a single solution to both. In opposition to this view, Popper emphasized that there are meaningful theories that are not scientific, and that, accordingly, a criterion of meaningfulness does not coincide with a criterion of demarcation. Thus, Popper urged that verifiability be replaced with falsifiability as the criterion of demarcation. On the other hand, he strictly opposed the view that non-falsifiable statements are meaningless or otherwise inherently bad, and noted that falsificationism does not imply it

## **INDUCTION**

Popper noticed that two types of statements are of particular value to scientists. The first are statements of observations, such as " this is a white swan." The second are universal statements that categorize all instances of something, such as " all swans are white". Popper was therefore concerned with how the scientist moves from observation to such universal

statements and how one can infer a universal statement from any given number of existential statements.

Inductivist methodology supposed that one can somehow move from a series of observations to a universal statement. That is, that one can move from 'this is a white swan', 'that is a white swan', and so on, to a universal statement such as 'all swans are white'. This method is clearly deductively invalid since the possibility exists that there exists a non-white swan that has eluded the observer and it is impractical to observe all the swans in the world to in fact verify that they are all white.

Based on the difficulty that exists in moving from observations to universal statements, Popper concluded that science could not be grounded on such invalid inference. Falsification is therefore the solution to the problem of induction.

Popper noticed that although a singular existential statement such as 'there is a white swan' cannot be used to affirm a universal statement, it can be used to show that one is false. For instance based on the previous example, the observation of a black swan serves to show that the universal statement 'all swans are white' is false. This logic is called modus tollens where the falsification of statements occur through some observation. Hence, the statement 'all swans are white' is testable by being falsifiable. For, if in testing many swans, the researcher finds a single black swan, then the statement all swans are white would be falsified by the counterexample of any 'non-white' swan.

In order to falsify a universal statement, one needs to find at least one falsifying statement. Popper noted that it is indeed possible to change the universal statement as that falsification does not occur. This can be done through the use of 'ad hoc' propositions/statements. Suppose that the universal statement forbids some form of observation. To illustrate from the previous example, if on hearing that a black swan was found in Australia for instance, the scientist can then introduce the ad hoc hypothesis that, 'all swans are white except those found in Australia'. At some point, the weight of the ad hoc hypotheses and disregarded falsifying observations will become so great that it becomes unreasonable to support the base theory any longer, and a decision will be made to reject it.

Popper saw science as evolving through the successive rejection of falsified theories and not merely by the falsified statements since falsified theories are to be replaced by theories that can better account for the phenomena that falsified the prior theory, that is, with greater explanatory power.

Falsification can therefore be seen as a criterion of demarcation to draw a sharp line between those theories that are scientific and those that are unscientific.

Popper's theory of demarcation is based upon his perception of the logical asymmetry which holds between verification and falsification as it is illogical to verify a universal proposition through the use of an observation, but one observation which shows counter-instance is sufficient to conclusively falsify the corresponding universal statement. Based on this, every genuine theory

is prohibitive as it forbids particular events or occurrences. Therefore theories can be tested and falsified but never logically verified. Therefore a theory that has withstood testing has never been verified but rather has received a high measure of corroboration and may be retained as the best available theory until it is falsified (if it ever is) or superseded by a better theory.

While advocating Falsifiability as the criterion of demarcation for science, Popper notes that in practice a single conflicting or counter-instance is never sufficient to falsify a theory, and that scientific theories are often retained even though much of the available evidence conflicts with them, or is anomalous with respect to them. Popper stresses in particular that there is no unique way, no single method such as induction, which functions as the route to scientific theory, as science can come from anywhere.

## **THE HYPOTHETICO DEDUCTIVE MODEL**

The hypothetico-deductive model is the method by which Popper suggested that would be useful in bringing about testability and by extension Falsifiability. The hypothetico-deductive model was introduced by the English scholar William Whewell(1794-1866) and further developed by Karl Popper. According to Martyn Shuttleworth 2008, the hypothetico-deductive model is seen as the only 'true' scientific research method. It is the scientific method whereby science could set up testable hypotheses and then try to falsify them, rather than trying to confirm them directly by accumulating favourable evidence.

This method involves the traditional steps of observations to then elaborate upon an area of study. It enables the researcher to generate a testable and realistic hypothesis.

The hypothesis must be falsifiable by recognized scientific methods but can never be fully confirmed since refined research methods may disprove it in the future. The researcher must use the hypothesis to generate some initial predictions, which can be proved, or disproved, by the experimental process. These predictions must be inherently testable for the hypothetico-deductive method to be a valid process. For instance, a hypothesis that 'God exists' is not falsifiable, since there may be no scientific way to test it.

After a theory was deductively tested, the theories which survived the process of falsification were therefore confirmed in Whewell's opinion.

Popper however, believes that such theories are simply corroborated and this is expected to overcome the invalidity that is associated with induction.

## **DEDUCTIVE REASONING**

Popper believed that the growth of human knowledge proceeds from problems and attempts to solve them. In these attempts, theories are formulated and these theories need to go beyond the existing knowledge. According to Popper, the centrality and priority of problems are significant and as such Popper characterises scientists as problem-solvers. Additionally, because the scientist begins with problems rather than with observations or 'bare facts', Popper argues that the only logical technique which should be an integral part of scientific method is that of the deductive testing of theories. In this deductive procedure conclusions are inferred from a



tentative hypothesis. These conclusions are then compared with one another and with other relevant statements to determine whether they falsify or corroborate the hypothesis.

As a result, Popper identified four steps in the deductive process. The first step is informal and comprises testing the internal consistency of the theory to find out if it involves any contradictions. The second step is the semi-formal step where the theory is broken down into its empirical and its logical elements. The scientist should make the theory explicit at this point, to avoid asking the wrong questions. Most theories therefore contain a priori elements that are necessary to properly separate the empirical from the logical elements. The third step involves the comparison between the new theory with the existing theories to determine whether the new theory provides an advancement of the existing ones. This is essential because if the new theory does not constitute advancement, it will not be adopted. Conversely, if the new theory seeks to solve some previously unsolvable problems, as well as greater empirical content and explanatory power, it will be adopted. This can be illustrated by an example in Physics where Einstein's theory of relativity replaced Newton's theory of universal gravitation. The fourth and final step according to Popper, is the testing of a theory by empirical application of the conclusions derived from it. If these conclusions are shown to be true, the theory is corroborated (but never verified). However, if the conclusion is shown to be false, then this signals that the theory cannot be completely correct and logically the theory is falsified. The theory is not abandoned until a better theory exists to substitute. The scientist therefore lives to try again by developing a better theory.

As absurd as it may sound, Popper argues that the more improbable a theory is, the better is the theory scientifically, since the higher the probability and informative content of a theory, the more information it contains and there will be a greater number of ways to falsify it.

Falsification for Popper is a criterion of demarcation between scientific and unscientific theories. Falsifiable statements are scientific. Popper's Falsifiability leaves us with the Duhemian problem as the problem of what constitutes a 'whole theory' as well as what makes a statement meaningful is still unresolved. Falsification is thus an alternative the concept of verification.

## **GROWTH OF KNOWLEDGE**

In Popper's view, the advancement of scientific knowledge is an evolutionary process characterized by his formula:

- 

The term PS1 represents a given problem. The term TT represents a number of competing conjectures or tentative theories that are systematically subjected to the most rigorous attempts at falsification possible. This is done through the process of error elimination, represented by the term EE. Error elimination performs a similar function for science that natural selection performs for biological evolution. Theories that survive the process of refutation are more applicable to our problem PS1. This testing however does not protect a scientific theory from refutation in the future. The evolution of theories through the scientific method may, in Popper's view, reflect a certain type of progress toward more and more interesting problems indicated by the term PS2. Accordingly for Popper, the interplay of

tentative theories or conjectures and error elimination or refutation, constitutes the advancement of scientific knowledge through the creation of more problems.

## **CONCLUSION**

Popper believed that the philosophy of science is misled by a false principle of sufficient reason. Popper argued for theories to be tested and scrutinized as the goal of scientist should be to eliminate any possible errors in theories. Therefore, for Popper, disproof is more important than proof and Science should make every attempt to disprove a theory through the process of Falsification. This is because the harder it is to disprove a theory the more 'fit' the theory is and hence more relevant to the problem. For Popper, scientific progress was made when scientists invented high falsifiable theories. Popper viewed all knowledge as provisional, conjectural and hypothetical since we can never prove a theory but merely confirm or refute them. At any given time, we must chose between the potentially infinite number of theories which will explain the set of problems under investigation. Hence, we can only eliminate those theories that are demonstrably false, and rationally choose between the remaining and unfalsified theories.

### **Did the early economists think that Falsifiability had a role in the search for truth?**

Although Popper fully endorsed Falsifiability as the way to distinguish Science from Pseudo Science, scientists and by extension early economists[1], did not always follow this notion of Falsifiability in constructing their theories and deriving their conclusions.

<https://assignbuster.com/the-karl-popper-concept-of-falsifiability-philosophy-essay/>

Nineteenth century economists employed an economic methodology which focussed on the premises of economic theory and the importance of verification of economic predictions. This methodology emphasised the use of observations to arrive at a priori truths, known before the actual experience. Therefore it can be seen that the purpose of testing was to determine its applicability and never to determine its validity. " Early 'methodologists of economics were verificationists, not falsificationists, and they preached a defensive methodology to make the young science secure against any and all attacks.'[2]

Adam Smith's work *The Wealth of Nations* was in one instance a priori and in other parts included a great amount of inferences, and his premises were more so based on the inductive method. It can therefore be seen that the principles has no single methodological character. Smith stressed the importance of being able to form explanations by a single principle as more important to the capacity to make predictions. Smith's views however exerted no influence on the early economists and by extension the 19th century philosophy of science.

Another early economist, David Ricardo, was an advocate of the hypothetico-deductive model of explanation. Ricardo believed that economics is considered a science not because of its methods of investigation but as a result of its certainty of results. Ricardo's work contained a number of testable propositions which were positive predictions and not hypothetical ones. Statistical evidence available in the 1830s and 1840s falsified all of Ricardo's predictions. In spite of this, early economists including Mills remained an advocate of Ricardo's work because he employed various ad  
<https://assignbuster.com/the-karl-popper-concept-of-falsifiability-philosophy-essay/>

hoc propositions which seemed to protect the theories from refutation.

Ricardo's work was opposed to verification: that is, it did not check to see whether a theory is confirmed by the evidence rather than simply waiting to see whether some modifying circumstance has been left out of account.

John Stuart Mill, appeared to be a lukewarm verificationist. He categorises economics as a mental science which was mainly concerned with human motives and intention as it related to economic life, and this is where the concept of 'economic man' emerged. Mill's work contained the a priori method which is used to designate a mode of philosophy that is not founded on experience at all but which reasons from an assured hypothesis. This can be contrasted with the a posteriori method which requires specific experience. Mills 'economic man' for instance is not derived from specific observations or concrete events. His theory which is an assumption will only be true under certain suppositions.

Mill therefore uses a body of deductive analysis to arrive at his conclusions. Because of the impossibility of conducting controlled experiments in human affairs, Mill used a mixed inductive-deductive method a priori. However, the inductive element a posteriori is merely a means to verify the theory and not to discover the truth of it. In spite of Mill's use of the deductive method, he cannot agree that a failure to verify a prediction with a refutation of the underlying theory but rather that a discrepancy between our anticipation and the actual fact shows not that the original statement is wrong and should be disregarded but rather that it is sufficient. Mills is also a supporter of the ad hoc proposition, as he saw the tendency laws and their ceteris paribus clauses, which makes it easier to falsify a theory.

<https://assignbuster.com/the-karl-popper-concept-of-falsifiability-philosophy-essay/>

Mill's system of logic emphasises the importance of deductive logic and puts an end to the logic of induction as the only part to new knowledge.

Deductive reasoning was sometimes viewed as logically demonstrative form of casual proof and other times as a non demonstrative method of confirming and corroborating casual generalizations.

Mill viewed induction as a set of non demonstrative rules of confirmation-the four methods of agreement, difference, residues and concomitant variations-and his analysis of causation, which attempted to solve Hume's problem of induction. Mill asserted that these rules did not apply to the logic of social sciences because of the plurality of causes at work, the intermixture of separate effects and the impossibility of conducting controlled experiments. As such Mill suggested the geometrical or abstract method which has limited use and is only applicable where a single cause produces all effects; the physical or concrete deductive method which is exemplified by his work on the political economy and the historical or inverse deductive method which is concerned with establishing genuine laws of historical change resting on certain universal principles of human nature. Mill does not have a clear view as to the road to truth, since he often switches between the inductive and the deductive method at various points throughout his writing.

Based on the above, it can be seen that Mill's methodological position was no different from Ricardo's. Mill formally used the rules and Ricardo implicitly adopted the rules. Mill was a verificationist and he was no believer in the symmetry thesis. If a theory failed to predict accurately, Mill would suggest a search for sufficient supplementary causes to close the gap between the facts and the casual antecedents laid down in the theory because the theory

<https://assignbuster.com/the-karl-popper-concept-of-falsifiability-philosophy-essay/>

s true in any case as far as it goes by the motive of its true assumptions. This notion enabled Mill to keep Ricardo's work from refutation. Mill and other economists, appealed fundamentally to assumptions in finding validity. Thus, in economics as Mill had explained, we test the application of theories to determine whether enough of the disturbing economic causes have been taken into account to explain what actually happens in the real world after allowing, in addition, for noneconomic causes. We never test the validity of theories, because the conclusions are true as one aspect of human behaviour by virtue of the assumptions, which in turn are true by virtue of being based on self-evident facts of human experience. We are miles away, therefore, from the popular modern position that assumptions do not need to be tested directly, although, it might be useful if they could be, that in the final analysis only predictions matter and that the validity of an economic theory is established when the predictions to which it gives rise are repeatedly corroborated by the evidence.

John Elliott Cairnes, was firmly convinced of the fundamental validity of the basic Ricardian tendencies as was Mill. Cairnes was more stringent in denying that economic theories can ever be refuted by a single comparison between implications and facts. Cairnes well known proposition was that political economy is a hypothetico-deductive model science since its conclusions 'will correspond with facts only in the absence disturbing causes, which is, in other words, to say that they represent not positive but hypothetic truths' (Cairnes, 1988 p. 64) Cairnes therefore believes that economists are at an advantage to the physical sciences because they begin their explanation with a knowledge of the ultimate cause. Therefore the

economist does not conjecture but bases his assumptions on observations which are easily proved. It should be noted that because of the plurality of factors affecting economic life, verification can never be perfectly performed but if perfectly conducted the it produces sufficient evidence to corroborate the conclusions obtained. Cairnes then concluded, that economic laws can only be refuted by showing that either the principles and conditions assumed do not exist, or that the tendency which the law affirms does not follow as a necessary consequence from this assumption. Basically, either prove that the assumptions are unrealistic or do not apply to the case in question, or else demonstrate a logical inconsistency, but never take a refuted prediction as a reason for abandoning an economic theory, particularly, because only qualitative predictions are possible in economics. So Cairnes was a supporter of the fact that theories should seek to predict as well as explain.

We can therefore see that for Senior, Mill, and Cairnes, verification is not a testing of economic theories to see whether they are true or false but only a method of establishing the boundaries of application of theories deemed to be obviously true: one verifies in order to discover whether 'disturbing causes' can account for the discrepancies between stubborn facts and theoretically valid reasons; if they do, the theory has been wrongly applied, but the theory itself is still true. The question of whether there is any way of showing a logically consistent theory to be false is never even contemplated.

John Keynes was a supporter of Smith's work because of Smith's combination of both the inductive and deductive methods but he thought Smith and Mill's work were the proper way to apply the hypothetico-deductive model. Keynes believed that economics must begin with observations and end with

<https://assignbuster.com/the-karl-popper-concept-of-falsifiability-philosophy-essay/>



observations and had a keen difference between inductive determining of premises and inductive verification of conclusions. Keynes saw statistics as being essential in the testing and verification of economic theories although he had no examples of it working in practice. Therefore, if the economic theory is true, then its predictions will generally be true and whenever they are not, there will always be an ad hoc proposition to bear the blame for the discrepancy.

Robbins defined economics as a science which studies human behaviour as a relationship between a given hierarchy of ends and scarce means which have alternative uses. He saw observations and experience as being necessary in postulating theories and testing them. Robbins argued that the field of economics does not require controlled experiments to assess their validity because it is based on experience that is our everyday life. For Robbins a theory is valid when it is logically derived from the assumptions it makes. Robbins admitted that he paid little attention to the problem of testing both the assumptions and the implications of economic theory and went on to say, that had he known about Popper's work at the time, he would have approached it differently.

Hereafter, when Popper's work of Falsification was made available, the economic methodology somewhat changed, where econometrics was often regarded as the means by which a theory could be tested. What assigns economics as a unique science is that its particular theorems do not require verification or falsification on the grounds of experience, but rather, the ultimate measure of economic theories is solely reason unaided by experience.

<https://assignbuster.com/the-karl-popper-concept-of-falsifiability-philosophy-essay/>

All in all, it can be observed that verification is unnecessary in the field of economics.