A TWO-FOLD CRITIQUE OF POPPER'S FALSIFIABILITY

www.prshockley.org

I. Introduction:

Sir Karl Popper advocates a unique theory of scientific methodology known as falsificationism. This view states that a claim is scientific if and only if it is falsifiable.[1] Popper believes that verification should be placed upon the ability to refute or falsify evidence rather than posit value on the positive confirmation of a theory by experimentation. In fact, science progresses by systematically attempting to falsify "tested" hypotheses.[2] One benefit of falsificationism is that it seemingly appears to draw a sharp divide between science and non-science. In this paper I will summarize his scientific methodology. I will then proceed to give a two-fold critique as a scientific method. I will argue that falsification alone as a scientific method is too simplistic because additional factors need to be considered when evaluating a hypothesis and falsification alone does not significantly advance science.

II. Summary:

[1] *The Philosophy of Science* edited by Richard Boyd, Philip Gasper, and J.D. Trout (Cambridge: The MIT Press, 1991), 777.

[2] Ibid.

Before I critique Popper's falsification as a method of science, a three-fold summary of his scientific methodology is contextually helpful.

Failure of induction. First, Popper argues that it is impossible to prove any inductive hypothesis on the basis of empirical observations or mathematical probabilities; logical positivism simply does not work.[3] Popper states, "It is this type of inquiry [inductive theory of science or naturalistic methodology] which leads me to dispense with the principle of induction: not because such a principle is as a matter of fact never used in science, but because I think that it is not needed; that it does not help us; and that it even gives rise to inconsistencies."[4] In fact, Popper claims that it makes little difference where a hypothesis originates: induction, deduction, or even poetic inspiration.[5] What actually bears significance is whether a hypothesis is true or false.

Principle of falsification. Secondly, it is impossible to prove the truth of any hypothesis containing a universal statement (e.g., all swans are white).[6] His justification is that it takes an infinite number of observations to prove that a universal statement is true.[7] For example, in order to verify the universal claim that *all swans are white*, we must examine every swan to be unquestionably certain that all swans are, indeed, *white*. While it is beyond our ability to verify the universal statement, *all swans are white*, we have the capacity to falsify this claim (this goes around Hume's problem of induction).[8]

---

[3] Popper, *The Logic of Scientific Discovery* (New York: Harper and Row, 1968), 29.

[4] *Philosophy of Science*, 103.

[5] Ibid., 31-2.

[6] Ibid.,118.

[7] Ibid.

[8] Olga's class notes from Allison's presentation (pg. 1); Cf. *Philosophy of Science*, 122.

All it takes to disprove this universal statement is to find *one black swan*.[9] Therefore, Popper advocates the principle of falsification as scientific methodology.

The corroboration of theories. And third, Popper believes scientists spend too much time defending indefensible positions, outdated hypotheses, and theories which develop into fixed biases (dogmas) in the scientific community. Popper states, "The game of science is, in principle, without end. He who decides one day that scientific statements do not call for any further test, and that they can be regarded as finally verified, retires from the game."[10] Rather, scientific methodology should make every hypothesis falsifiable so erroneous claims may be identified and discarded, and new theories be developed. He states:

> Once a hypothesis has been proposed and tested, and has proved its mettle, it may not be allowed to drop out without 'good reason.' A 'good reason' may be, for instance: replacement of the hypothesis by another which is better testable; or the falsification of one of the consequences of the hypothesis.[11]

If a hypothesis survives falsification tests, it is to be classified as a well-corroborated hypothesis. This does not mean that a well-corroborated hypothesis is more likely to be true than an uncorroborated one, because one can never eliminate the infinite number of competing theories. Rather, Popper argues that we have reasons to hold on to the surviving theory (i.e., the most severely tested theory), subjecting it to further testing and revision; it is turning our focus, time, and industry on potential claims as opposed to stagnant claims and dogmas (e.g., celestial motion by Eudoxus).[12]

---

[9] Ibid., 122.

[10] Ibid., 103.

[11] Ibid.

[12] Ibid., 122-3; 775.

In sum, Popper favors content over origin, testable provability over and against universal un-testability, and the separation of good hypotheses from poor claims and even dogmas. Hence, Popper's notion for falsifiability is also labeled as "critical rationalism."[13] By following this three-fold methodology, good science is separated from pseudo-science, thus enabling scientists to focus acutely on well-corroborated theories so that scientific knowledge may possibly advance. He is not saying that pseudo-theories are meaningless or that they can or should be eliminated. Rather, these theories are simply non-scientific - on the basis of falsifiability.

Though Popper's scientific methodology is informative, precise, and logically elegant, I will now proceed to offer a two-fold critique of falsifiability as a method of science.

III. Critique:

Popper's falsifiability as a methodological science should be rejected because it is too simple for two reasons: (A) Additional factors need to be considered when evaluating a hypothesis other than falsifiability; (B) Falsifiability alone does not significantly advance science. I will now proceed to elaborate on each point. Afterward, I will offer a conclusion.

A. Other Factors Need to be Considered. First, Popper's view that science is distinguishable from non-science is too simplistic for two fundamental reasons: (1) I may have positive, multi-faceted reasons and a web of interrelated epistemic support for accepting a hypothesis which cannot be tested for falsifiability; (2) Scientific theories can

---

[13] Olga's class notes from Allison's presentation, 1.

and often include other factors for rejecting or accepting a hypothesis other than falsifiability.

Regarding the first claim that I may have both constructive and intricate motivations for accepting a hypothesis which cannot be tested for falsifiability, two examples suffice: "*All children need love*" and the Law of Universal Gravitation.

"*All children need love*." Though it is true that a person may not love a child, he or she can sustain the child with adequate means for physical growth, and therefore, claim that indeed, children don't need love, i.e., personal attention and affectionate stimulation. Yet there is plenty of scientific research to show that a child who is well cared for in every way would certainly have a more fulfilling existence. I would also argue that we are not prepared to throw out the statement that "all children need love" on the basis that it is pseudo or even non-scientific when the entire field of psychiatry, psychology, and even sociology are built on the health of individuals. For example, when an adult goes to visit a psychiatrist, the doctor's first question tends to be an inquiry into his or her childhood experience. Additionally, the epistemic support for these fields of study is so multifaceted that it would be non-sensical to classify these disciplines as non-science (e.g., psychiatry; psychology). Therefore, I have positive and multi-faceted reasons for accepting this universal and "scientific" statement which cannot be falsified.

Law of Gravity. Sir Isaac Newton's theory of universal gravitation states that "every body *a* exerts on every other body *b* a force F_{ab} whose direction is towards *a* and whose magnitude is a universal constant *g* times M_aM_b/d^2."[14] Though Hilary Putnam has already offered this as a critique, it is enough to state that the law of gravity is indeed a

[14] *Philosophy of Science*, 124.

scientific theory - even though no one is able to "strongly" falsify it.[15] Moreover, we are able to make observations on the basis of this law, e.g., gravity is necessary for muscular development and maintenance.

Secondly, scientific theories can and often include other factors for rejecting or accepting a hypothesis (other than falsifiability) such as metaphysical claims and the progress and success achieved in the physical sciences by practical experimentation. For example, let's consider Hobbes' physicalism (metaphysical position).[16] Physicalism is the view that all is matter or reducible to it. As Thomas Hobbes states:

> The world (I mean not the earth only, that dominates the lovers of it 'worldly men,' but the universe, that is, the whole mass of all things are) is corporeal, that is to say, body; and hath the dimensions of magnitude, namely, length, breadth, and depth: also every part of the body is likewise body, and hath the like dimensions; and consequently every part of the universe is body, and that which is not body is no part of it the universe: and because the universe is all, that which is no part of it is nothing, and consequently nowhere.[17]

I am not able to falsify this claim using falsifiability. In order for me to test Hobbes' physicalism I must stand outside of the universe. Since I cannot go outside the physical universe, I am not able to falsify it. One possible way I could test physicalism is to observe whether my mind can consciously survive death. But since my mind cannot function without my brain, my brain dies of consciousness as I physically die. In other words, in order to falsify Hobbes' physicalism I must have some existence as a mind, spirit, or soul that survives the dissolution of matter.

---

[15] Ibid.

[16] Ibid., 778.

[17] Thomas Hobbes, *Leviathan*, *Great Books of the Western World*, edited by Robert M. Hutchins (Chicago: Encyclopedia Britannica, 1952) 23: 269.

But then again I might have a way to falsify the hypothesis by the application of logic. For example, Hobbes' physical hypothesis that all is matter is not made up of matter. That is, Hobbes' hypothesis about matter has no matter in it. In other words, his idea about matter is not made up of physical evidence. Moreover, his thought about *all* matter stands above and beyond matter. Stated differently, if his thought about matter is a part of matter then it cannot be a thought about all matter, since being a part of matter it cannot transcend itself to make an assertion about all matter. Thus, Hobbes hypothesis that all is matter is logically falsifiable.

However, Popper would reject the above attempt to falsify this claim because, in his opinion, falsification only considers *empirical* hypotheses (logic alone is insufficient): Popper states:

> All these metaphysical concepts and ideas may have helped, even in their early forms, to bring order into man's picture of the world, and in some cases they may even have led to successful predictions. Yet an idea of this kind acquires scientific status only when it is presented in falsifiable form; that is to say, only when it has become possible to decide empirically between it and some rival theory.[18]

Thus, while physicalism is not falsifiable by Popper's standards, he presupposes it in his falsifiable method for science. I believe the reason why he does is because physicalism derives its plausibility from other sources such as the progress and success achieved in the physical sciences (e.g., chemistry).

Having argued additional factors need to be considered when evaluating a hypothesis other than falsification, such as multi-faceted reasons and interrelated epistemic support - which may not be able to be tested for falsifiability, I will now direct our attention to my second argument why falsification is too simple.

---

[18] Popper, *The Logic of Scientific Discovery*, 278.

B. *Falsifiability alone is inadequate in advancing science.* A well-corroborated hypothesis alone does not significantly advance science; other factors need to be included such as experimental practice. Let's consider the following:

1. The truth content of H_1 is greater than that of $H_{2;}$
2. The falsity content of H_2 is greater than that of $H_{1.}$

While H_1 and H_2 may be falsifiable, corroborated, and have the appearance of being true to a lesser or greater extent, I contend we need to consider other factors that go beyond falsification in order to make significant progress in science. For example, scientists may, in fact, have two well-corroborated hypotheses. But if other features of the hypotheses are not considered, it seems scientists will make little scientific progress in choosing one over the other. Conversely, one such factor that may significantly assist scientists in judging competing corroborated hypotheses is experimental practice (interference and interaction).[19] In other words, scientists are able to advance empirical science because they are able to take advantage of something more: the actual experimental activity or practical applications of "enhanced" hypotheses. As Ian Hacking states:

> Surely, there are innumerable entities and processes that humans will never know about. Perhaps there are many in principle we can never know about, since reality is bigger than us. The best kind of evidence for the reality of a postulated or inferred reality is that we can begin to measure it or otherwise understand its causal powers. The best evidence, in turn, that we have this kind of understanding is that we can set out, from scratch, to build machines that will work fairly reliably, taking advantage of this or that causal nexus. Hence engineering, not theorizing, is the best proof of scientific realism about entities.[20]

[19] Ibid., 247.

[20] Ibid., 258.

This is well documented in Hacking's comments regarding the construction of Peggy I, the experimental advancement with Peggy II, and the actual collection of neutrinos from the sun.[21] Thus, features such as success in experimental practice, not merely falsification, are needed to advance science because scientists are able to take these hypotheses and conduct experiments, carry out trials, implement practical research, and develop additional, new, or even nullify hypotheses.[22]

IV. Conclusion:

While I am not disputing the usefulness of falsifiability in view of its informative nature in both the hard sciences and even the humanities, I have argued that Sir Karl Popper's falsifiability as a methodological science should be rejected because it is too simple for at least two reasons: First, additional elements or issues need to be considered when evaluating a hypothesis other than falsification such as multi-faceted reasons and interrelated epistemic support which may not be able to be tested for falsifiability; and secondly, even an enhanced hypothesis, one that has survived multiple falsification attempts, does not significantly advance science; other aspects need to be included such as experimental practice.

[21] Ibid., 254-7.

[22] Ibid., 127.

BIBLIOGRAPHY:

Books:

Popper, Karl. *The Logic of Scientific Discovery*. New York: Harper and Row. 1968.

The Philosophy of Science. Edited by Richard Boyd, Philip Gasper, and J.D. Trout. Cambridge: The MIT Press. 1991.

Other:

645 Philosophy of Science Class Notes Fall 2006.