

AN EXEGESIS OF SCHOLARLY VIEWS ON KARL POPPER'S FALSIFICATIONISM

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Abstract

Karl Popper's falsificationism has been regarded as the cornerstone of Philosophy of Science. As it were, it has been subject to diverse scholarly perspectives. This paper provides an in-depth exegesis of prominent scholarly views on Popper's falsificationism examining both supportive and critical stances. By means of systematic analysis of key scholars and commentators, this research explores and elucidates the nuances and controversies that greet Popper's postulations. This exegesis exposes an interesting tapestry of perspectives as well as highlights the debates on demarcation, verification and the role of conjecture in Popper's Philosophy of Science. By synthesizing these scholarly views, this paper aims to provide a comprehensive understanding of the complexities and implications of Popper's falsificationism. This way, this paper contributes to the perennial discussions in Epistemology and Philosophy of Science.

Keywords: Exegesis, Scholarly Views, Falsificationism.

Introduction

Karl Popper's falsificationism has been a pivotal concept in the philosophy of science, shaping the way we understand the scientific method and the nature of knowledge. Since its introduction in the mid-20th century, falsificationism has been subject to diverse scholarly interpretations, critiques, and applications. As a result, a rich and complex landscape of perspectives has emerged, reflecting the nuances and controversies surrounding Popper's ideas.

This paper aims to provide an in-depth exegesis of the scholarly views on Popper's falsificationism, examining both the supportive and critical stances of prominent commentators. By delving into the works of key thinkers such as Imre Lakatos, Thomas Kuhn, and Paul Feyerabend, among others, this research seeks to clarify the core principles of Popper's falsificationism, identify areas of agreement and disagreement among scholars and analyze the implications of these perspectives for our understanding of science, knowledge, and reality. Through this comprehensive analysis, this paper aims to contribute to a deeper understanding of the complexities and significance of Popper's falsificationism, ultimately shedding light on the ongoing debates and discussions in the philosophy of science.

SCHOLARLY VIEWS ON KARL POPPER'S FALSIFICATIONISM: AN EXEGESIS

First and foremost, Bryan Magee in his book titled *Popper* states that what distinguishes science from non-science in the traditional view is the inductive method. He said that Popper denies the inductivist view which stipulates that "what the scientists are looking for are statements about the world which have the maximum degree of probability, given the evidence".¹ He went on to say that, for Popper, what the Scientists are interested in are statements with a high informative content. This is because the more information a statement contains the greater the number of ways in which it may turn out to be false. The fact that they are highly falsifiable makes them also highly testable since "informative content, which is in inverse proportion to probability, is in direct proportion to testability."² Therefore, the criterion of Demarcation between what is science and what is not according to Karl Popper is falsifiability. By implication, falsification becomes the anticipated fate of all hypotheses of science. Expatriating upon this, Magee states that:

Falsifiability is the criterion of demarcation between science and non-science. The central point is that if all possible states of affair fit in with a theory, then no actual state of affairs, no observations, no experimental results can be claimed as supporting evidence for it. There is no observable difference between its being true and its being

false. So it conveys no scientific information. Only if some imaginable observations would refute it, is it testable. And only if it is testable is it scientific.³

G.H.R. Parkinson, in his book, *The Theory of Meaning*, stated that it was as a result of search for a system to surpass the difficulties inherent in the verification principle as a criterion of demarcating science from non-science that the principle of falsification was arrived at. His argument goes thus:

This criterion has been attributed to Popper, who, however, has said that he did not aim at solving the problem of meaningfulness, but rather at solving the problem of how to draw the line between the statements of the sciences and all other statements. If a science is to be factually significant, what it says must be falsifiable.⁴

The import of Popper's idea is that a universal proposition can be falsified even if there is just one contrary instance. Thus in line with this, Parkinson has it that "the fact that a single contrary instance would falsify it establishes its scientificity."⁵ However, Parkinson does not think that Popper is correct. This is because for him, it may not be certain that a scientific law would be abandoned based on the strength of a single observation.

Maurice Cornforth, in his book, *The Open Philosophy and the Open society: A Reply to Sir Karl Popper's Refutations of Marxism*, is of the view that "Popper's theories about science and scientific method have acquired almost the status of a 'cult' among many younger scientists and intellectuals".⁶ He further maintains that for Popper, science does not only consist in proposing theories, but in testing them. This is because testability proves the scientificity of scientific theories; as such a theory that is testable is falsifiable.

Again, Cornforth attacks Popper for positing that scientific hypothesis can be separately stated as a falsifiable proposition and that each is tested on its own and independently of testing other connected hypotheses. Cornforth's disputation is that Popper does not take cognizance of how scientific theories are put forward. For Cornforth therefore, Popperian system is not how science proceeds. Cornforth brings out his argument more properly when he states that Popper ignores the fact that science is a social activity, and that scientific theories are not simply propositions which scientists formulate because they would like to see whether they can be falsified, but are theories important for and tested in social practice.⁷

Cornforth's line of thought is well understood. However, he seems not to have properly grasped Popper's aim of making falsification a criterion of demarcation between what is and what is not science. To that end, it becomes important to state that Popper was primarily concerned with discovery and innovation, and of course with the testing of theories and the growth of knowledge. Therefore, for Popper, falsifying or refuting theories is a sure way of making sure that growth in science is sure to come.

Zhenhua Yu, in his article, "Traditions, Authority and Originality in a Post-critical Perspective", writes that Karl Popper emphasizes the importance of critical rationalism in his theory of Falsification. According to Yu, Popper argues that the growth of science is not, as conceived by empiricists, a result of collecting or accumulation of empirical data, rather, it is a result of producing hypothesis and theories, then testing them. That is to say that "the role of observation is not to produce theories, but rather test and criticize them".⁸ In Yu's explication of Popper, he avers that scientific investigation begins with established hypothesis and theories.

In his book, *The Philosophy of Logical Positivism and the Growth of Science*, G.O. Ozumba made an allusion that Popper advocated for "Open Market Practice of Science".⁹ In it we see that imagination, that is what Popper termed bold conjectures, is important in science. In contrast, dogmatism in science is what Popper wants to jettison in its entirety. The field of science should be filled with scientists who are free in their manner of rational enquiry. In other words there should be no restriction in the practice of science as this would ensure growth in science. In this way "Science would cease to be portrayed as a cult for only a few".¹⁰ Ozumba further maintains that "the business of science would then be made public and this is bound to attract men of genius who have been barred entry for no good reason other than that science is a rarefied discipline for the chosen few".¹¹ Thus, in interpreting Popper on the issue of dogmatism in science, Ozumba proposes that it is only open market practice of science that

can fully permit refutation by new experience, which Popper rightly advocates. Therefore, for Ozumba “Popper teaches that it must be possible for an empirical scientific system to be refuted by experience.”¹²

In his book, *Science and the Open Society: The Future of Karl Popper's Philosophy*, M.A. Notturmo contends that “Popper appeals to deductive arguments not because they are conclusive, but because, as opposed to inductive arguments, they allow for criticism and revision.”¹³ For him, growth of knowledge and criticism go hand-in-hand because human minds are fallible. Thus, our fallibility makes it imperative for us to be critical of our theories. But this is possible only when we move from the awareness of our fallibility to the criticism of our theories. However, this happens only when we deliberately aim at the truth.

Stallan Ohlsson, in his book, *Falsification, Anomalies and Naturalistic Approach to Cognitive Change*, said that Karl Popper in *The Logic of Scientific Discovery* proposed that scientists are to change a theory when they find out that its predictions are contradicted by observations. For Ohlsson, “this idea of Popper was not a new one, but that Popper formulated it rigorously and promoted it as the main conceptual tool for understanding the dynamics science.”¹⁴

But Ohlsson was worried as to whether scientists actually discard a theory when the theory fails test. According to Ohlsson, Popper's core point was that theory of verification, which played a central role in Logical Positivism, lacks logical validity. Shedding light on this point, Ohlsson argues that:

If a prediction P is derivable from a theory T, observational support for P tells us nothing about the truth of T, because P might be derivable from many alternative theories, T₁, T₂,... Observation that show P to be false, on the other hand, logically imply the falsity of T... if observation that are consistent with a theory are ambiguous while observations that are inconsistent with it have clear implication, then it is plausible that the latter are more important determinants of scientific progress than the former.¹⁵

Stallan Ohlsson's submission on the aim of Popperian Philosophy of science is in order because the whole idea of falsificationism is geared towards ensuring and maintaining growth in human knowledge as well as progress in science and which the verification principle of the Logical Positivists is not likely to achieve.

On his own part, F. Williams stated that the most fundamental issues tackled by Karl Popper's Philosophy of science revolves around the demarcation of science from other sorts of assertions such as assertions of pseudoscience, metaphysics, and myths. He opined that earlier philosophies championed the idea that science is that which could be conclusively verified but that Popper's Philosophy rose in opposition to these earlier philosophies. Popper asserted that the criterion for scientific status of a theory should, in fact, be its ‘falsifiability’.

Thus, “for a proposition to be truly scientific, it must be capable of undergoing testing which should potentially demonstrate its falsity”.¹⁶

Williams further argues that Science is that which perseveres in the face of challenges, and that scientific guess is, at least in part, a search for falsifying instances of promising theories. Pseudo-sciences or non-sciences fall short of this criterion for the single reason that they are unfalsifiable. In furtherance of his position Williams contends that:

In spite of his insistence on demarcation by falsification, Popper was not as dismissive of non-science as some of his philosophical and scientific peers. In keeping with the general tenor of his thought, which viewed certainty as elusive, he realized that boundaries were often blurred. Pseudo-scientific ideas could, with proper tempering, later emerge fully fledged scientific theories (though they must eventually submit themselves to the falsifiability criterion).¹⁷

The nature of scientific statements, according to Popper, is that scientific hypotheses are not arrived at by induction but are formed by creative imagination. A scientist tests a hypothesis by seeking instances that falsify it. Also, even after exhaustive testing, "a hypothesis can never be considered more than provisionally true, science is not even a statement of probability, it is at best a guess".¹⁸

James Brown, in his article, "Popper and His theory of Falsification", posits that scientific change has been thought of as governed by rational procedures that incrementally help science achieve its goal. But for logical empiricists, the aim of scientific theories is to systematize knowledge in such a way that it yields true predictions in the observational language. As such, science progresses through the elimination of error by reducing one theory to another of greater scope. To make sense of these sorts of changes, "the logical empiricists developed accounts of reduction, explanation, and inductive logic confirmation of theory."¹⁹

According to Brown, Karl Popper and others offered different accounts of theory change. Thus he argues that:

Popper defended an eliminativist account whereby science attempts to eliminate or falsify theories. Only those theories that pass severe test ought to be provisionally accepted...Popper argued that there are no "paradoxes of falsification" parallel to the "paradoxes of confirmation". And, indeed, the only way in which even a material conditional can be falsified is by things satisfying the antecedent but not satisfying the consequence. Emphasis on falsification, therefore, implies that any serious test of hypothesis presuppose satisfying their antecedents, thereby suggesting a methodological maxim of deliberately searching for examples that should be most likely to reveal the falsity of a hypothesis if it is false...²⁰

Stefano Gattei, in his book, *Karl Popper's Philosophy of Science: Rationality without Foundation*, posits thus:

The core feature of Popper's thought-the key to understanding his ideas on objectivity and rationality, as well as on politics and society is that knowledge is not a form of justified true belief. The majority of philosophers have regarded it thus; in their eyes, knowledge is justifying belief. It is objective and rational if and only if it can be justified and an argument is a justification if and only if it is rational and objective.²¹

Dogmatism and relativism are two opposing authoritarian approaches to science. It is the idea that knowledge is a justified true belief that has brought the tale of rebellion against one authority or another which characterizes the greater part of Western Philosophy. The clash between competing authorities; from Aristotle to the Bible and from reason to experience, has been the brain child of this idea-knowledge as justified true belief. This is because each of them proved to be not only an inadequate justification, but also fallible and questionable in itself. Karl Popper's philosophy of science is all about trying to establish a coherent, rigorous and unstable middle way between these two opposing authoritarian approaches to science-dogmatism and relativism. Popper is chiefly interested in candid attempt to make the knowledge of science objective and rational without it being certain, without appealing to induction or grounding itself upon expert opinion, consensus, and authority of any kind. Gattei further opined that "Popper exposes the errors of any attempt at providing a foundation for our knowledge and describes science as empirical but not inductive, testable and confirmable but never certain, demarcated from metaphysics by falsifiability without deeming metaphysics meaningless".²²

Michael Drieschner, in his article, "Popper and Synthetic Judgment", demonstrates that Karl Popper bases his justification for falsificationism on Humean Philosophy. That is to say that Popper's problem of induction takes its bearing from Humean doubt. Popper's own doubt is whether "presupposing that there are laws of nature, the laws we accept are in fact valid."²³ It is the confusion emanating from these doubts that gave rise to falsificationism. In elaborating on this, Drieschner writes that:

This is how Popper arrives at his ultimate concern: He (Popper) maintains that attempts at falsification are the foremost task of natural science. Popper detests all dogmatic fixing, he wants to keep science alive, and he wants to encourage progress, which in his view consists of passing to new knowledge over what has been assumed to be true so far. So progress can only be promoted when science at all times is active in doubting and trying to disprove what has been considered to be true so far.²⁴

Drieschner lauds Popper's reason for the theory of falsification. However, the problem he has with Popper is that Popper did not succeed in his attempt to do without any positive confirmation of a proposed law. This is because "Popper says that one can consider those laws best corroborated that have best survived all attempts of falsification."²⁵

Steve Fifield, in his article, "Just a Theory: Exploring the Nature of Science", did observe that "while Popper overstated falsification role as a methodology, a good scientific theory must be falsifiable."²⁶ Fifield falls in line with Popper that every scientific theory should be inherently falsifiable. But the idea of Popper that falsification method is the only method science uses does not go down well with him. For him, method of induction is also a good and workable method which scientists use. Fifield finally concludes that both falsification and induction should be used by scientists in scientific research and findings.

Stefano Gattei, in his article, "Karl Popper's Philosophical Breakthrough", examines the origin as well as the gradual development of Karl Popper's Philosophy of Science. He stated that "at the very beginning of his philosophical development, Popper was an inductivist"²⁷. He holds that it was only later at a certain stage that Popper changed his position from inductivism to falsificationism. Elaborating on this, Gattei has this to say:

As I see him, Popper is the philosopher of revolution. He said that we learn from experience by the very act of overthrowing a theory with the help of that experience. We learn from experience, that is, by repeatedly positing explanatory hypotheses and refusing them experimentally, thus approximating the truth by stages. In other words, we gain theoretical knowledge when and only when revolution occurs²⁸.

Stefano Gattei understood and interpreted Popper well because Karl Popper's theory of falsification upholds the view that we learn and discover new ideas when we criticize our errors. Gattei further states that "Popper almost alone, and alone in the twentieth century, claimed that criticism institutes the very engine of the advancement of our understanding of the world and our place in it."²⁹ This portrays that for Popper, critical rationalism or simply falsification is the hallmark of every scientific enterprise.

John Wettersten in his Philosophy of Science is of the view that though it is a factuality that novel and enhanced views of science have been developed, the traditional inductivist views still subsist among many philosophers of science. The belief pattern of these philosophers of science who have held on to traditional inductivist views is that it is not possible to have any other view of science. For this reason they oppose any view of science which tries to critically interrogate the authority of the traditional inductivist views. Regarding this, Wettersten writes that:

Popper's Philosophy is now deemed a challenge which should be either absorbed into standard view or excluded from those possibilities deemed respectable. It must not be established the way inductivism, with some accommodation for conventionalism, now is... Popper's theory, then, gives a new dimension to the traditional problem. We may have knowledge without justification, but if we seek more, we run the very real danger of ending up with less... Only Popper and some of his followers see in conventionalism a threat to science, because it undermines the pursuit of truth and encourages obscurantism³⁰.

The import of Wettersten's submission is that there has been frantic effort in the philosophy of science to defend the authority of science based on the traditional inductivist view of science.

That explains why he sees Karl Popper as a revolutionary thinker in that he vehemently opposed this traditional conventionalist view of science. Recall that Popper's position is that undue emphasis on defence of authority of science is in resemblance with dogmatism which does not allow for flexibility in science and as such blocks creativity and progress. Thus, Popper maintains that critical rationalism or theory of falsification is the ideal way of ensuring creativity and progress in science.

In his article, "No more than Conjectures: Popper and the Ethics of Scientific Enterprise", N. G. Diora falls in line with Popper by postulating that "One of the most important achievements of Popper's Epistemology was his defense of the possibility of talking about knowledge growth without necessity to adhere to foundationalist model, also important is his claim that we don't need either to think knowledge progress as accumulation"³¹.

Accumulation of evidence to justify scientific theories amounts to inductivism and should not be the way of progress in science. Diora upholds this view as Popper that we can never achieve truth by means of induction. The growth of scientific knowledge, for Popper, is always revolutionary. A theory is often contrary to its predecessor in a logical sense.

Thus, "it cannot be viewed as an addition to its antecedent, but actually as a new development impossible to be deduced or inducted from the theory it is substituting"³². Going further, Diora states that:

What we can learn from Popperian Ethics of science are lessons of humility in scientific enterprise. We should not believe we can be bearers of the final truth; we need always to be open to discussion. We should always formulate our theories in a way that others can prove it to be false, we should strive for an 'open society' where the free discussion of ideas could take place³³.

The apparent position of Diora is that the attitude of falsification should be adopted by promulgators of knowledge. For him, this enables them to remain open to criticisms. In this way, a better and a purer body of knowledge is given birth to.

In his article, "The Logic of Discovery in Popper's Evolutionary Epistemology", M. Shah made it explicit when he posits that:

There is a sense in which Popper's account of scientific inquiry in terms of conjectures and refutations involves a type of logic of discovery. That is, if Popper is providing more than a mere description of the process of inquiry, then he is not just saying that hypotheses are, as a matter of fact, generated haphazardly but that hypotheses should be generated haphazardly. Thus, it is a negative logic of discovery, because it says that hypothesis should be generated haphazardly, that the haphazard generation of hypothesis provides the best chance for the success of scientific inquiry³².

According to Shah, Popper's position is that theories are generated anyhow. But this shows that Shah does not have a thorough comprehension of Popper's view of scientific theory as a product of conjectures and refutations. He only made reference as to how and when scientific theories originate without making reference to the end product and how it is arrived at. In other words, Shah did not talk about falsification which is what refines scientific conjectures. Thus, even when we may agree that scientific theory starts anyhow as Shah posits, we will not agree that scientific theory ends anyhow.

Park Seungbae in his paper *To Be Scientific is to Be Interactive*, focuses attention on "what is the nature of science?" as against "what is the nature of non-science. For him, this is a very vital question in the terrain of philosophy of science because "what we take to be science depends on what we take to be what science is".³⁶ Just

like Karl Popper proposed falsification as that which puts science apart from non-science, Seungbae, on his own part, proposed three approaches for understanding an object, including science. These approaches include “the historical approach, the functional approach and the compositional approach”.³⁷ In explaining briefly these approaches, he says “to put briefly, we investigate where an object came from, what it does, and what it is made up of in order to understand it”.³⁸

This simply means that the historical approach to understanding science investigates where science came from, the functional approach looks into what science does and the compositional approach questions what science is made up of. As it were, the three approaches as outlined above are very much ad rem to understanding what science is as against what science is not. However, the compositional approach underscores more the essence and the epicenter of this study which is understanding science apart from non-science from the point of view of Karl Popper’s falsification.

This is so because for Karl Popper, what demarcates science from non-science is falsification which for him is in the compositional character of science. It is interesting to underscore at this juncture that what Popper calls falsification is what Seungbae calls the interactive nature of science. In expatiating on the interactive nature of science, Seungbae has this to say:

Presocratic philosophers in ancient Greece proposed various hypotheses about the fundamental building blocks of the universe. For example, Thales, Anaximander, Pythagoras and Democritus contended that everything is made out of water, boundless, numbers and atoms, respectively. Their hope was to understand physical objects like trees, apples, stones, and so on by investigating their physical compositions ... According to Popper, presocratics initiated science by being engaged in a series of conjectures and refutations over the basic stuff of the universe.³⁹

In all this, Sungbae agrees with Popper that science is not a one-way enterprise neither is it an individualistic activity. Thus, for an enterprise to be counted as science, it must take on the character of being falsifiable. Shedding more light on the nature of science, Seungbae further submits that:

Science is composed of certain activities. The most salient ones are constructing hypothesis, observing the world, and performing experiments. Also, Science is not an individualistic enterprise but a collaborative enterprise. Scientists hold a meeting to reach an agreement on whether a particular experimental result establishes a hypothesis or not. They attend conferences and publish papers where they criticize opponents’ hypothesis and experiments, and defend their own hypothesis and experiments from their opponents’ criticism.⁴⁰

Suffice it to say that the above submission of Seungbae is a veritable way of understanding Popper’s falsification principle. That is to say that for a hypothesis to count as scientific, it must be falsifiable in itself. This is because science is not an individual activity, rather, it is a collaborative activity. Thus, in the postulation of Seungbae, science is an interactive enterprise.

Carl Hempel in his book - *Philosophy of Natural Science* submits that “to be scientific is to be testable”.⁴¹ For him, a scientific hypothesis is that which has a bearing on observations. He went further to present the process of testing a hypothesis as follows:

Assume that the hypothesis is true, we imagine what observable events would occur and would not occur. We observe the relevant part of the world. The hypothesis is confirmed and disconfirmed respectively, if an observable event occurs that agrees

with it, and if another observable event occurs that disagrees with it. Thus, the hypothesis passes or fails a test, depending on what observable event occurs.⁴²

In explaining his proposition that to be scientific is to be testable, Hempel concludes that “no statement or set of statements can be significantly proposed as a scientific hypothesis or theory unless it is amenable to objective empirical test, at least in principle”.⁴³ This goes to corroborate Poppers view on falsifiability of scientific hypotheses. For Popper, to be scientific is to be falsifiable. Here, we recall the submission of Hempel that to be scientific is to be testable. Thus, he aligns himself with Popper. Even though one may observe some semantic distinction in their terminologies, namely, ‘falsifiable’ and ‘testable’.

But by and large, the positions of Popper and Hempel are the same in terms of what constitutes science. Thus, for Hempel, a scientific hypothesis or theory is that which can be subjected to objective empirical test. This is very interesting due to the fact that it portrays another way of presenting Poppers position which is that “a hypothesis is falsifiable if and only if we can conceive of an observable event that is incompatible with it”.⁴⁴

Therefore, with this, Popper believes that falsifiability is the criterion for distinguishing between scientific hypotheses and nonscientific hypotheses. As a matter of fact, Popper puts it succinctly in his *Conjectures and Refutations* that “the criterion of falsifiability is a solution to this problem of demarcation, for it says that statement or systems of statements, in order to be ranked as scientific, must be capable of conflicting with possible or conceivable observations.”⁴⁵

Lewthwaite seems not to have properly understood the trajectory of Popper’s falsification when he stated that “scientists do not go about their labours seeking the falsification of their theories”.⁴⁶ His line of argument seems to suggest that he views falsification as an enterprise or activity that must be carried out by individual scientists on their own hypotheses. As if to strengthen his position, he stated thus:

It is unlikely that a scientist or theorist would accept the denouncement of an entire scientific theory simply on the grounds that an error has been identified in one of the many premises in an experiment test of that theory. Indeed, no legitimate ‘knowledge hunter’ would be so hasty in dismissing a life’s amount of work.⁴⁷

The above thoughts of Lewthwaite is undoubtedly a clear case of non-sequitor argument even as it is a logical trick in the fashion of digression. It is also argumentum ad ignorantiam, since it is a show of ignorance of what the falsification of Karl Popper entails. A proper hermeneutical approach to Popper’s falsification in science portrays science as an enterprise that makes progress. Therefore, scientists and indeed, ‘knowledge hunters’ as Lewthwaite calls them, should not settle for less when there is a reason to go even higher.

Papineau is another thinker who aligns himself with the thoughts of Lewthwaite. According to him, if scientists were to be solely concerned with refuting their theories, that it would undermine the goals of the scientific enterprise. This is yet another portrayal of lack of proper comprehension of Poppers falsification. Besides, Papineau mentioned about undermining the goals of science without mentioning not even one goal of science.

It is worthy of note that if not for anything, Popper’s falsification seeks to demarcate science from non-science or pseudo – science such as dogmatism, superstition, etc. Thus, falsification purifies science and makes it stand out as a progressive enterprise. Besides, if one looks at science as a problem solving exercise, will it be reasonable to remain stagnant when there is every capability to make improvement? By no means. Of course, growth and progress are part of life. That explains why falsification is seen as a means through which science grows. Therefore, it makes no sense to say that scientists should not be concerned with refuting their theories. Better theories will always supersede good theories and better theories will still give way for best theories. This is simply dialectics of scientific growth. This is why it sounds quite incomprehensible when Papineau stated that:

Popper's falsificationist strategy of conjectures and refutations can only deliver negative knowledge. It can show that certain scientific theories are false, but it never shows that any theory is true... There would be no point to science unless its conjectures sometimes acquired enough inductive evidence to graduate to the status of established truths. This is the real reason for testing hypothesis against predictions. The aim is not to falsify them, but to identify those that can be turned into the kind of positive knowledge that enables us to build bridges and treat disease.⁴⁸

The last parts of Papineau postulation amounts to a situation of someone licking his own spit. This is particularly so when he stated that – the aim is not to falsify them, but to identify those that can be turned into the kind of positive knowledge that enables us to build bridges and treat diseases. The clear understanding here is that Papineau is not so comfortable using the term-falsification, but he is quite at home with the end-result of the process of falsification.

Paul Thagard postulation is of great interest; his view directs attention to the progressive and problem-solving aspect of science. As a matter of fact, a comprehensive hermeneutical study of Popper's falsification would reveal progressive aspect of science as an inherent and an integral part of falsification. Put in another way, falsification portrays the progressive aspect of science as against non-science. This simply means that progressive aspect of science is in the character of falsification principles of Karl Popper.

Thus, Paul Thagard aligned himself with Popper's position when he posited that:

A theory is not scientific if it fulfills two conditions: 1) It is less progressive than alternative theories over a long period of time and faces many unresolved problems, and 2) The community of practitioners is making little attempts or none to develop to solve the problems, is not interested in the evaluation of the theory and is selective in terms of confirmations and disagreements.⁴⁹

The above position of Thagard suggests that any theory that is stagnant for over a period of time is anything but scientific. For Popper, falsification brings about progress and refinement of scientific theories. That explains why he (Popper) believes that any hypothesis that is in itself unfalsifiable, is nothing but non-science. Furthering on the position on the distinction between science and pseudoscience, Thagard holds that whereas pseudoscience is personal and subjective, science on its part, involves a systematic approach. This is yet another important aspect of falsification. Falsification involves a process and this process involves a systematic approach which is not found in non-science.

In the thoughts of Larry Laudan, scientific methodology is heterogeneous and as such there can be little chance of finding a necessary and sufficient criterion for demarcating science from non-science. The point to buttress here to correct or counter the impression of Laudan on the diverse nature of scientific methodology is that diversity of scientific methodology does not render any one method invalid. After all, he underscores that scientific method is heterogeneous, he should also acknowledge any one method as part and parcel of that heterogeneity.

Thus, it seems illogical for Laudan to note that “the demarcation between science and non-science was a pseudo-problem, more importantly focusing on the distinction between reliable and unreliable knowledge”.⁵⁰ The position of Sebastian Luta that “demarcation must not be the only necessary and sufficient condition; there must be a necessary criterion and a sufficiently different criterion”,⁵¹ is more acceptable in philosophy of science than Laudan's postulation that demarcation principle is a pseudo-problem.

In his *The Structure of Scientific Revolutions*, Kuhn argues that Popper's characterization of science only applies to extraordinary science and never to normal science. This implies that scientists may try to employ falsification of theories during the research period of extraordinary sciences and not during the research period of normal science. He posits that "normal science accounts for the overwhelming majority of the work done in basic science".⁵² Thus, Kuhn's supposition is that to be scientific is to engage in normal science. He stresses this point when he posited that "finally, and this is for now my main point, a careful look at the scientific enterprise suggests that it is normal science, in which sir Karl's sort of testing does not occur, rather than extraordinary science which most nearly distinguishes science from other enterprises."⁵³

Kuhn introduced his idea of paradigm change and holds that normal science goes for what scientists do when a paradigm would have been established, and it is followed by extraordinary science. Thus, in the Philosophy of Kuhn, three concepts stand out, namely; paradigm, normal science and extraordinary science. He defines paradigm as "the entire constellation of beliefs, values, techniques and so on shared by the members of a given community".⁵⁴ Kuhn went further to speak of normal science as a puzzle – solving enterprise. He views normal science as an enterprise that seeks to solve a puzzle (problem) in the field of knowledge. Here it is worthy of mention that what Kuhn refers to as "Normal Science" is what Popper strictly calls "Science" as against pseudo-science.

Just as Popper holds that there is a criterion of progress in science, Thomas Kuhn equally posits that progress in science does not involve a simple line that leads to the truth. He therefore, propose that it involves more progress away from less adequate conceptions to more and better conceptions of the world. This way, new theories are built on previous ones. As a matter of importance, Kuhn's proposition is that scientific progress comes by way of revolution. Kuhn cited 'The Copernican Revolution' as an example of revolution in science. For him, revolution comes through a paradigm shift. In the Philosophy of Kuhn, a paradigm could be regarded as an exemplar, which is the very best among examples.

It can also mean a model, a pattern and a template. Examples of such paradigms are scientific laws, theories, applications, experiments, etc. Kuhn explains that in the progress of science, each paradigm is the first port of call before a superior one takes over.

Another important philosopher in this philosophical voyage is Paul Feyerabend. In his book – *Against method*, he launched an intellectual attack on the rationalist account of scientific method which encourages the search for a system of rules that should guide scientists in generating scientific theories. Feyerabend argues that science does not have a specific method so that any tradition that can actually lead to knowledge should be encouraged and adopted in science. To further buttress his position, he contends that there should be proliferation of theories as a means of making progress in science. Little wonder he posits that "variety of opinions is necessary for objective knowledge"⁵⁵ For Feyerabend, relying on method inhibits and obstructs progress in science.

Feyerabend, like Popper, rejected induction as a method in science on the grounds that "induction is insufficient because it is bound to eliminate ideas simply because they do not fit into the framework of some older cosmology, but proliferation of theories leads to development of counter induction which is both a fact and is needed much more in the game of science".⁵⁶ Feyerabend also upholds the same view as Popper that the task of science is to give us a correct account of the world. Recall that Popper calls it satisfactory explanation about the world. Suffice it to say therefore, that Popper and Feyerabend argue that science has an aim and a goal which is to provide a correct account or satisfactory explanation about the world.

However, there is a point of divergence in Popper's and Feyerabend's account of science. While Popper expounded the method of falsification, Feyerabend, on his own part accounts for methodlessness in science. Rather, he proposed 'subjective wishes' of individuals as a way forward for growth and progress in science. According to him, it is these 'subjective wishes' that makes it possible for different individuals to exhibit freedom in the enterprise of science. An interesting thing in the point of divergence between Popper and Feyerabend is also the point of convergence between them; a critical and an analytic look at the 'subjective wish' of Feyerabend reveals a point of confluence with Popper's notion of conjecture. In popper's conjecture; the individual has freedom to

hazard a guess. Thus, at the level of conjecture, science is not yet born just as it is with ‘subjective wish’ of Feyerabend. This simply goes to suggest that in the position of popper, science comes to being when conjecture assumes an objective status. In a similar fashion, in the position of Feyerabend, science is born when ‘subjective wish’ translates to objectivity.

Imre Lakatos knowingly or unknowingly developed Popper’s idea of falsification. In his *Philosophy*, he demonstrated how popper’s falsificationism has actually contributed in the history of science and Philosophy of Science. Lakatos projected what could be regarded as ‘sophiscated falsification’ whereby series of theories can combine and over time mature into a better theory. He called it research programmes. It is interesting to note that although Lakatos did not totally agree with Popper, he did not as well discard the principle of falsification. Instead, he proposed some changes as to how falsification should be adopted. Thus he stated:

According to my methodology the great achievements are research programmes which can be evaluated in terms of progressive and degenerating problem shifts; and scientific revolutions consists of one research programme superseding (overtaking in progress) another. This methodology offers a new rational reconstruction of science. It is best presented by contrasting it with falsificatism and conventionalism, both of which it borrows essential elements.⁵⁷

In his *Methodology of Scientific Research Programmes*; Lakatos expressed a somewhat radical view of popper’s criterion of demarcation between science and non-science and contends that ‘ the problems of methodological falsification (Popper’s falsification) are that we have no means to judge whether the theories of our successive theories decrease or increase and that methodological falsification lacks history of science’.⁵⁸ Another interesting part of Lakatos’ *Methodology of Scientific Research Programmes* is his mention of prediction and novel facts. Expatiating on this, Wenceslao J. Gonzalez states that:

Prediction appears in Lakatos’ methodology of scientific research programs in at least three different levels: a) as an important aim of the research programs; b) as a procedure - a key method - to increase the scientific knowledge both theoretically and empirically; and c) as the way to access the scientific character of the knowledge claims - a form of evaluating results. At all these levels he (Lakatos) sees a connection between prediction and novel facts..... Moreover, the link between prediction of novel facts has an epistemological content which affects the methodological process of evaluating science according to the reliability of predictions.⁵⁹

Lakatos sees prediction as the creativity of the human mind so that there is no limit to what the human mind can create. In making clear his point he holds that “all the research programmes admired have one characteristic in common. They all predict novel facts, facts which had been either undreamt of or have indeed been contradicted by previous rival programmes”.⁶⁰

In his subtle analysis and hermeneutic approach to Lakatos’ position, Gonzalez opines that “Lakatos ordinarily uses prediction for the theoretical anticipation of a novel fact with a research program”.⁶¹ However, Lakatos somewhere in his book emphasized that “the novelty of a factual proposition can frequently be seen only after a long period has elapsed”.⁶² Lakatos went further to criticize the position of logical empiricists on their position that scientific hypotheses follows from the concordance with experimental data. Lakatos believes in the primacy of prediction.

Thus, for him, “new scientific hypotheses are assumed not simply in order to catch up gaps between data and theory but in order to predict novel facts”.⁶³ According to Gonzalez, “Lakatos’ conception considers a research program as degenerating when accommodating known facts, whereas he conceives that a progressive program is

one which anticipates new facts".⁶⁴ More still, Lakatos posits that when the program ceases to anticipate novel facts, its hard core might have to be abandoned."⁶⁵

In the Philosophy of Lakatos, prediction plays a very vital role in scientific progress and in the interpretation of scientific change. He sees scientific progress or change from point of view of superseding of theories. That is to say that "one research programme supersedes another if it has excess truth content over its rival in the sense that it predicts progressively all that its rival truly predicts and some more besides".⁶⁶ From the foregoing, one could see that the position of Lakatos is perceived more as a support to Popper's position rather than an attack. After all, Lakatos submitted that "a research programme is successful if it leads to a progressive problem shift and unsuccessful if it leads to a degenerating problem shift".⁶⁷ In similar view, he opines that "without falsificationist research, when faltering the inductivist research only, scientific progress halts".⁶⁸ Looking at the above, one sees a great similarity between Popper's Falsification and Lakatos' Methodology of Scientific Research Programme.

Conclusion:

This study has engaged in an exegesis of some scholarly views which has provided the enablement to see the various ways in which Popper's falsificationism has been interpreted. While these views are important in understanding Popper, it is important to note that they are never exhaustive. However, this exegesis has revealed a complex and dynamic landscape of perspectives, highlighting both the enduring significance and the contested nature of Popper's ideas. Through a critical examination of prominent commentators, this research has demonstrated that falsificationism remains a pivotal yet multifaceted concept in the philosophy of science.

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