

A CRITICAL ANALYSIS OF THE ROLE OF CONJECTURE IN KARL POPPER'S FALSIFICATIONISM

Charles Kosolu Onebunne (PhD)

Department of Philosophy, Nnamdi Azikiwe University, Awka, Nigeria

Email – ck.onebunne@unizik.edu.ng

Phone - 07039442817

Abstract

Karl Popper's falsificationism revolutionized the philosophy of science by way of highlighting the importance of testing hypotheses against empirical evidence. However, a crucial part of Popper's account that is often overlooked is the role of conjecture in the scientific process. This paper adopts the method of analysis to examine the interplay between conjecture and falsification. The paper contends that conjecture serves as the creative drive of scientific progress as it facilitates the formation of bold hypotheses that are subjected to rigorous testing and possible falsification. By showcasing this dynamic interplay between conjecture and falsification, this paper by means of analysis demonstrates the nuanced and iterative nature of scientific inquiry thereby postulating that conjecture is a necessary and valuable ingredient of Popper's Falsificationism. The paper concludes that by acknowledging and embracing the role of conjecture in scientific inquiry, scientists and knowledge seekers can gain a deeper understanding of the creative and innovative aspects of science as well as develop a more comprehensive and nuanced view of the scientific method.

Keywords: Conjecture, Falsificationism, Critical Analysis, Karl Popper.

Introduction

Etymologically, science is from the Latin word *scientia*, which means knowledge. This knowledge stems from an attempt to understand, explain, and predict the world we live in. This definition brings forth the conception of science as the intellectual and practical activity which has to do with the systematic study of the structure and behaviour of the universe. Again, science can be defined as the organized body of knowledge that is derived from observation that can be verified or tested by further investigation. This is where Popper's Falsification wades in while stating that a good scientific statement must be capable of being refuted by empirical events. For Popper, scientific statement or assertion at this level is better referred to as a conjecture. In the scientific realm, conjecture means drawing inference from presumptive evidence. Again, it is defined as a situation whereby a conclusion is deduced by means of surmising or guess work. For K. Popper, it is the state of a proposition before it has been proved or disproved. Therefore, the term conjecture is indicative of a proposition which is presumed to be real, true and genuine based on inconclusive grounds.

This paper provides a critical examination of the role of conjecture in Popper's falsificationism as it explores the tensions and synergies between these two concepts. By analyzing Popper's position and the works of relevant commentators, this research aims

to provide clarifications on the concept of conjecture in Popper's philosophy. While examining the relationship between conjecture and falsification, this paper evaluates the implications of conjecture for the scientific method as well as the growth of knowledge. This way, the paper seeks to contribute to a deeper understanding of the complex interplay between conjecture and falsification as it sheds light on the creative and dynamic nature of scientific inquiry.

Overview of Popper's Falsificationsim: Falsification is simply the principle of falsification which stipulates that a scientific theory is falsifiable if it is capable of conflicting with observable phenomena or events. It is a principle which states that “it must be possible for an empirical or scientific system to be refuted by experience”¹. This implies that there must be a logical possibility for an assertion to be demonstrated as false by observation or physical experiment. Therefore, a good scientific statement must be capable of being refuted by empirical events. However, it must be made clear that for something to be falsifiable does not in any way imply that it is false; on the contrary, falsification means that every scientific assertion must contain within it the tendency to be checkmated by observation and experiment. If there is no means of falsifying a theory, then that theory is anything but scientific.

Overview of Conjecture in Karl Popper's Philosophy: In the scientific realm, conjecture means drawing inference from presumptive evidence. Again, it is defined as a situation whereby a conclusion is deduced by means of surmising or guess work. For K. Popper, it is “the situation of a proposition before it has been proved or disproved”². Therefore, the term conjecture is indicative of a proposition which is presumed to be real, true and genuine based on inconclusive grounds.

Highlights of The Role and Implications of Conjecture in Popper's Falsificationism

Conjecture and Explanation in Science: The two major issues of attention in Popper's Philosophy of Science are his rejection of induction as a method in science and propounding of falsification in science. For him “all human knowledge is fallible and conjectural ... a product of the method of trial and error”³. In Popper's submission, scientists bring forth bold conjectures for trials and then carry out systematic falsification of those conjectures. In Popper's argument, for a proposition, statement or hypothesis to be counted as scientific it must be found to be at the risk of making some predictions. This is what Popper calls bold conjectures. Furthering his submission, he succinctly states that “statements or systems of statements, convey information about the empirical world only if they are capable of clashing with experience; or more precisely, only if they can be systematically tested, that is to say, if they can be subjected to tests which might result in their refutation.”⁴

In Popper's understanding of science, the duty of the scientist is to make a conjecture and try to refute it. For him therefore, making conjectures and falsifying them should be the real route of science. Therefore, scientific statements or propositions should be exposed to the risk of being falsified by way of subjecting them to severe tests. Popper explains that the greater the severity of the various tests, that the proposition has successfully endured the higher the degree of corroboration”⁵. What this implies in Popper's parlance is that well tested theories can as well remain merely provisional and therefore, can be rejected following an experimental result that runs contrary to its predictions or conjectures. About this, Popper's remark is that “scientific theories are either falsified or

forever remain hypothesis or conjectures”.⁶

In Popper's philosophy of science, conjecture and explanations or rather better explanations are intertwined. This is so because he believes that our desire for knowledge is linked to our desire for getting solutions to some problems. Thus, in the quest for knowledge for problem solving explanation are needed and indeed not just explanations but better explanations at every point in time. However, in the process of looking for explanation sometimes we ordinarily and already possess some forms of explanations which might have come by way of hazarding a guess or speculation. This is what Popper termed bold conjecture. But the already made explanation as the case may be could be inadequate to deal with the problem solving, hence the need for better explanations that surpass what are currently at hand. More still, these better explanations can still be expected to birth better and better explanations. In analyzing Popper, Danny Frederick in his article – *Karl Popper: Conjectures and Refutations*, reeled out some conditions of better explanations by stating that an explanation is better than another if:

- i. It is falsifiable while the other is not.
- ii. It explains what the other explains and some other things better.
- iii. It provides a unified solution to problems that were explained in different ways by the other.
- iv. It generates surprising falsifiable predictions that are not derivable from the other and those predictions survive testing.
- v. It corrects the other, that is, it shows that some falsifiable predictions of the other that were thought to be successful were actually not successful and it explains why they seemed successful.

This is a thorough representation of Popper's evolution of better explanations that emanate from conjectures. This is so because in Popper, we learn that for us to get better explanations we should expound conjectures and then subject them to criticism. When this is done, poorer explanations should be jettisoned in favour of better explanations.

Conjecture and Objectivity of Science: There is no doubt that science is an objective enterprise. This is so because it is public knowledge as against individual knowledge or information. Consequently, it is essential that in science, that the information about the object of study is accurate and reliable and therefore as objective as possible. The talk of science being objective is science not being influenced by human emotions, biases and prejudices. It is good to mention this because science being an empirical endeavor emanates from observations. Observations, in themselves are done by means of human senses such as senses of vision, taste, hearing, smell etc. Because our senses may differ from person to person, there is every indication that scientific objectivity is not guaranteed were science to rely on human senses alone.

For Karl Popper, the question of objectivity in science must not be swept under the carpet. This is so because, as has earlier been mentioned, science takes off from observations which are done by the senses. Thus, what we have at this level could be likened to personal feelings or personal convictions. This personal feelings are tantamount to conjectures that form the starting point of Popper's falsificationism. However, science is not the same as personal conviction because personal convictions are not sufficient to justify a statement. That is the reason why for Popper, Science begins with conjectures but tilts towards

objectivity. Hence the need for falsification. Thus, scientific statements or theories should not be accepted based on personal convictions as they are at variance with scientific objectivity. Expatiating on this in his *Logic of Scientific Discovery*, Popper notes that:

Even the fact, for me so firmly established that I am experiencing this feeling of conviction, cannot appear within the field of objective science except in the form of a psychological hypothesis which, of course, calls for inter-subjective testing: from the conjecture that I have this feeling of conviction the psychologist may deduce, with the help of psychological and other theories, certain prediction about my behaviour, and these may be confirmed or refuted in the course of experimental test.⁷

The implication of the above postulation of Karl Popper is that no matter the level of one's feeling of conviction about a particular statement or statements, it cannot constitute the ground for its acceptability and justifiability as scientific statement or statements. This is because such a statement lacks merit when placed in the scale of scientific objectivity. For scientific statements to be objective means that they have to pass through inter-subjective testing. This is falsification at play. Thus for Popper, "inter-subjective testing is an aspect of all the all-embracing idea of inter-subjective criticism or what may be called mutual rational control by critical discussions"⁸. This way Popper believes that the talk of objectivity of scientific statements lies in the fact that they can be inter-subjectively tested.

At this point may it be stressed that the question of inter-subjective testing of theories as Popper would have it has its root in falsification which takes off from conjectures. In itself, falsification aims at bringing about objectivity of scientific statements or theories. Thus, Popper's insistence on testing is designed to highlight the necessity that should greet every scientific statement to be capable of being tested so that there will not be any statement in the terrain of science that is accepted as true on the basis of sounding convincingly true but without appropriate testing.

In Philosophy of Science, objectivity is understood as the concept of truth that is independent of individual subjectivity, bias, prejudice, judgment, etc. Therefore, something is considered to be objective when its judgment is based on observable phenomena that is uninfluenced by emotions or personal prejudices. It is in the same vein that Popper underscores objectivity in science as that which "indicates that scientific knowledge should be justifiable, independently of anybody's whim: a justification is objective if in principle it can be tested and understood by anybody".⁹ Therefore, objectivity in science simply means that scientific statements exist independently of individuals' perceptions or conceptions. Scientific statements are not to be distorted by emotions or personal bias. Here we see that science is demarcated from non-science based on objectivity and subjectivity. Thus, whereas science thrives in objectivity, non-science is enshrouded in subjectivity.

For clarity sake, may it be highlighted that subjectivity refers to what is belonging to, proceeding from or relating to or emanating from a person's emotions, prejudice, sentiments, etc. This explains why subjective information usually consists of judgments, assumptions, beliefs, suspicion, rumour, etc. As a corollary, subjective information can

vary from person to person and so it can be far away from the truth. On the contrary, objective information does not vary and it is close to the truth. Based on the foregoing, some statements of suit Sayers, diviners, astrologers, etc, are not to be counted as scientific on the basis of them lacking in objectivity.

Therefore, it is here succinctly clear that the talk of scientific progress is the talk of search for objectivity. Thus, without objectivity, there is no science. That explains why Karl Popper expressed that scientific knowledge should be independent of any body's whims, prejudice, bias and perception. Scientific knowledge is equal to objective knowledge even though for Popper it may emanate from individuals perceptions or perspectives in the form of conjectures but it is not to stop at the level of conjecture. For Popper, conjectures are made and falsified for the sole purpose of scientific progress which in turn is the search for scientific objectivity. However, when conjectures are made and they do not pass falsifiability test, they are jettisoned on the ground of not being scientific. Thus, in Popper's Philosophy, falsification aims towards scientific objectivity just as scientific objectivity is a product or outcome of falsification.

Conjecture and Verisimilitude: Etymologically, the term - *verisimilitude* is a derivation of Latin term – *verisimilitude*. Dissection of the term takes us further to the origin which are 'verus' - 'true' and 'similis' – 'like'. The 'veri' in 'verisimilitude' is the genitive case of 'verus'. Thus we now have 'veri' and 'similis' which are 'of true' and 'like' respectively. Therefore, the concept of verisimilitude would translate to English as 'truthlikeness'. This is not different from its Greek equivalent – 'eikotos' which in English means – 'like the truth'. This term suggests that conjectures are made in the belief that it looks like the truth which is the goal of science.

At this point, this study will consider the concept of verisimilitude in Karl Popper's Philosophy of Science. It may sound contrasting to state that Popper believes that science does not ultimately seek after unraveling of truth. At best, it is the position of Karl Popper, after all, his theory of verisimilitude suggests that science in its move to explain reality as it relates to truth, can only try to come near to the truth. That simply means that science in its endeavor can only achieve truthlikeness. However, this does not take away the objective nature of science. After all, Popper's theory of falsification stipulates that the search for the truth sets out as a conjecture even as it is an ever continuous exercise. This implies that no theory in science can actually claim finality.

And for Popper, that spells progress in science. In explaining out the nexus between verisimilitude and objectivity, Popper portrays that:

The status of truth, in the objective sense, as correspondence to the facts, and its role as a regulative principle, may be compared to that of a mountain peak wrapped in clouds... A climber may not merely have difficulties in getting there – he may not know when he gets there, because he may be unable to distinguish, in the clouds, between the main summit and a subsidiary peak... yet this does not affect the objective existence of the summit; and if the climber tells us 'I doubt whether I reached the actual summit', then he does, by implication, recognize the objective existence of the summit ... the very idea of error or of doubt (in its normal straight

forward sense) implies the idea of an objective truth which we may fail to reach.¹⁰

The above outlined expatiation of Popper reveals how arduous and enduring the trajectory of truth could be. In his theory of conjecture we see how the search for truth begins from opinion (bold conjecture). As a matter of fact, Popper is not the first to offer this kind of explanation with regard to quest or search for truth. In his own right, Plato stated that “we, for the most time, live in the twilight zone between knowledge and ignorance.”¹¹ In a similar vein, Plato was quoted as having put forward the following lines below:

It is wisdom judging things correctly without being able to give a reason ... surely you see that this is not the same as knowing – for how could knowledge be unreasoning? And it's not ignorance either – for how could what it's the truth be ignorance? Correct judgment, of course has this character: it is in between understanding and ignorance.¹²

What the above lines portray is that there is no absolute or final truth in any understanding of the truth content of any concept.

On his own part, Popper is of the opinion that whatever the case, that we must not remain static. Instead, we must make progress because it is that way that scientific progress is assured. Therefore, for there to be progress in scientific knowledge, the scientist must critically engage in testing of already available theories in order to decipher a greater nearness or closeness to truth. This nearness to truth simply implies acceptance at any point in time of a scientific theory with greater explanatory power. This is so because Popper believes that every scientific theory is a response to a scientific problem which in turn is linked with discovery of an explanation. The theory of verisimilitude brings out the non-finality and fallibility of scientific theories. But Popper did not want to give in. That is why with his theory of verisimilitude he sounds very much hopeful that scientists can still get closer to the objective truth so much so that scientific progress is very much possible. Shedding light on this, Popper postulates thus:

Looking at the progress of scientific knowledge, many people have been moved to say that even though we do not know how near to or how far from the truth we are, we can, and often do approach more and more closely to the truth... I myself have sometimes said such things, but always with a twinge of bad conscience ... But as long as we speak as clearly as we can, yet do not pretend that what we are saying is clearer than it is ... there is no harm whatever in occasional vagueness, or in voicing every now and then our feelings and general intuitive impressions about things.¹³

The above position of Popper leads us to understand verisimilitude as an approximation to truth which means that every sincere search for truth portends getting closer to the truth.

Conjecture and Corroboration: The best way to present Popper's notion of corroboration is to explain it in terms of severe testing of theories which happen after conjectures have been made. For Popper, theories that could not be falsified by sincere effort and attempt are to be tentatively corroborated. Because Popper differs with the members of Vienna circle in their verification principle, he pointed out that corroboration is significantly different from verification. Thus for Popper, corroborating a theory is different from verifying it and that after all, a theory cannot be verified whereas it can be corroborated. At this juncture, he dismissed the arguments of the verificationists who sought to input truthfulness, falsity and probability to statements. Popper's contention here is that it is worthless to lay claims about probability of hypothesis in science. Instead, Popper believes that interest in science should be focused on how far hypotheses have been able to withstand series of tests and trials. This in the language of Popper is the same thing as examining how far hypotheses have been corroborated.

Therefore, to say that a theory or hypothesis is corroborated is the same as saying that it has successfully passed through series of tests. Shedding light on this, Feigl posits that "Popper allows for corroboration in the sense that we may say that a theory which has withstood very severe tests is at least until further notice, acceptable as part of the justified corpus of scientific knowledge claims".¹⁴ This goes to portray that the term corroboration in Popper's parlance can only be ascribed to a proposition tentatively and relatively and not actually absolutely. However, the qualities of universality and precision count in terms of degree of corroboration. That is to say that Popper holds that a theory has a high degree of corroboration if it has a high degree of universality. In the same vein, a theory that possesses the quality of precision has a better chance and degree of being corroborated as against imprecise theory. Therefore, for a test to be severely conducted upon a theory depends so much on the level of precision and universality of its assertion. Therefore, for Popper, the content and the nature of a scientific statement influences the extent of its testability and thus corroboration.

There is no doubt that Popper's effort within the terrain of Philosophy of science is to provide strong ground and foundation for scientific theories. Little wonder, he postulates that real scientists are given to making bold conjectures. By bold conjectures, he means conjectures that can be severely and independently tested. These bold conjectures would later metamorphose into theories that are capable of standing a better chance of being corroborated as against those that cannot be corroborated. Popper found some examples of statements that cannot be corroborated in the prophecies or predictions of sooth-sayers. For him, they cannot be corroborated because of imprecision that characterize them. Concerning this claim, Popper substantiates that: "... we are inclined to doubt so much as their alleged logical improbability since we intend to believe that such prophecies are non-corroborable, we also tend to argue in such cases from their low degree of corroborability to their low degree of testability".¹⁵ Popper's conception of corroboration denotes the genuineness of a scientific theory in terms of it withstanding severe tests. However, but more importantly, corroboration in Popper does not connote finality of scientific theory.

Conclusion

Falsification provided a new viewpoint on the scientific progress. In this view, scientific progress, following the falsificationist method, emerges from propositions of theories,

their refutations, and replacement with corrected theories that better explain the phenomena of interest. Falsification is therefore, a productive method that accelerates the growth of knowledge. It helps scientists improve their theories by pointing out those theories and their aspects that are empirically problematic. It also motivates the necessity of searching for existing theories' boundary conditions by encouraging researchers to examine domains where theories may not be valid. Clarification of existing theories' boundaries reveals 'gaps' for which new theories can be proposed.¹⁶ Popper posits that the real procedure of science is to operate from conjectures. That explains why he asserts that "all human knowledge is fallible and conjectural ... a product of the method of trial and error".² By this, Popper means that scientists bring forth bold conjectures for trials and then carry out systematic falsification of those conjectures.

This critical analysis of the role of conjecture in Karl Popper's falsificationism has revealed a complex and nuanced relationship between falsification and conjecture. While Popper projects falsification as a method of testing hypotheses he also highlighted the role of conjecture as a creative and speculative component of scientific inquiry. This way, it has become clear that conjecture and falsification cannot be mutually exclusive, but rather complementary aspects of the scientific process. This is so because whereas conjecture provides the creative spark and the first drive for new ideas and hypotheses, falsification serves as a critical filter, testing these ideas against empirical evidence. Therefore, this research portrays the fact that Popper's falsificationism is not a rigid or dogmatic framework in scientific endeavour, but rather a dynamic and iterative process that relies on the interplay between conjecture and falsification. Thus acknowledging and embracing the role of conjecture in scientific inquiry, scientists and knowledge seekers can gain a deeper understanding of the creative and innovative aspects of science as well as develop a more comprehensive and nuanced view of the scientific method.

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