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A Philosophical Appraisal of Karl Popper's Scientific Theory

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ABSTRACT

It is pertinent to disclose that Karl Popper's scientific theory is a theoretical leaning which comprises of the adaption of methods in evolutionary biology, cognitive psychology, developmental neuroscience and even artificial life programming toward the comprehension, structure and growth of epistemic claims. Borrowing heavily from these naturalistic approaches to codifying the phenomena, Karl Popper develops his idea of negative falsificationism which admits Darwin's theory of natural selection where all theories are allowed to compete, only for the fittest or best to be picked when others are discarded. Through the method of analysis, this study engages Popper's evolutionary epistemology, which encapsulates his scientific theory and his negative idea of falsificationism to show that in the end, the entire discourse has been the search for good reasons. In spite of the powerful arguments produced by Karl Popper, hid scientific theory has come under serious rebuttals which had to be defended by David Miller who tinkers that the essential character of the objections leveled against Popper has been thesearch for good reasons. Following Miller, a contemporary critical rationalist, this study concludes that there are no such things as good reasons, for why one theory is favoured more than another. The search for good reasons leads either to regression or begs the question.

Keywords: Evolutionary epistemology, Karl Popper, Falsificationism, Evolutionary Biology, Scientific knowledge.

INTRODUCTION

Perhaps it will helpful to commence with the understanding that evolutionary epistemology is an idea concerning how concepts and ideas spread in the scientific community. Karl Raimund Popper, who is one of the foremost proponents of evolutionary epistemology and whose reflections on science were affected by same, treats the process of science as a process of selecting among "bold theories," without emphasis on their sources or authors [1,2,3]. This is the case since scientific progress is replete with instances where theories are refuted even when they cannot be proved wrong. It is in this sense that Popper admits that the way to truth is paved by bold conjectures or trials [4]. The main thrust of the ideas of Popper on science therefore is the growth of knowledge and the continuity of animal and human knowledge [5]. Popper's analysis of scientific knowledge and its growth, we need to state from the outset is girded by evolutionary epistemology, whose main doctrine is worthy of exploring in order to grasp the foundation of Popper's analysis of the growth of science. Consequent of the foregoing, it is therefore instructive to commence with the given that evolutionary epistemology has also expanded to admit into its schema not only "evolutionary biology and philosophy, but also cognitive psychology, developmental neuroscience, and artificial life programming" [6]. In plain terms, evolutionary epistemology is a "naturalistic approach to epistemology, according to which human beings' and other organisms' capacities of knowledge and belief are the products of biological evolution (as well as social evolution)" [7]. This field being naturalistic, admits the approaches of the natural sciences and findings of evolutionary biology, cognitive psychology, developmental neuroscience in addressing epistemic issues such as the growth of knowledge, beliefs, and theories of truth and meaningful propositions. Evolutionary

epistemology finds place in Popper's *Logic of Scientific Discovery,* wherein Popper describes scientific progress and also prescribes a methodology for science through the idea of negative falsificationism. This association of Popper's evolutionary epistemology as falsificationism implies the analogy between biological evolution and the evolution of scientific theories. This is a view that has been branded as Evolutionary Epistemology of Theories [8]. This theory states that "growth of scientific theories is explained by way of analogy with biological evolutions...a lot of competing views will be proposed to explain phenomena in the world. But only one or some of them are accepted by scientists and all others are eliminated" [9]. This is a view that is upheld not only by [10] but [10,11,12]. In this paper, our aim is to provide a critical analysis to the points that have been leveled against Popper's version of evolutionary epistemology as inadequate. Using the method of analysis and logic, this study begins with the main thrust of Popper on evolutionary epistemology, in the next section. Afterward, it analyses some of the sharp objections leveled against his negative idea of falsificationism, which serves as the fulcrum of his evolutionary epistemology. In the last section, the crux of this paper is concluded.

An Analysis of Karl Popper's Negative Idea of Falsificationism as an Evolutionary Epistemology.

As had been hinted before,[13] believes that the central problem of epistemology has always been the one of growth of knowledge [14]. Popper provides what may be termed as selective elimination (through conjectures and refutations) logic to explain the growth of knowledge and scientific discoveries. He is certain that for nearly all times, there will be several competing theories, available to explain phenomena. He however insists that one of them will be preferred over others. This preference, Popper says, is due to survival of the fittest theory, following the thrust of evolutionary biology [15]. A theory is preferred or selected by exposing all the competing theories to real life application and eliminating those theories which are falsified [16]. [17], identified trial-and-error learning by humans and animals as illustrating his basic logic of inference i.e., natural selection. According to [18], scientific progress and also human as well as animal trial and error learning (analogically) follow a process of evolution through natural selection. This is a position that is also shared by Donald T. Campbell while proposing his 'General Selection Theory,' which has been seen as "all-purpose physicalist (a.k.a materialist, mechanist, naturalist) solution to puzzles of 'design'" [19]. With a very good comprehension of Popper's evolutionary epistemology encapsulated in his idea of negative falsificationism, the present scope is now to turn to this idea critically. Falsificationism or refutationism is an approach to statements, hypotheses or theories with the inherent possibility to prove it to be false [20]. A statement is called falsifiable if it is possible to conceive an observation or an argument which proves the statement in question to be false. In this sense falsify is synonymous with nullify, meaning" not to commit fraud but show to be false' [21]. Some philosophers argued that science must be falsifiable. For instance, by the problem of induction, no number of confirming observations can verify a universal generalization, such as "All swans are white", yet it is logically possible to falsify it by observing a singly black swan. Thus, the term falsifiability is sometimes synonymous to testability. Falsification considers scientific statements individually. Scientific theories are formed from groups of these sorts of statements, and it is these groups that must be accepted or rejected by scientists. Scientific theories can always be defended by the addition of ad hoc hypotheses. Thus the new theory had to posit the existence of unintuitive concepts such as energy levels, quanta and Heisenberg's uncertainty principle [6]. As Popper puts it, a decision is

required on the part of the scientist to accept or reject the statements that go to make up a theory or that might falsify it. 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. In his own words, Popper informs us that:

> My proposal is based upon an asymmetry between verifiability and falsifiability; an asymmetry which results from the logical form of universal statements. For these are never derivable from singular statements, but can be contradicted by singular statements [9].

Popper stressed that unfalsifiable statements are important in science. Contrary to intuition, unfalsifiable statements can be embedded in and deductively entailed by falsifiable theories. For example, while "all men are mortal" is unfalsifiable, it is a logical consequence of the falsifiable theory that "every man dies before he reaches the age of 150 years" [6]. Similarly, the ancient metaphysical and unfalsifiable idea of the existence of atoms has led to corresponding falsifiable modern theories. Popper invented the notion of metaphysical research programs to name such unfalsifiable ideas. In contrast to positivism, which held that statements are meaningless if they cannot be verified or falsified, Popper claimed that falsifiability is merely a special case of the more general notion of criticizability, even though he admitted that empirical refutation is one of the most effective methods by which theories can be criticized. Criticizability, in contrast to falsifiability, and thus rationality, may be comprehensive (i.e., have no logical limits), though this claim is controversial even among proponents of Popper's philosophy and critical rationalism. At each stage, experimental observation made a theory untenable (i.e., falsified it) and a new theory was found that had greater explanatory power (i.e., could account for the previously unexplained phenomena), and as a result, provided greater opportunity for its own falsification. Very close to the notion of falsificationism is the demarcation criterion. This had also concerned the logical positive scholars who clinged to the verification criterion. Popper noticed that the philosophers of the Vienna Circle had mixed two different problems, that of meaning and that of demarcation, and had proposed in Reductionism 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 [9]. Popper uses falsification as a criterion of demarcation to draw a sharp line between those theories that are scientific and those that are unscientific. It is useful to know if a statement or theory is falsifiable, if for no other reason than that it provides us with an understanding of the ways in which one might assess the theory. One might at the least be saved from attempting to falsify a non-falsifiable theory, or come to see an unfalsifiable theory as unsupportable. Popper claimed that, if a theory is falsifiable, then it is scientific [10]. The Popperian criterion excludes from the domain of science not unfalsifiable statements but only whole theories that contain no falsifiable statements; thus it leaves us with the Duhemian [13], problem of what constitutes a 'whole theory' as well as the problem of what makes a statement 'meaningful.' Popper's own falsificationism, thus, is not only an alternative to Reductionism; it is also an acknowledgement of the conceptual

distinction that previous theories had ignored. Thus far, we have been able to disclose how Popper's evolutionary epistemology works. We have shown that the nature of Popper's view of how knowledge is acquired it likened to Darwin's version wherein the fittest theory is the one that carries the day. As simple and straightforward as this idea is, it has come under serious critical scrutiny. This is what we contend with in the next section.

An Exposition of the Critical Receptions of Popper's Evolutionary Epistemology and Scientific Theory

Whereas Popper was concerned in the main with the logic or method of the growth of knowledge, borrowing from evolutionary biology and cognitive psychology, his reflections has come under critical receptions. It appears there are some scholars who do not share in his outlook or attitude concerning how the knowledge of scientific knowledge blossoms. These are the scholars that we concern with. Thomas Kuhn is one of the most influential minds that raised some objections and places of departure from Popper's evolutionary epistemology captured in his idea of negative falsificationism. Kuhn's influential book *The Structure of Scientific Revolutions* examined in detail the history of science. Kuhn argued that scientists work within a conceptual paradigm that strongly influences the way in which they see data. Scientists will go to great length to defend their paradigm against falsification, by the addition of *ad hoc* hypotheses to existing theories. Changing a 'paradigm' is difficult, as it requires an individual scientist to break with his or her peers and defend a heterodox theory [9]. Kuhn's work as a vindication for Popper's foray into evolutionary biology, since it provided historical evidence that science progressed by rejecting inadequate theories, and that it is the *decision*, on the part of the scientist, to accept or reject a theory that is the crucial element of falsificationism. Foremost amongst these was Imre Lakatos. Lakatos attempted to explain Kuhn's work by arguing that science progresses by the falsification of *research programs* rather than the more specific universal statements of naïve falsification. In Lakatos' approach, a scientist works within a research program that corresponds roughly with Kuhn's 'paradigm.' Whereas Popper rejected the use of *ad hoc* hypotheses as unscientific, Lakatos accepted their place in the development of new theories [11]. In other words, Imre Lakatos maintained that all scientific theories have a metaphysical "hard core" essential for the generation of hypotheses and theoretical assumptions. Thus, according to Lakatos, scientific changes are connected with vast cataclysmic metaphysical revolutions [13]. In a related development, Paul Feyerabend examined the history of science with a more critical eye, and ultimately rejected any prescriptive methodology at all. He rejected Lakatos' argument for ad hoc hypothesis, arguing that science would not have progressed without making use of any and all available methods to support new theories. He rejected any reliance on a scientific method, along with any special authority for science that might derive from such a method. Rather, he claimed that if one is keen to have a universally valid methodological rule, epistemological anarchism or *anything goes* would be the only candidate. For [11], any special status that science might have derives from the social and physical value of the results of science rather than its method. Much recent work has been devoted to analyzing the role of metaphysics in scientific theorizing. Alexandre Koyré led this movement, declaring in his book *Metaphysics and Measurement*, "It is not by following experiment, but by outstripping experiment, that the scientific mind makes progress" [15]. For Paul Feyerabend, even science does not need rationalists to stand on its feet. What science has offered us is a century of failure and to say metaphysics is irrelevant as some want to say is very untrue. In his own words, Feyerabend

showed that some of the disciplines that have a distinct logic of their own today may be said to have been plucked from metaphysics. He explains that:

> Scientific education as we know it today has precisely this aim. It simplifies 'science' by simplifying its participants: first, a domain of research is defined. The domain is separated from the rest of history (physics, for example, is separated from metaphysics and from theology) and given a 'logic' of its own. A thorough training in such a 'logic' then conditions those working in the domain; it makes their actions more uniform and it freezes large parts of the historical process as well [7].

Now, several scientists are usually prone to say some disciplines should adopt their methodology as though the scientific method is the best out of all. [4] insists that:

> Again I want to make two points: first, that science can stand on its own feet and does not need any help from rationalists, secular humanists, Marxists and similar religious movements; and, secondly, that non-scientific cultures, procedures and assumptions can also stand on their own feet and should be allowed to do so, if this is the wish of their representatives. Science must be protected from ideologies; and societies, especially democratic societies, must be protected from science. This does not mean that scientists cannot profit from a philosophical education and that humanity has not and never will profit from the sciences.

In their book *Fashionable Nonsense*, physicists Alan Sokal and Jean Bricmont criticized falsifiability on the grounds that it does not accurately describe the way science really works. They argue that theories are used because of their successes, not because of the failures of other theories. [8] write:

> When a theory successfully withstands an attempt at falsification, a scientist will, quite naturally, consider the theory to be partially confirmed and will accord it a greater likelihood or a higher subjective probability. ... But Popper will have none of this: throughout his life he was a stubborn opponent of any idea of 'confirmation' of a theory, or even of its 'probability'. ... [but] the history of science teaches us that scientific theories come to be accepted above all because of their successes

They further argue that falsifiability cannot distinguish between astrology and astronomy, as both make technical predictions that are sometimes incorrect. In spite of the foregoing objections leveled against Popper's evolutionary epistemology, it needs to be stated that Popper has come to be defended by David Miller, a contemporary philosopher of critical rationalism. [3], in his defense and restatement of critical rationalism admits that the critics of Popper have been searching for good reasons whereas there is nothing as such. He maintains that the quest for any such thing as good reason either leads to an infinite regress or begs the question. Elsewhere, [9] argues critically by that astrology does not lay itself open to falsification, while astronomy does, and this is the litmus test for science. This however, is another matter for another day. The main thing is that falsificationism and the demarcation criterion is not foolproof, however, the objections too are not error free.

CONCLUSION

We have been able to provide a historical genesis into Popper's foray into evolutionary biology and the use of these ideas to cater for the development and

progress of scientific knowledge. We have been able to reveal how this idea is captured in his theory of negative falsificationism. In spite of the strides recorded by Popper concerning how scientific knowledge builds, this essay has been able to show how Popper's evolutionary epistemology has been giving critical receptions before rounding up with the attempt by Miller who insisted that the hitherto assumed stance has been the search for good reasons. Miller however makes this bold claim to rouse from our dogmatic slumbers, for there is no thing as such.

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