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Dr. Willie U. Willie,

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Methodological Anarchism and the Growth of Science: A Critical Examination

ARCHIBONG, Emmanuel Iniobong, Ph.D
Faculty of Arts, Department of Philosophy
University of Uyo, Uyo-Nigeria

Mobile: +2348032325087
E-mail: emmaiarchibong@uniuyo.edu.ng

&

MICHAEL, Godwin Adahada (Doctoral Candidate)
Faculty of Arts, Department of Philosophy
University of Uyo, Uyo-Nigeria
Mobile: +2348064772258
E-mail: goddyesmyke@gmail.com

Abstract

In this paper, methodological anarchism is critically examined as one of the scientific philosophies that enhance the growth of science. The paper argues that methodological anarchism informs the point that science should not limit its practice to only prescribed empirical methods and rationality but that it should be humanitarian (human oriented or focused) in its quest to understand the world. By this, methodological anarchism upholds that the humanitarian nature of its character will foster the rapid growth of science. The paper avers that the debate about the methods of science and the discontentment among its practitioners divides philosophers of science. The paper shed light on the big picture of science and the possibility of vicissitudes of the natural world and at times, the failure of some prescribed methods bearing out their expected outcomes. This position is believed to be corroborated by the success of some of the seventeenth century great sciences that were not in compliance with the procedural methods of science. In this paper, it is critically and analytically argued that methodological anarchism enhances scientific growth because of its pragmatic and functional approach to science with its focus on what- ever insights that will help for the progress of humanity. The paper concludes by adding to the ongoing debate in philosophy of science particularly, on scientific

Keywords: Method, anarchism, theories, humanitarian, growth, diversity, progress, attitude.

Introduction

There are two perspectives to science which is science as a body of knowledge and science as a method of acquiring knowledge. The latter is held in this paper as a means to attaining the former. Method is important for science as a body of knowledge. There are many methodological claims to science as well as methodologists of science. In this paper, the concern is on non-methodologists. Methodologists uphold scientific rules and procedure as prerequisites for doing science. Non methodologists stand opposed to this claim. An example of non-methodological theory is methodological anarchism.

Methodological anarchism proposes the thesis that defends the assertion that science does not thrive by uniform and homogeneous procedures. It supports that the horizon of science is multifaceted and therefore, any procedure it takes can accomplish the desired result. Paul Feyerabend opines that "the events, the result, procedures that constitute the science have no common structure. There are no elements that occur in every scientific investigation but are missing elsewhere" (Feyerabend, Against Method 1). Anarchism also explains the fact that not every discovery can be accounted for in the same manner. A procedure that produces result at one material time may prove abortive at another time. Similarly, a procedure that leads to a breakthrough in a context may be completely ineffective in another. What these scenarios entail are diverse procedures.

Methodological anarchism or anarchism, therefore, is not chaotic and does not imply chaos, but the appropriation of multiple approaches for a solution to a problem. Science is not a fixated enterprise but a progressive one. Such progress is underscored in science such as is involved in the Copernican revolution. Revolution involves change in operational matrices, changes which entail the involvement of many approaches to solving a named problem. A point of interest in revolution could be that a named approach could solve a problem it was not designed for. This succeeds in widening the horizon of science. Surely this is the point Thomas Kuhn is underscoring in his Structures of Scientific Revolutions. In it, he claims that the employment of several operational matrices often leads to revolution. One could then ask how different such revolution is from anarchism, paying particular attention to their modus operandi? This paper argues out the claim that anarchism is both humanitarian and pragmatic.

Hence, methodologists having discovered the limiting impact on science by the use of methods and conformity to scientific rationality deviate significantly and disguise themselves as methodologists while in practice, they are anarchists.

The Notion of Science and the Scientific Method

The term science comes from the Latin 'scientia', meaning, knowledge that is based on empirical observation, demonstrable and that can be reproduced anywhere following the same principles. In keeping with this explanation, science arrives at its results through testing and observation. The different approaches of testing and observation are what is described as a scientific method. Science is classified, systematized, organized and tested. From this perspective, any organized body of knowledge could be described as science, and this qualifies every academic discipline as a science. Thus, the commonest view of science is that of a body of knowledge. Scientific horizon includes the study of the physical world and its phenomena. As a body of knowledge, science organizes knowledge into testable explanations and predictions about the universe and these can logically and rationally be explained. The seventeenth century scientific revolution is a clear case in point (Chalmers 1). One could claim that scientific knowledge comes directly from nature and since nature is not so uniform because of vicissitudes, science stands in need of different approaches of unraveling nature's mysteries.

As a method, science is used in the pursuit and discovery of knowledge. The physical and the natural world form the materials for scientific investigation. Science is often associated with the branch of studies that concern the natural world and physical entities. Within this purview are physics, chemistry, biology, geometry, geology and so on. These branch of studies are natural and empirical. We obtain knowledge of them from observation, inferences and empirical analysis. Jerome Mbat notes that "investigations are guided chosen methods and procedures which themselves are empirical" (6). This paper is therefore confronted with a more suitable ordering of science both as a body and as a method of knowledge acquisition. As a body, science must have been investigated and must have conformed to certain guidelines and accepted standards. It must, however, be replicable under the same conditions. On the other hand, as a method science is a procedure that is used to discover and acquire systematic and systematized knowledge. The method of science provides detailed explanations for the body of knowledge

acquired. Often, scientific investigation follows either inductive or deductive reasoning.

In science, inductive method proceeds from observable empirical facts to a generalization of events yet to be observed. On inductive and deductive reasoning, Henry P. and Koren H. claims that:

> The best known and most important in science are the deductive and inductive methods or briefly, deduction and induction. They correspond to the ways of progressing in thinking, viz, from the general and the universal to the less universal or particular and individual, and from the particular and individual to the general and universal [respectively]" (57).

Henry and Koren opine again that "by induction in general is meant the process whereby one passes from the less universal to the more universal, or more strictly from individual or particular to the more universal" (65). This means that inductive reasoning involves a generalization from particular instances which have been experienced to instances not yet experienced. Induction is the commonest kind of knowledge assessable to man. According to Susan Stebbing, "induction was first used by Aristotle" (243). Aristotle uses the word in two senses: in one sense, induction is used to refer to that process by means of which we apprehend a particular instance as exemplifying an abstract generalization. In the second sense, induction is a form of reasoning in which we establish a generalization by showing what it shows for every instance that is said to fall under it. As used, induction implies inferring from a particular concrete instance to a general or universal instance.

Induction could be described as an "ampliative [which is] reasoning from observed to unobserved, from part to whole, from sample to population" (Hugh 150). Induction provides for science the general principles for the generalization of facts from the basis of observation to those yet to be observed. In this sense, induction provides the basis upon which scientific laws and theories are formulated. Induction gained its popularity as a scientific method through the works of the seventeenth Century great scientists. The notable great scientists of the 17th Century were Galileo Galilei, Copernicus and Isaac Newton. These great scientists in their discoveries employed and popularized induction as a scientific method and this century witnessed a turning point as far as science is concerned.

There are two types of inductive approaches. The First is the simple enumeration or primitive or narrow sense induction. The Second is the sophisticated or mathematical induction. An argument is said to be simple or enumerative if it

claims to draw its conclusion from its premises directly in a simple step. For example, this consists in arguing that "because some or all observed 'A's are 'B's, therefore further 'A's are 'B' s" (Lacey 151). This in other words means that all 'A's are 'B's. The sophisticated form of induction is "any rational process where from the premise about some things of different kind, a conclusion is drawn about some or all of the remaining things of that kind." (Lacey151). Sophisticated or mathematical induction involves a transition from any information about a given set or situation to a conclusion about a more inclusive set of the thing. For instance, for the statement, 'all chairs in the hall are made of wood', this assertion is made after observing the chairs one by one. Positivism is closely connected to deductive method of scientific activity.

Positivism is the radical empiricist position which came into existence in the nineteenth century. Auguste Comte is popularly recognized as the father of positivism. However, positivism is also linked to the small group of philosophers who usually gathered to discuss philosophy in Vienna and was called the 'Vienna Circle'. The logical positivists claimed to have discovered the true task of philosophy which is: "to analyze knowledge statements with the aim of making them clear and unambiguous. The new philosophy would demonstrate the meaninglessness of all metaphysics and more constructively provide a foundation for empirical science" (Cardwell 54). By metaphysics, Positivists mean any claim to knowledge that cannot be verified by empirical testing or logic such as synthetic and analytic statements. The task of positivism aligns with its empiricist tradition of acquiring objective knowledge of the natural world by observation and testing.

In order to achieve its aims, positivism employs the scientific method of enquiry (experimentation and survey) after which it analyzes its results mathematically. At the conclusion, the results provide the evidence, the basis with which a hypothesis is either verified or rejected. Positivism uses deductive method. By deductive method here, we refer to that logical approach in which the truth of a particular case is deduced from generally observed and tested instances. The truth of this approach rather than being a matter of probability is that of necessity. Its approach moves from general established cases to particular instances. Richard Miller claims that "positivism seeks the general a priori principles that make a given body of data evidence for or against a hypothesis" (267). Based on its empirical and analytical character, positivist propositions can be distinguished from non-positivist propositions or systems basically through observation and experimentation. However, the

anarchistic school of thought is opposed to methodological prescriptions. For them, science must be open to a plurality of approaches and practices as we shall see.

Understanding Methodological Anarchism

Methodological anarchism as a view rejects the prescription of method for science. It is put forward and defended by Paul Feyerabend. This view challenges methodologists and advocates that any approach to science, provided, it brings about useful and desired outcomes, must be accepted. In his advocacy, Feyerabend defends the view that "science is essentially anarchistic enterprise: theoretical anarchism is more humanitarian and more likely to encourage progress than its law-and-order alternatives" (Against Method 9). Anarchism does not imply disor- der in the practice of science but a rejection of prescribed method and an advocacy for multiple approaches to the practice of science. Methodological anarchism proposes the thesis that defends its earlier assertion that science does not thrive by uniform and homogeneous procedures. It supports the view that science is multi- faceted and that any procedure it takes can accomplish the desired result.

Anarchism also explains the fact that not every discovery can be accounted for in the same manner. A procedure that produces result at one material time may prove abortive at another time. Similarly, a procedure that leads to a breakthrough in a context may be completely ineffective in another. What these scenarios entail is diverse procedures. Anarchism, therefore, is not chaotic and does not imply chaos, but the appropriation of multiple approaches for a solution to a problem. Science is here understood as not a fixated enterprise but a progressive one. Such progress is underscored in scientific revolutions such as could be that a named approach could solve a problem it was not designed for. Scientific revolution is neither dependent on nor achieved from scientific rationality.

Rationality of science is the methodologist conformity of practice with rules and procedures. For the anarchists, rationality is neither the basis of nor the method of science. Anarchism is pragmatic and humanitarian and Feyerabend strongly rejects rationality in science which tilts to the prescription of rules and norms, hence methods. Proponents of methods, according to Feyerabend will always find reasons to support it but rather than enhancing science, such rules are delimiting it and hence, detrimental to it (Against Method, 1). Methodologists must come to terms with the truth that scientific successes and progress is complex and can never

be explained in a simple and unidirectional manner. Furthermore, prescribing a method for science is (in Popperian term) corroboration -using the past success of science to prescribe for the future what is yet to be discovered. For Feyerabend, such arrogation or qualifications are arbitrary for it could be effective in some cases and abortive in others.

Scientific enterprise is pragmatic in the sense that what is needed in science are the results of its experimentation. When an approach offers the needed results, it should be exploited. To hold tenaciously to prescribed or scientifically accepted methods is like rejecting the desired outcomes of an activity because the method used is not the prescribed one (non-scientific). If, however, the result of an activity is what is needed from it, then it is ridiculous to seek a demarcation criterion (using Popper's term). Describing scientists as architects that build and corrects by destroying parts of their building, Feyerabend deconstructs the assertion that science is always successful for there are many instances of scientific failures and that science thrives by uniform method, for there are no such procedures (Against Method 2). Science basically operates by conjectures and refutations which as Feyerabend notes is anarchism in disguise. Conjectures and refutation imply that scientific activities are not always successful. This challenge entails a doublespeak role: firstly, it refutes methodological prescription for scientific activities and secondly, justifies methodological anarchism. Whereas the former limits science, the latter fosters scientific growth. This avowal agrees with the truth that scientific successes and achievements can only be evaluated not prior to but after the event of science. In this sense, methodological prescription is only but an abhorrence to scientific growth.

Scientific practices are not methods inclusive as Feyerabend strongly maintains. The fact that people lived, mastered, and survived their environment centuries before the advent of Western science alludes to this. What this means therefore is that, people use different approaches to provide their personal and environmental needs. There were no prescribed methods, yet it served their purposes. The dominance of contemporary Western science is accounted for by colonization as Feyerabend argues thus: "it is true that Western sciences now reign supreme all over the globe; however, the reason was not insight in its 'inherent rationality' but power play (the colonizing nations imposed their way of living) and the need for weapons: Western science has so far created the most efficient instrument of death" (Against Method 3).

The argument shows firstly that, prescribed methods are not really necessary for science, but rather limit its progress. Secondly, that the rationality of science if it has some merit, also replicates demerits, namely, instruments of death. Unintended impacts Feyerabend argues of Western science are lethal, creating problems as well as proffered some solution to the already existing problems. Feyerabend notes that the different ways our ancestors solved their problems represented their cultural values and that no science opposes them (Against Method 3). In what follows, adherents have fallen back to them and these nuance approaches put science on the path of growth and progress.

Methodical Anarchism and the Methodologists Arguments

Feyerabend, who is the arch-proponent of methodical anarchism is of the opinion that methodical rules and standards are narrow and restrictive to the scientific practice considering the vast area of scientific coverage. For him, methodological prescription does not only limit science but does same to the ingenuity of prospective scientists. Feyerabend refutes the claim of scientific rationality which according to methodologists consists in the rules and procedures of practice. Feyerabend rejects this and argues that the area of science is so broad; therefore, the area of discovery should not be restricted by rules and procedures alone. This will help to foster wide range discoveries and bring about multidimensional perspectives and inputs to science.

However, since science with its activities is not conclusive, the area of discovery is followed with justification. Scientific rationality could therefore be imposed on the aspect of justification. Feyerabend toe a slippery route and argues that contemporary science exists because rationality was not always imposed on it, it was sometimes ignored, and it accounted for the progress of the enterprise (Feyerabend Against Method 154). Feyerabend states further thus: "as rules and standards are usually taken to constitute 'rationality', we inferred that famous episode in science that are admired by scientists, philosophers and common folks were not 'rational', they did not occur in 'rational' manner, reason was not the moving force behind them, and they were not judged rationally" (Feyerabend Science in a Free Society, 14). Feyerabend is clear about the fact that scientific rationality is tied down to methodological rules but claims that the route to science is sloppier and more irrational than its claim of rational approach. He advised that any "attempt to make science more rational and more precise is bound to wipe it out" (Feyerabend

Against Method 164). Feyerabend rather maintains that scientific irrationality is beneficial to the scientific enterprise. He claims that irrationality of science brings about errors which are preconditions as well as points to the trajectories for new research.

Again, scientific rationality sometimes results to contradictions in practice. Feyerabend states his claim as follows: "some very and plausible rules and standards which both philosophers and scientists regarded as essential parts of rationality were violated in the course of episodes (Copernican Revolution; triumph of Kinetic theory; rise of quantum theory and so on) they regarded as equally essential" (Science in a Free Society 13). He argues that since rules and methods were violated by these great sciences, the more scientists become aware of this fact, the less insistence and emphasis they would place on methods and the wider the breakthrough. Thus, rules and method do not improve matter; rather they arrest the progress of science. His argument assumes that there is good science and that there is progress in science. For him, progress is independent of rules and methods. A case in point here is the science of the motion of the earth; atomic constitution of matter of the late nineteenth century (Feyerabend SFS 13). Feyerabend's insistence of methodical anarchism has two implications. Firstly, anarchism is humanitarian and diversifies scientific horizon and consequently, leads to revolution. Secondly, scientific rationality narrows down scientific spectrum and could stall science. In what follows, we attempt to demonstrate how the scientific methodologists manifest some features of anarchism.

Here, we consider "Scientific Research Programme" (SRP) of Imre Lakatos as a conglomeration of scientific theories that are used as a unit of appraisal. The remarkable thing is that member's theories of this group are connected and usually by certain features that fuse them together and so foster them as a programme (Lakatos 117). What justifies the Lakatosian SRP is the goal he claims for science, namely, higher attainment and proximity to the truth. Therefore, to attain this goal, rather than using a single goal for appraisal, theories should be conglomerated. The conglomeration of theories brings Lakatos to Feyerabend's critical search light. Feyerabend protests that Lakatos deviated from rationality. He argues that the deviation is aimed at rescuing science from the woes of scientific rationality, therefore, he introduces ad hoc hypotheses.

The ad hoc hypotheses resolve the contradictions between theory and fact. That is why the ad hoc is removed when the problems are solved. The ad hoc are the two

methodological rules, the positive and the negative heuristic. They are the guidelines for the research on the path to follow or avoid. Whereas the positive heuristic directs the research on the path to follow, the negative heuristic shows the research the path to avoid (Lakatos 47). The positive heuristic specifies what direction to follow. It "consists of a partially set of articulated set of suggestions or hints on how to change or develop a refutable variant of the research programme, how to modify, sophisticate the refutable protective belt" (Lakatos 50). Similarly, the negative consist of the hard core of the programme which is the theoretical assumptions that are presupposed by every theory which is a member of the SRP. The negative heuristic specifies the hard core of the programme which is irrefutable by the methodological decision of its opponent (Lakatos 50). It forbids the researcher to direct modus tollens to the hard core but to generate an auxiliary theory if need be (Lakatos 48). We think that the working of the SRP regarding the positive and negative heuristics and generating of auxiliary theories is not very different from conjecture and refutation, for since the researcher is unsure of the specific outcomes of his research, he uses the "conjectural" negative and positive heuristics for guidance. In thinking through the scientific rationality, if it consists of definite rules and approaches, then the introduction of these heuristics contradicts it. The expectation of anomalies in the course of the research will prompt the introduction of the heuristics. The positive and negative heuristic entail plurality of methods simultaneously which amounts to methodological anarchism.

Feyerabend contends that whether the ad hoc is removed or not, their introduction amount to a replacement of standard and so affects the scientific rationality (Lakatos 14).The refutation of this practice invariably is the refutation of scientific rationality. From the above argument, rationality is unnecessary for scientific practice. The conclusion then is that, for Feyerabend, Lakatosian Scientific Research Programme is anarchism in disguise because it consists of a chain of theories as a unit of appraisal. Feyerabend calls Lakatos his fellow anarchist and criticizes Scientific Research Programme as "naïve and simple-minded rules" (Feyerabend Against Method 9). He also faults scientific rationality as a maze of interactions. By this he means every scientific epoch and aspect of science is unique and peculiar in their characteristics and decision of method cannot be made a common rule. This suggests that scientific activities have to be carried out individually and treated based on their unique merits. In this way, methodological prescription (which underlies rationality) is uncalled for otherwise we are thrown into mass confusion.

From the above, one could still question how the Scientific Research Programme is very different from anarchism.

Scientific revolution describes a paradigmatic growth of science. This description is espoused by Thomas Kuhn. The Kuhnian description of the path of scientific growth is more inclined to anarchism because it passes through several phases. The bottom line of it is the practice of normal science. Normal science is research based on past scientific achievements acknowledged by the scientific community as a foundation for their practice (Kuhn The Structure of Scientific Revolution, 10). The normal science could be assessed as a process that adds new idea to a pre-existing knowledge through experimentations and ordinary reading of books. Normal science is directed specifically at puzzle solving, as an instance to ascertain if a certain conjecture could be understood (Kuhn Logic 4). In this scenario, progress plays out in the ability of constructed theories to solve the puzzles they were designed for. It is because of this reason that Kuhn claims that scientific progress is a movement from a scientific episode to another, for instance from normal science to revolutionary science. Notably, it is the instance of an anomaly that occasion the engagement of the community of scientists to carry out a revolutionary shift.

An anomaly is a discrepancy that occurs between a paradigm at hand and an experimental result. In other words, an anomaly arises when the result of an experiment deviates from the expectation of normal science in the area of solvable problems. Anomalies lead to new paradigms or paradigm shift. Kuhn has equivocal use of the term paradigm but in our context here, a paradigm refers to a theory or rule, procedure of scientific practice at a given time. For Kuhn, the number of followers and the open-endedness of science that leaves the scientific activities for practitioners fosters the achievement of the paradigms (Kuhn The Structure of Scientific Revolution, 10). Scientific revolution, therefore, goes beyond the puzzle solving of normal science because it often bring about results that were not directly aimed at i.e. unexpected outcomes. “Scientific revolutions are taken to be those non-cumulative developmental episodes in which an older paradigm is replaced, in whole or in part by an incompatible new one” (Kuhn The Structure of Scientific Revolution, 92). As seen above, revolution does not just arise from accretion of theories or knowledge but by intensified practise by practitioners in want of result for existing problem.

What is clear is that the path to scientific revolution is not unidirectional but do defy the scientific rationality. Scientific rationality could be established at the point

of development of the anomaly in the normal practice. What counts as a failed theory for a methodologist (Popper) is jettisoning of the theory. But for Lakatos in his Scientific Research Programme the scientist would develop auxiliary theory along with positive or negative heuristic to guide the theory and the scientific research to success. However, for Kuhn in his scientific revolution, when the research has developed an anomaly, there is a discrepancy between the current paradigm and the experimental results which trigger on a revolution. The revolution therefore, will involve activities of several scientists in several scientific communities that try to find solution to the problem that put them to work. In the revolution, several paradigms are used. The appropriation of several paradigms to get to the desired result is anarchistic in approach. The anarchism is occasioned from the known paradigm to solve the puzzle for which it was designed in the normal practice of science. The anomaly accompanied the change in the paradigm and the involvement of more scientists that in turn bring about the result that solved the puzzle. Examples of such revolution are the Copernican revolution, the transition from quantum mechanics, Lavoisier's experiment on calcinations (Kuhn The Structure of Scientific Revolution, 92).

The process of scientific revolution above could be understood as anarchistic. It defies the rationality of science at the point of anomaly. It is the challenge posed by the anomaly that led to the revolution. The revolution proved to robustly support the growth of science because both the intended and unintended scientific problems were solved due to the paradigm shift. The conclusion here is that scientific revolution invariably implies scientific growth. This comes about through change in paradigm (methods, theories, rules, approaches) employment of many scientists in many communities. Falsificationism is another method that thrives strictly on scientific rationality. Falsificationism represents strict methodological prescription in the practice of science as championed by Karl Popper. Falsificationism consists in a critical testing or discussion of a scientific theory such that the theory under test or discussion proves its mettle and is accepted as having passed the critical tests without being verified. Popper declares that "if the observation shows that the predicted effect is definitely absent, the theory is simply refuted. The theory is incompatible with certain possible result of observation" (Conjectures and Refutations, 36).

Falsificationism is strictly guided by scientific rationality as its rules are strict to the point that a theory that failed to produce the required effect is thrown out. It

is the more important that the theory must be scientific, that is, it must have the capacity to be falsified. It must contain sufficient empirical content that exposes it to critical discussion and testing. These contents account for the scientificity of the theory. It is for this reason that testability assumes the feature of the scientific theory and "the criterion for the scientific status of a theory is its falsifiability or refutability or testability" (Popper Conjectures and Refutations, 37). These features are the virtue of science and together they make up the criterion of demarcation between science and pseudo-science. In other words, a false science cannot be tested whereas a true science is testable.

Falsificationism has a single theory as a unit of appraisal. At the end of any critical discussion, the theory either proves its mettle or is jettisoned. Popper thinks that by treating a scientific theory in this way, the theory is not found wanting. More insights into the Popperian rationality is shared by Anthony O' Hear who argues that "the true scientist does not attempt fruitlessly to prove or to make theories probable by the laborious pilling of insignificant and ultimately unravelling confirming evidence. Rather in the spirit of natural selection, scientific theories have to prove their mettle against the fiercest competition that can be found wanting" (35). O' Hear shares in Popper's approach of jettisoning theories with low empirical contents because they are not genuine scientific theory because of their inability for critical tests or discussion. Thus, like the Darwinian theory of natural selection, the weaker ones must be weeded out.

Despite Popper's affinity with rationality, some strands of irrationality could be detected in his characterization of falsificationism. Although this paper does not intend a detailed discussion of it, some highlights can suffice. Firstly, corroboration is a term used to explain the success of a new theory based on the merit of a previously successful theory. Corroboration explains the merit of a theory in the past not in the future. Popper states that:

> by degree of corroboration of a theory, I mean a concise report evaluating (at a certain time, t) of the critical discussion of a theory, with respect to the way it solves its problems; its degree of testability; the severity of the test it has undergone and the way it stood up to these tests. Corroboration or degree of corroboration is thus an evaluating report of past performance. (Objective Knowledge 18)

We can understand here that the theory in question only agrees with a past theory. Our argument is that, the acceptance of the theory is based on the merit of a

previous theory. By not following the rationality of science which Popper himself is so faithful to, the corroboration principle becomes anarchistic. And what is more, it facilitates accretion of theories not based on their merits but on those of the past. An error in the principle of corroboration is that it is still not verification for a new theory so that more or stronger empirical contents can jettison corroborated theories.

A retroactive justification of a scientific theory implies two things. The first is that the notion of relative verisimilitude (truth-likeness) of the theory is high. Verisimilitude of a scientific theory explains the amount of the truth contents of a scientific theory less its falsity contents. The amount of the truth contents of a theory implies that the theory is closer to the truth. This means that two theories could possess different verisimilitude (Popper Conjectures and Refutations, 233). Thus, the one with the higher verisimilitude is merely preferred and accepted at the given time. The point is that it may not really be the desired theory. Being closer to the truth does not really imply the truth. Furthermore, some indices of Popperian anarchism is also in his notion of probability.

Probability means a likelihood that a named event will occur. In Popper, probability expresses uncertainty. The idea of a subjective interpretation of subjective probability in its original sense could be understood as the measure of feeling about the certainty of an event or the uncertainty of an event on the one hand or the feeling of a doubt or a belief on the other hand (Popper Logic.148). Probability is associated to the chances of a certain event occurring or the likelihood of a proposition being true or not. The notion of probability is a deviation from the rationality of science in the methodologists' construct. An appeal to this irrationality is to increase the chances of broadening the scientific horizon which entails anarchism. There is a link running through probability, corroboration, and falsifiability. Popper tells us that "the logical probability of a statement is complementary to its degree of falsifiability: it increases with decreasing degree of falsifiability". (Popper Logic, 119) This implies that if the falsifiability of two statements are compared, the less falsifiable statement is also the less probable. Therefore, the better testable theory is one which is more probable because it has more explanatory power. The tenacious use of the above features by falsificationism stipulates the difficulties of conclusively asserting the rationality of science which for its adherents underscores methodological justification in the practice of science.

Critical Evaluation

Methodological anarchism supports plurality of scientific methods in the practice of science and Feyerabend's methodological anarchism offers a different perspective for evaluating scientific rationality. The vastness of the area covered by science, the vicissitude of the natural and empirical world and the humanitarian need seem to justify methodological anarchism. To consolidate anarchism, Feyerabend views scientific practice in two segments which are discovery and justification. Firstly, the area of discovery covers the different activities of scientists in their various scientific communities and practice of normal science (to use the words of Kuhn). This segment of scientific practice is primarily for solving difficult puzzles. Feyerabend defends the view that in scientific discovery, anarchism should be used since it offers to practising scientists a wider horizon to employ different methods. It is in connection to this that he eulogizes anarchism as being humanitarian. This understanding explains why Chukwuokolo opines that "the epistemological framework of Afro-constructionism is in tandem with Feyerabend's repudiation of hegemonic imposition of the method of modern science and is valid". (42).

By being humanitarian, Feyerabend means that it allows practitioners to use different and available methods to unravel the mystery of the universe. We agree that besides being humanitarian, anarchism is also pragmatic because it allows any relevant method to be used for science bringing about the needed knowledge and solution to humans. Feyerabend thinks of discovery as a preliminary aspect of science and must not be restricted. In defence of this position, he argues that before the advent of Western science, people in the earliest centuries solved their problems using nuanced humanitarian and pragmatic methods and got results for their problems. The area if discovery must not be limited by rationality of rules and methods as this can be quite limiting. Anowai and Okafor (21) agrees that "there is no universal way to development. Development is dependent on the circumstances and conditions of the environment. History has shown that no culture is bereft of the capacity to develop science and technology".

On the area of justification, this is characteristically different from discovery. For this reason, scientific rationality, if it must be imposed should not be on this area. The reason could be for the sake of verification of facts as a window to understanding things as they are in the world. Ghadikolaei and Sajjadi maintain that "Feyerabend holds a postmodern position towards science. He believed that we do not just have one unparalleled unique rationality, harmonic to ordinary and

standard common sense" (2481). It would do just fine if scientific rationality that is, rules and method would be used by different practitioners in other communities to stimulate scientific discovery. Anarchism however clearly frowns at methodological prescription in the practice of science as limiting the practice and hence, the prospect of its growth. This discontent could we capture as follows:

i. The use of prescribed methods and rules are not the only ways of arriving at the solutions of scientific puzzles. Indeed, some scientific puzzles in the form of Copernicus heliocentric view of the universe got their solutions without prescribed methods.
ii. Prior to the advent of the Western scientific practices, people lived in their environments and solved their problems without recourse to a systematic scientific method as we have it today.
iii. In the area of medicine, some ailments defy methodological diagnosis and scientific rationality in treatment. Medical prognosis seems to thrive more in anarchism. This agrees with Feyerabend's precept that the area of discovery should not be subjected to methodological rules, but justification could be subjected through the rationality and rigidity of rules. Non-methodological scientific practice often transcends puzzles that challenge method. In this case we could confirm that methodological science is only one among other possible sciences. However, strict adherence to it will unduly limit the growth of science.
iv. The ascription of 'humanitarian' to methodological anarchism explains that people globally have developed different methods of survival in different situations. These methods do not necessarily conform to scientific rationality and methodologists' prescriptions. Since the outcome of these activities are not products of scientific methodology or do not conform to scientific rationality, clearly they should not be jettisoned.
v. Anarchism can further be justified in the sense that no specific prescribed theories or methods always agrees with all facts in its domain.
vi. Science does not have a single tradition and there is not likely to be a best possible tradition. This is true also of methodological rules and scientific rationality. Science in the thinking of Feyerabend should be

humanitarian like democracy.

The ways in which methodological prescription and rationality of science are limiting to scientific growth and progress is evident in falsificationism as already observed. Falsificationism has as its precept that theories which do not bear out the expected effects are out rightly jettisoned. This practice argues that the growth of science is not measured by accumulation of theories but as in natural selection, weaker theories must be laid off to give space for stronger ones. The culture of jettisoning a falsified theory in falsificationism cannot be accepted uncritically as underlying the growth of science. Falsificationism further shields its weakness by characterizing it in terms of corroboration, relative verisimilitude, and probability. These terms and their entailments variously aim at protecting theories not based on their merits but on those of others. Gabor Zoltan (Online, n.p), holds the view that "philosophical anarchism and realist theory are natural allies against strong theories of political obligation".

Conclusion

From the forgoing discussion, methodological anarchism is seen to defend the use of plurality of scientific methods in scientific practice. It refutes and rejects imposition of methodological rules and the rationality of science for practitioners. It justifies its precepts as being humanitarian and so enhances the growth of science. Its robust argument is that since the area of science is so vast and the natural world is not so uniform, therefore, the vicissitude of the world invokes nuanced methods to unravel the mystery within. This paper holds that even though methodological anarchism proposes an interesting idea for the growth of science, it liberality should not be abused. To this end, the discovery phase must be given prominence as a matter of meeting the urgent need of humanity before the talk about justifica- tion.

Since methodological anarchism as a philosophy will clearly expand the horizon of scientific discovery, methodological rules and scientific rationality held strictly will limit scientific progress. Any idea intending to be incorporated into science must fulfil the condition of pragmatism and functionality. Fixed method of doing science is detrimental to scientific progress. Law and order is good but not always because it often limits possibilities. This paper is of the opinion that science will succeed more when it is opened to plurality of methods, not hindered by scientific rationality such as acupuncture from the Chinese culture and several other

pragmatic practices in African culture. The methodologists' position disguised in their practices reveals the limitation of methods and the rationality of science. In conclusion, methodological anarchism will widen the scientific horizon and enhance the growth of science if it takes into cognizance, human limitations and explanation of every singular phenomenon in nature.

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