

Theory Choice in Thomas Kuhn's Philosophy of Science: Implications for Scientific Objectivity

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Abstract: *This article examines Thomas Kuhn's concept of theory choice in philosophy of science and its implications for scientific objectivity. The issue of making objective choice between competing scientific theories is very controversial in philosophy of science. Logical positivists argue that logic or good reason can compel objective choice between rival scientific theories. It was traditionally assumed in philosophy of science that certain objective criteria such as accuracy, consistency, broad scope, simplicity and fruitfulness can enable scientists make objective choice between rival scientific theories. Contrarily, Thomas Kuhn argues that logic or reason alone cannot compel an objective choice between competing scientific theories. He further argues that the objective criteria for theory choice cannot alone guarantee objective choice between rival scientific theories. Hence, he insists that subjective factors such as previous experience of scientists, personality of scientists, personal preferences of scientists as well as historical and sociological factors, also influence theory choice in science. This article argues that Kuhn's account of theory choice has serious implications for scientific objectivity. The researcher argues that Kuhn's introduction of subjective factors in theory choice threatens scientific objectivity. This article examines the criticisms and lapses in Kuhn's ideas on theory choice, and maintains that despite the criticisms and observed lapses in Kuhn's submissions, his unique ideas on theory choice made notable contributions in restructuring and revolutionizing contemporary philosophy of science. Kuhn remains very remarkable in the history of contemporary philosophy of science for challenging the traditional assumptions on theory choice, and for calling attention to the neglected subjective factors in scientific investigations.*

Key Words: *Theory, Science, Philosophy, Objectivity and Choice.*

1. INTRODUCTION:

The problem of objective choice between competing or rival scientific theories is one of the controversial issues in the contemporary philosophy of science. It has necessitated serious scholarly attention in the contemporary period of philosophy of science. The basic questions are: Is it possible to make objective choice between rival or competing scientific theories? How can one ascertain that a particular theory is objectively better than the other? What are the factors that can enable one to choose a particular scientific theory in preference to another one? Can value judgment be made about scientific theories? Are there subjective factors that influence theory choice in science? Philosophers of science hold different opinions on this issue of theory choice in science. Logical positivists maintain that science is an objective activity. Hence, they maintain that objective choice between different scientific theories is very possible. Shapere called attention to the traditional view advanced by the logical empiricists "that a theory must be tested by confrontation with objective (theory-independent) facts and that one theory is chosen over another because it is more adequate to the facts which are the same for both theories." (1) This implies that there are good reasons choosing a theory in preference to the other. Furthermore, it was traditionally assumed in philosophy of science that some objective criteria such as accuracy, consistency, broad scope, simplicity and fruitfulness enable scientists to make objective choice between competing scientific theories. The implication of this is that it is quite practicable to make objective choice between competing scientific theories without reference to subjective factors. These views were upheld in philosophy of science before the emergence of Thomas Kuhn. Against these views, Thomas Kuhn, an influential historian and philosopher of science, maintains that reasons alone cannot give rise to such choice, and describes the transition from one theory to another as a 'conversion experience'. He further maintains that the objective criteria for theory choice cannot alone guarantee objective choice between competing theories in science. Thus, he insists that subjective factors also influence theory choice in science, and even laid more emphasis on the subjective factors.

The introduction of subjective factors in theory choice is one of the major innovations of Thomas Kuhn in the contemporary philosophy of science. However, such introduction seems to question and threaten scientific objectivity. Hence, this article investigates the implications of Kuhn's idea on theory choice on scientific objectivity.

For a systematic presentation of the discourse on Kuhn's concept of theory choice in science, this article is divided into four major parts. The first part clarifies the concept of scientific theory. The second part discusses theory choice in Thomas Kuhn's philosophy of science. The third part examines the implications of Kuhn's idea on theory choice on scientific objectivity, while the fourth part focuses on the evaluation as well as conclusion of the study.

2. THE CONCEPT OF 'SCIENTIFIC THEORY':

It ought to be noted that this article examines Thomas Kuhn's idea on 'Theory Choice' in the context of philosophy of science, which is "the branch of philosophy that critically examines the methods, practices and assumptions of science." (2) It becomes scholarly very important to clarify and elucidate the concept of scientific theory in order to meaningfully appreciate the discourse in this article. This stems from the fact that scientific assumptions and ideas are embedded in scientific theory.

However, before delving into the clarification of the concept of scientific theory, there is need to first of all articulate what the term 'theory' is all about. This is as a result of the fact that scientific theory is only a dimension or an aspect of theory in general. Besides, understanding what theory means in general places scientific theory into its proper perspective. Etymologically, the term 'theory' was derived from the Greek word 'theoria' meaning 'viewing' or 'beholding'. From this perspective, a theory has to do with how something is viewed, perceived, looked at or beheld.

This applies to different dimensions of life. *Oxford Advanced Learners Dictionary* describes theory in the following ways:

- 1... a formal set of ideas that is intended to explain why sth (sic) happens or exists...2... the principles on which a particular subject is based...3...an opinion or idea that sb (sic) believes is true but is not proved. (3)

Theory can be said to be an opinion or a set of ideas propounded by someone or a group of people that offers explanation of phenomena in the universe. It is a formal set of statements that explains events or facts in the universe. Feyerabend as cited in Shapere describes theory in a wide or general sense thus: "A theory is 'a way of looking at the world' [62, p. 29]; it is really a philosophical point of view, a metaphysics, although it needs not be so precise or well formulated..." (1) Explanation of phenomena in the world becomes very fundamental and essential in every theory.

From the foregoing, it is obvious that a theory has to do with a set of ideas or a set of statements intended to explain a phenomenon or a subject matter. It enables one to understand things in the world. Theory is basically not only explanatory, it is also predictive in nature. It makes predictions about a given phenomenon in the world. It predicts future events.

Theory exists in different aspects or dimensions of human endeavour. Hence, one can talk of political theory, economic theory, social theory, cultural theory, scientific theory etc. However, the one that concerns us in this article is scientific theory. A good understanding of what scientific theory is all about enables one to appreciate better Kuhn's idea on theory choice which is the focus of the discourse in this article.

Scientific ideas and discoveries are articulated in scientific theory. Scientific theory is quite distinct from other theories due to its unique characteristics. It is based on observation and experimentation. Thus, it is empirical in nature. It is related to facts, though very distinct from facts. Bradford brings out the relationship between scientific theory and facts thus:

Any scientific theory must be based on a careful and rational examination of the facts. Facts and theories are two different things. In the scientific method, there is a clear distinction between facts, which can be observed and/or measured, and theories, which are scientists' explanations and interpretations of the facts. (4)

It becomes clear from the above that scientific theory tries to explain, examine and interpret facts of the physical world. Such explanations and interpretations are different from those offered by non-scientific theories. Bradford further states that scientific theory ought to have observational consequences and ought to be formed from testable hypotheses. In his words:

An important part of scientific theory includes statements that have observational consequences. A good theory, like Newton's theory of gravity has unity, which means it consists of a limited number of problem-solving strategies that can be applied to a wide

range of scientific circumstances. Another feature of a good theory is that it formed from a number of hypothesis that can be tested independently. (4)

A scientific theory can be tested, and its procedures can be repeated at any time. Testability is an indispensable feature of scientific theory. Hence, a scientific theory is “A tested and widely accepted model that helps explain and predict natural facts and which is based on observations, experiments and reason.” (5) Concepts in scientific theory have technical as well as fixed meanings, and they are always very precise. It does not give room for ambiguity. Also, Popper argues that a scientific theory must be falsifiable or refutable, and such distinguishes it from non-scientific theories.(6) Falsifiability or refutability, for Popper, becomes an indispensable feature of a scientific theory.(6)

Furthermore, it seems to the researcher that every detailed scholarly discourse on the concept of scientific theory ought to make reference to Thomas Kuhn, a renowned historian and philosopher of science. He conceives scientific theory as a structure shared by scientists. In many places, Kuhn uses the concepts ‘theory’ and ‘paradigm’ interchangeably, though paradigm is a broader concept. Kuhn maintains that a “paradigm is what the members of a scientific community, and they alone, share.” (7) He brings out very clearly the social dimension of scientific theory. Scientists within a scientific community are guided in their scientific investigations by the set of ideas provided by the dominant theory.

Generally, it ought to be noted that ‘theory’ is of great importance in science. It captures and articulates scientific ideas as well as discoveries. It is a substantiated explanation of phenomena in the natural world, and such is based on experimentation as well as observation. It is arrived at through a systematic procedure or process. The essence of scientific theory is to explain phenomena in the natural world and at the same time make predictions about future occurrences. Scientific theories have enabled human beings to have a good understanding of various phenomena in the universe, and thus have improved tremendously the condition of human existence on earth.

3. ‘THEORY CHOICE’ IN THOMAS KUHN’S PHILOSOPHY OF SCIENCE:

Thomas Kuhn initiated very unique ideas on theory choice in contemporary philosophy of science. The basic question are these: Is it possible to make objective choice between rival or competing scientific theories. Can one say that a particular theory is objectively better than the other one? These are controversial questions in contemporary philosophy of science. Logical positivists claim that objective choice can be made between rival or competing scientific theories. Such was the assumption in philosophy of science before the emergence of Thomas Kuhn, who revolutionized ‘theory choice’ in philosophy of science. Kuhn disagreed with this position, and thus articulated his ideas on theory choice. For a systematic analysis of Kuhn’s idea on theory choice, the researcher chooses to discuss it in two parts, viz. (a.) Kuhn’s Earlier Views on Theory Choice and (b.) Kuhn’s Later Views on Theory Choice

4. KUHN’S EARLIER VIEWS ON THEORY CHOICE:

Kuhn’s earlier views on theory choice were articulated in his very influential book *The Structure of Scientific Revolutions*. He made such very explicit in the context of his idea on scientific revolution in which he argued that logic or good reason alone cannot guarantee the choice between competing scientific theories or paradigms. This contradicts Logical positivists’ claim that objective choice can be made between rival scientific theories based on good reasons. Kuhn argues that “...the transition between competing paradigms cannot be made a step at a time, forced by logic and neutral experience.” (8) This implies that objective comparison and choice between rival or competing scientific theories cannot be as objective as the logical positivists posited. Kuhn holds this position as a result of his incommensurability theory which denies any common standard for evaluating rival or competing scientific theories. The pertinent question is this: If two scientific theories are incommensurable, how can one be objectively chosen in preference to the other? It is quite obvious that Kuhn’s unique ideas on theory choice were necessitated by his incommensurability thesis. He likened the choice between competing theories or paradigms to that between competing political institutions, and insisted very strongly that such decision cannot be made by evaluative procedure, but rather through persuasion. This is because of the fact that the choice between competing scientific theories is like the choice between incompatible modes of community life. Kuhn maintains that during paradigm or theory debate, each group of scientists uses its own paradigm or theory to argue, and this makes the argument to be simply circular. Scientists argue from incommensurable perspectives in this context. Thus, the technique of persuasion is necessary in effecting choice between paradigms or theories. Kuhn argues that paradigm choice cannot be unequivocally settled by logic and experiment alone because there are differences that separate the proponents of competing theories. Consequently, the choice between competing theories cannot just be resolved by proof. Analysing the difficulty in choosing between competing or rival paradigms or theories, Kuhn states:

The proponents of competing paradigms are always at least slightly at cross-purposes. Neither side will grant all the non-empirical assumptions that the other needs in order to make its case. Like Proust and Berthollet arguing about the composition of chemical compounds, they are bound partly to talk through each other. Though each may hope to convert the other to his way of seeing his science and its problems, neither may hope to prove his case. The competition between paradigms is not the sort of battle that can be resolved by proof. (8)

Furthermore, in line with his incommensurability theory, Kuhn argued that the factors that determine the choice of theory are not fixed, and also are not neutral but rather vary and are dependent on the theory within which the scientist is working. Thus, decision making is not rule-governed or algorithmic, because there is no neutral algorithm for theory choice. Siegel notes that “Kuhn is claiming that paradigm debate is not objective, but rather, it is irrational, circular, subject to paradigm-based criteria, etc...”(9). Obviously, this contradicts the traditional assumption in philosophy of science advanced by logical positivists.

Also, Kuhn insists that there is no systematic decision procedure which, properly applied, must lead each individual in the group to the same decision. Contrary to the logical positivists’ assumption that different theories can be compared by having recourse to the pure or neutral observation-languages, Kuhn argues that there can be no scientifically or empirically neutral system of language or concepts for evaluating rival scientific theories. Consequently, the superiority of a theory to another cannot be proved in the debate but rather through persuasion in which each party tries to convert the other. This is as a result of the fact that the debate over theory choice does not fully resemble logical or mathematical proof. In the words of Kuhn:

Debate over theory choice cannot be cast in a form that fully resembles logical or mathematical proof. In the latter, premises and rules of inference are stipulated from the start. If there is disagreement about conclusions, the parties to the ensuing debate can retrace their steps one by one, checking each against prior stipulation. At the end of that process one or the other must concede that he has made a mistake, violated a previously accepted rule. After that concession he has no recourse, and his opponent’s proof is then compelling. (8)

Hence, Kuhn maintains that persuasion play significant role in theory choice. Persuasion, for Kuhn, is to convince the other that one’s own view is superior to his own. This made Kuhn to affirm that the choice of a theory is a ‘conversion experience’ which he likened to a gestalt switch. Such conversion experience, which he likened to a gestalt switch, remains at the centre of the revolutionary process in scientific investigation. Let me at this juncture analyse Kuhn’s later views on theory choice.

5. KUHN’S LATER VIEWS ON THEORY CHOICE:

Kuhn’s earlier views on theory choice as articulated in his book *The Structure of Scientific Revolution* were very controversial. The controversy was necessitated by the fact that it contradicted the traditional assumptions in philosophy of science. Thus, Kuhn’s revolutionary views were criticized by many scholars. The major criticisms against Kuhn’s idea revolve around the view that it makes theory choice not to be based on good reasons. In his later book, *The Essential Tension*, Kuhn summarises the criticisms against his ideas on theory choice thus:

My views, it is said, make of theory choice ‘a matter for mob psychology’. Kuhn believes, I am told, that ‘the decision of a scientific group to adopt a new paradigm cannot be based on good reasons of any kind, factual or otherwise. The debates surrounding such choices must, my critics claim, be for me mere persuasive displays without deliberate substance. (7)

Such criticism, for him, portrayed a total misunderstanding of his ideas. This necessitated his further articulation of his ideas on ‘Theory choice’ at greater length and with greater precision. To do this, he began by analysing the characteristics of a good scientific theory. He identified five characteristics of a good scientific theory which, for him, are not exhaustive, but are sufficient for him to articulate his ideas on theory choice. Such characteristics include: (a) Accuracy—This means that a good theory should agree with the results of existing experiments. (b) Consistency—This connotes that a good scientific theory should be consistent with other accepted theories. (c) Broad scope—This characteristic implies that a good theory should extend beyond the laws or sub-theories it was originally designed to explicate (d) Simplicity—It should bring order and cohesion to phenomenon. € Fruitfulness—A good theory should

disclose new phenomena. These characteristics of a good theory were traditionally assumed in philosophy of science to be the objective or shared criteria for theory choice in science. It was claimed by the logical positivists that these objective or shared criteria guarantee objective choice between competing scientific theories. Against this view, Kuhn argued that these criteria may not guarantee objective choice between competing scientific theories because of the difficulties that are associated with their various applications. Kuhn's arguments in this regard seem strange and revolutionary.

6. KUHN'S ARGUMENTS AGAINST THE OBJECTIVE OR SHARED CRITERIA FOR THEORY CHOICE IN SCIENCE:

Before the emergence of Thomas Kuhn, it was traditionally assumed in philosophy of science that objective choice can be made between rival scientific theories based on the objective or shared criteria such as accuracy, consistency, scope, simplicity and fruitfulness. In one of the chapters of his later book *Essential Tension* captioned 'Objectivity, Value Judgment and Theory Choice', Kuhn made explicit his ideas on theory choice. He agreed with the traditional view in Philosophy of Science that these five criteria play fundamental role in choosing between competing theories, and are the bases for theory choice. However, against the claim that these criteria enable one to make adequate choice between competing scientific theories, Kuhn argued that there are difficulties in using these criteria, and these make theory choice to be problematic and very difficult. The difficulties associated with these criteria for theory choice result from the fact that they are individually imprecise and that they conflict with one another when deployed together. According to Kuhn:

Nevertheless, two sorts of difficulties are regularly encountered by the men who must use these criteria in choosing say, between Ptolemy's astronomical theory and Copernicus's, between the oxygen and phlogiston theories of combustion, or between Newtonian mechanics and the quantum theory. Individually the criteria are imprecise: individuals may legitimately differ about their application to concrete cases. In addition, when deployed together, they repeatedly prove to conflict with one another; accuracy may, for example, dictate the choice of one theory, scope the choice of its competitor. (7)

Thus, these difficulties in applying the criteria for theory choice render objective choice between different theories very problematic. Kuhn firstly examined the criterion of accuracy which, for him, entails both quantitative and qualitative agreement. He maintains that theories cannot always be discriminated in terms of accuracy. He gave example with Copernicus and Ptolemy; and observed that Copernicus's system was not more accurate than Ptolemy's system until was revised drastically by Kepler after many years. He argues that If Kepler had not found other reasons to choose heliocentric astronomy, those improvements in accuracy would not have been made, and Copernicus's work might have been forgotten. However, Kuhn acknowledged that accuracy can permit discriminations, but such discriminations cannot guarantee unequivocal choice between competing scientific theories. Thus, he concluded that accuracy by itself is not a sufficient criterion for theory choice despite its importance in theory choice.

Furthermore, Kuhn examined the criteria of consistency and simplicity in order to ascertain how they function in theory choice with particular reference to the choice between the heliocentric and geocentric astronomies. With regard to the criterion of consistency, Kuhn observed that Ptolemy's and Copernicus's systems related differently to other theories. Thus, consistency criterion does not guarantee objective choice between competing theories. Considering the criterion of simplicity with particular reference to Copernicus's and Ptolemy's systems, Kuhn argued that the criterion of simplicity does not properly discriminate between the two scientific theories. Consequently, he insists that there are difficulties in applying the standard criteria of choice. This makes theory choice to be very problematic. Scientists, in applying these criteria in theory choice may reach different conclusions because the criteria cannot adequately discriminate between competing theories. Elaborating further on the difficulties in applying the objective or shared criteria for theory choice, Kuhn states:

When scientists must choose between competing theories, two men fully committed to the same list of criteria for choice may nevertheless reach different conclusions. Perhaps they interpret simplicity differently or have different convictions about the range of fields within which the consistency criterion must be met. Or perhaps they agree about these matters but differ about the relative weights to be accorded to these or to other criteria when several are deployed together. (7)

Certainly, in this situation of divergence, the standard criteria for theory choice cannot guarantee objective choice between competing theories. They are not sufficient by themselves in determining the decisions of scientists.

Thomas Kuhn further noted that the factors that influence decisions but do not specify what the decisions must be are called maxims, norms or values, but not criteria or rules ordinarily. They are often vague and are in conflict with one another when employed in making choices. Thus, the objective criteria of choice, for Kuhn, function not as rules, which determine choice, but rather as values, which influence it. Consequently, such values like consistency, accuracy and scope, though necessary in themselves, may be ambiguous in application both individually and collectively, and thus may not be sufficient ground for a shared algorithm of choice.

Thus, Kuhn insists that there is need to go beyond these criteria to the characteristics of the scientists who make the choice. These characteristics vary from one scientist to another, and they bring about differences in the choice of scientists. Among these factors or characteristics that influence the choice of a theory is the previous experience of a scientist. In the words of Kuhn:

Some of the differences I have in mind result from the individual's previous experience as a scientist. In what part of the field was he at work when confronted by the need to choose? How long had he worked there; how successful had he been; and how much of his work depended on concepts and techniques challenged by the new theory? (7)

From the foregoing, it can be said that personal experiences of scientists influence their choice of scientific theory.

Also, Kuhn observed that the other factors that are necessary for theory choice are even outside the sciences. He substantiated this point with some examples. Firstly, Kepler's early choice of Copernicanism was, for him, as a result of his immersion in the Neo-Platonic and Hermetic movements of his day. Also, the acceptance of Darwin's concept of the struggle for existence was influenced by the British Social thought of 19th century. With these examples, Kuhn insists that some factors which are outside science also influence the choice or acceptance of a theory.

Other factors that influence theory choice, for Kuhn, have to do with the personality of the scientist. Some scientists place more importance than others on originality and are more willing to take risks; while some scientists prefer comprehensive as well as unified theories to narrow ones. Hence, personal preferences of scientists also influence theory choice.

Obviously, these factors identified by Kuhn seemed very subjective and they are totally different from the shared or objective criteria for theory choice. He acknowledged that both objective as well as subjective factors play part in theory choice, but laid more emphasis on the subjective factors. Kuhn states thus:

My point is, then, that every individual choice between competing theories depends on a mixture of objective and subjective factors, or of shared and individual criteria. Since the latter have not ordinarily figured in the Philosophy of Science, my emphasis upon them has made my belief in the former hard for my critics to see. (7)

The distinguishing feature of Kuhn's philosophy of science is that he brought in very explicitly the individual or subjective factors in theory choice. He lamented that philosophers of science have, for long, been neglecting the subjective elements which, for him, influence theory choice made by scientists. He was worried with how scientists see the subjective elements as indications of human weakness and not as belonging to the nature of scientific knowledge.

Kuhn also believes that it is difficult to construct algorithms for theory choice, and argued that the objective criteria are insufficient to determine fully any algorithm for theory choice. Each individual has an algorithm, and the algorithms of individuals are all ultimately different due to the subjective considerations with which each must complete the objective criteria. These subjective differences play important role in determining the hypothetical algorithm on which each individual bases during the initial stages of the competition between competing theories. Hence, subjective factors are inevitable for decisions in theory choice. Kuhn summarizes his major arguments on theory choice thus:

My argument has so far been directed to two points. It first provides evidence that the choices scientists make between competing theories depend not only on shared criteria—those my critics call objective—but also on idiosyncratic factors dependent on individual biography and personality. The latter are, in my critics' vocabulary, subjective, and the

second part of my argument has attempted to bar some likely ways of denying their philosophic import. (7)

It is obvious that, for Kuhn, both the shared (objective factors) and idiosyncratic factors (subjective factors) play significant roles in theory choice. However, the subjective factors in theory choice have not been given serious attention in philosophy of science.

7. IMPLICATIONS OF KUHN'S IDEA ON THEORY CHOICE TO SCIENTIFIC OBJECTIVITY:

This article argues that Kuhn's idea on theory choice has remarkable implications to scientific objectivity. Before delving into such implications, there is need to examine very briefly what scientific objectivity is all about. Generally, science is taken to be an objective enterprise. Objectivity is one of the fundamental features of science. Hanna attests to this by stating that "It is generally agreed that one of the distinguishing virtues of science is its objectivity. The scope of science is the *objective world* and the limits of science are determined by the limits of the *objective methods* of formal and empirical research." (10). However, the basic question that is scholarly very necessary at this juncture is this: What is scientific objectivity? In the attempt to address this question, Lloyd as cited by Hanna brings out clearly the 'hybrid' character of scientific objectivity thus:

-*Objective means detached*, disinterested, unbiased, impersonal...not having a point of view...

-*objective means public*, publicly available, observable, or accessible (at least in principle);

-*objective means existing independently* or separately from us;

-*objective means really existing*. Really real, the way things really are. (10)

This implies that science is unprejudiced, real and has public character. Also, it exists independent of any particular person. Furthermore, Hanna distinguishes between external objectivity and internal objectivity thus:

There are at least three distinct carriers of external objectivity: namely, i) entities or processes; ii) kinds, constructs, or magnitudes; and iii) interpreted sentences or theories. We will say that an entity, process, magnitude, construct or kind is externally objective if and only if its existence and properties are independent of its representation, while a linguistic statement or theory is externally objective if and only if its truth value is independent of its representation. Intuitively, external objectivity amounts to independent from subjective or inter-subjective factors or influences—our human hopes, fears, desires, expectations, etc are irrelevant to the existence, properties or truth likeness of objective features of the world (10)

External objectivity is quite distinct from internal objectivity. Explaining what internal objectivity is all about, Hanna states that "internal objectivity is concerned with the processes or methods by means of which science investigates the world: so it might appropriately be called methodological objectivity." (10)

It ought to be noted that objectivity in this article is to be understood in its general perspective, including both external and internal objectivity. Both of them are expected to be fundamental features of science, and are to be given serious attention in this discourse.

It is obvious in this article that Kuhn's relativistic ideas on incommensurability of successive scientific theories created problem for theory choice in science, which led him to subjective ideas on theory choice. By insisting that the objective factors alone cannot guarantee choice between competing scientific theories, and by bringing in subjective factors in theory choice, Kuhn casts a serious doubt to scientific objectivity. Hence, Anetoh argues that "Be that as it may, Kuhn's idea of paradigm choice as well as paradigm shift seems irreconcilable with the logical positivists' image of science as an objective and rational activity." (11) His ideas on theory choice led him into subjectivism, which is totally opposed to objectivism. Generally, science is expected to be an objective enterprise. There ought to be objectivity in the processes by which theories are tested or judged, and these processes ought not include subjective factors. By laying more emphasis on the subjective factors for theory choice, Kuhn seems to have downplayed the role of the objective criteria for theory choice which, for him, is associated with difficulties. Obviously, Kuhn's emphasis on the subjective factors

for theory choice could be seen as an inevitable consequence of his incommensurability theory. If rival theories are incommensurable, there is no common ground for comparison between them, and thus choice between them may not be guaranteed by the objective criteria. Be that as it may, Kuhn's idea on theory choice made him a subjectivist. This might be what prompted Siegel to argue that that "Kuhn cannot be construed as a proponent of objectivity in science, especially insofar as theory change is part of science." (9). It seems to the researcher that Kuhn tampered with the essential feature of science by down-playing objectivity, and subsequently bringing in subjective factors in theory choice.

8. EVALUATION:

This article has tried to examine Kuhn's notion of theory choice in philosophy of science as well as its implications to scientific objectivity. His concept of theory choice was very controversial in contemporary philosophy of science because of its revolutionary nature. It contradicted the traditional views on theory choice in philosophy of science. This necessitated the severe criticisms of Kuhn's ideas on theory choice by different scholars and philosophers of science. One of the most remarkable critics of Kuhn's idea on theory choice is Hilary Putnam, who argues that Kuhn's view leads to relativism. According to him:

Kuhn's most controversial assertions have to do with the process whereby a new paradigm supplants an older paradigm. Here he tends to be radical (overly so, in my opinion): data, in the usual sense, cannot establish the superiority of one paradigm over another because data themselves are perceived through the spectacles of one paradigm or another. Changing from one paradigm to another requires a 'Gestalt switch'. The history and methodology of science get rewritten when there are major paradigm changes; so there are no 'neutral' historical and methodological canons to which to appeal. Kuhn also holds views on meaning and truth which are relativistic... (12)

Such relativism poses serious threat to objectivity in scientific investigation. Anetoh attests to this when he remarks that:

By denying the existence of any common standard or language for evaluating the theories of different paradigms, Kuhn landed into relativism. Hence, everything in science becomes paradigm-relative... Such relativism renders objective choice between rival paradigms very difficult... Certainly, his relativism is a threat to scientific objectivity. (11)

Some scholars even went to the extent of describing Kuhn as an opponent of objectivity in science. In the words of Siegel Kuhn "is an opponent of objectivity as regards theory change..." (9). However, the researcher argues that it is an over statement to describe Kuhn as 'an opponent of objectivity' because he did not completely deny the objective factors for theory choice. He only down-played them, insisting that they are associated with some problems, and as such cannot alone guarantee objective choice between competing scientific theories.

Furthermore, the researcher observes that there seems to be internal inconsistencies in Kuhn's arguments on theory choice. In the *The Structure of Scientific Revolution*, Kuhn states that "To be accepted as a paradigm, a theory must seem better than its competitors..." (8) It could be argued that for a theory to seem better than its competitors, there ought to be objective yardstick for assessment or evaluation. By this assertion, Kuhn seems to imply that there are objective factors that enable one to ascertain that a theory is better than its competitors. If a theory can explain phenomena more than its competitors, this implies that it is objectively better than its competitor. This seems irreconcilable with Kuhn's argument that logic or reason alone cannot guarantee objective choice between rival scientific theories. Furthermore, the subjective factors Kuhn claims that influence theory choice viz. previous experiences of scientists, personality of scientists, personal preferences of scientists, historical and sociological factors, are quite very strange as far as theory choice in science is concerned.

However, despite the criticisms and observed lapses in Kuhn's submissions, his unique ideas on theory choice made innumerable contributions in restructuring contemporary philosophy of science. His ideas on theory choice debunked the assumption that later scientific theories are objectively better than the earlier ones. His denial of the claim that objective choice between different scientific theories can be made using the objective criteria for theory choice alone, and his consequent introduction of the subjective factors in theory choice could be said to have revolutionized the process of theory choice in contemporary philosophy of science. Such revolution is quite necessary for development of philosophy of science in the contemporary era. Obviously, the subjective factors have not been given any consideration

in philosophy of science as far as theory choice is concerned until the emergence of Thomas Kuhn. Hence, Kuhn occupies a notable position in the history of contemporary philosophy of science.

9. CONCLUSION:

Detailed and critical attention has been given to Kuhn's account of theory choice in philosophy of science and its implications for scientific objectivity in this study. It is obvious from the discourse that though Kuhn made very unique as well as remarkable contributions to philosophy of science by his unique ideas on theory choice, his ideas are not without problems as demonstrated in this article. Such problems necessitated the criticisms levelled against his views. However, it ought to be noted that such criticisms pertain to the essential nature of philosophy as a critical activity, and at the same time are very necessary for growth of knowledge in general. More importantly, it is very difficult for any revolutionary endeavour like that of Thomas Kuhn to thrive without criticisms by scholars. Nevertheless, despite the criticisms of Kuhn's ideas on theory choice, he remains very remarkable in the history of contemporary philosophy of science for challenging the traditional assumptions on theory choice in philosophy of science. By bringing in some subjective elements in theory choice, he called attention to the neglected factors in scientific investigation as far as theory choice in science is concerned.

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