Tradition and Discontinuity: Interrogating the Notions of Normal Science and Revolution in Thomas Kuhn

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ABSTRACT

The present paper is a representation of a systematic inquiry as well as an application of the main thrust in Thomas Kuhn’s discourse concerning the growth of human knowledge represented in philosophy of science. The paper begins by stating the points of tradition and normal science in Thomas Kuhn’s analysis of the growth of scientific knowledge. This is juxtaposed with the notions of discontinuity and revolution. A fundamental point in the paper is that Thomas Kuhn presents an analysis that bring to the fore a tradition of continuous discontinuity. This he expounded in the philosophy of paradigm shifts brought about by crisis and revolution, resulting in the overthrow of an existing hegemony and the birth of a new one. In all, Thomas Kuhn believes that science does not represent a paradigm of rationality because going through the history of science; we are not able to discover a particular paradigm or rationality that runs through the entirety of the history of science. If anything at all, science is made up of different paradigms of rationality, models of knowledge systems of method such that, the change from one scientific epoch to another cannot be a lineal rational or methodic one. Rather, it is a shift from one model to an opposing one; what he calls a gestalt switch which is a change in ‘form of life’, ‘language game’ or ‘conceptual scheme’. The paper however, presents the thesis that even if there is no outstanding form of rationality the history of science is seen to contain a certain continuous tradition. This has to do with the aim of any science. And so, be it the science of Ptolemy, Copernicus or Galileo, Einstein or Newton, there is the aim of human interest transcending all the epochs. To this extent, the paper argues a rationality of any scientific epoch or paradigm must derive from the quality of human interest it potent. Any science be it religion, mysticism or positivism that does not aim at human flourishing is not rational. The paper employs the method of text-analysis, conceptual clarification, constructive criticism and reconstructivism to bring forth its central argument.

Keywords: Tradition; discontinuity; paradigm shift; normal science; revolution
INTRODUCTION

Thomas S. Kuhn, a philosopher and historian of science, employs the instrument of history in interrogating the popular image central to science that is, ‘that science is the paradigm of rationality’. This image had been canonized by the positivist school of science and handed down in history to the present-day conception of science as a rational inquiry. For the positivists philosophy of science, any attempt to discover and bring to the fore those principles and methods that are universal and permanent for knowledge focus must be fixed at the principles and methods of scientific inquiry. For this reason, any culture, discipline, activity or enterprise that must be identified as ‘rational’ must operate in the path of scientific (positivist inquiry). Apart from the traditional logical positivists, logical empiricists, the works of Karl R. Popper proclaimed scientific inquiry as the model of truth example of knowledge and the paradigm of rationality because among other things, scientific inquiry is in possession of a particular method. In his works, such as The Structure of Scientific Revolutions (1970) and Essential Tension: Selected Studies in Scientific Tradition and Change (1977), Thomas S. Kuhn argues that a study of the history of science negates the fundamental claims of the positivist’s school with regard to truth, knowledge and rationality in any universal sense. For Thomas Kuhn, going through the history of science, one finds no evidence that there exists any continuity of transcending epochs of scientific growth, the reality of truth, knowledge or rationality. And, for this reason science can neither be the model of truth nor example of reliable knowledge and neither is it paradigm of rationality. Every scientific epoch right from the days of alchemy, Claudius Ptolemy, Nicolaus Copernicus, Galileo Galilei and Isaac Newton through Albert Einstein and Max Planck have been guided by different paradigms and therefore presents no universality of truth, knowledge or rationality. If this is so, a problem arises; how is the reality of Kuhn’s normal science guided by a given paradigm but usually overthrown in a revolution resulting in a new normal science implicated in the growth of knowledge that must be based on a given tradition, unbroken and continues? In other words, how is tradition and discontinuity implicated in Thomas Kuhn’s understanding of growth in human knowledge? This is the focus of attention in the following lines of discussion in this paper. The discussion would rally round two pairs of concepts: tradition and normal science as well as discontinuity and revolution.

SOME CONCEPTS CLARIFIED

In other to grasp a proper understanding of the philosophy of science proposed by Thomas Kuhn, it is imperative that we attempt some clarification of concepts found to be common in his discourse. One of such concepts is the notion of pre-science. The idea of pre-science refers to the period in the history of the growth of science when there were no definitive guiding principles, precepts, norms, axioms and presuppositions. During such period, mythologies, magic, mysticism, atomism rained in the mixed economy of knowledge. Another notion that occupies a prominent position in Kuhn’s analysis of scientific knowledge is the notion of paradigm. By paradigm it is understood, a matrix of relations between truth and method, meaning and rationality constitutive of a given form of life or language game. In Kuhn’s terms paradigm understood in science is an accepted model or pattern that is not an object for replication; rather it is an object for further articulation and specification under new or more stringent conditions (Kuhn 1996, pp. 23). It coordinates and directs the 'puzzle-solving' activity of the groups of normal scientists who work within it (Chalmers 1999).

Normal science recognized by Kuhn as mature science involves detailed attempt to articulate a paradigm with the aim of improving the match between it and nature (Chalmers 1999). Again, it is a single monolithic and unified enterprise that must stand or fall with any one
of its paradigms as well as with all of them together. It does not aim at novelties of fact or theory and, when successful, finds none (Kuhn 1996, pp. 23). Also, in normal science **anomalies** are bound to emerge as Kuhn thought in an attempt to match paradigms with nature or during puzzles which essentially is an absence of a solution. Put differently, an anomaly in research is recognizing that nature has somehow violated the paradigm-induced expectations that govern normal science (McManus 2004). Finally, **scientific revolution** is 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 (Wray 2019). Another crucial concept in growth of scientific knowledge identified by Thomas Kuhn is the concept of incommensurability or sometimes referred to as incommensurability thesis. By this it is understood that two sets of paradigms or theories from two different forms of life are not usually commensurable. In other words, they do not have a common unit of measurement. And so cannot be described as one being true and the other being false. Instances of such realities of incommensurability are to be found in the differences in paradigms in religion and positivist science or between Newtonian physics and Quantum mechanics or between Galilean worldview and that of Ptolemy. In the same vein, we have the juxtaposition of particulate and wave theory of science. These theories are guided by opposing conceptual scheme or language game or what Peter Winch would call ‘forms of life’ these and many other notions play very central role in Kuhn’s analysis of growth of scientific knowledge. The thesis of incommensurability is aptly captured thus:

One group took light to be particles emanating from material bodies; for another it was a modification of the medium that intervened between the body and the eye; still another explained light in terms of an interaction of the medium with an emanation from the eye; and there were other combinations and modifications besides. Each of the corresponding schools derived strength from its relation to some particular metaphysics, and each emphasized, as paradigmatic observations, the particular cluster of optical phenomena that its own theory could do most to explain. Other observations were dealt with by ad hoc elaborations, or they remained as outstanding problems for further research (Kuhn 1962, pp. 12-13).

**KUHN’S IDEA OF GROWTH AND PROGRESS IN HUMAN KNOWLEDGE**

Epistemology as we have it is sometimes referred to in contemporary parlance as philosophy of science. What this means is that epistemology being the search for knowledge is to be understood and, its investigation carried out in the light of a method. In other words, if we are to carryout successfully epistemological inquiry (search for the principles and methods of knowledge) we must conduct our inquiry following the principles and method of science. And so, the scientific community has managed to serve to epistemologists an image of science as the paradigm of knowledge and rationality following an established method (scientific method).

In the works of Thomas Kuhn, particularly the *Structure of Scientific Revolutions* (1970), Kuhn presented an idea of science, knowledge and growth in human knowledge. According to him, as shown in the history of ideas, the enterprise of science began as a non-formal period which he referred to as pre-science. During this period of pre-science, there exists no given paradigm. Rather knowledge was a collection of ideas, methods, speculations etc. almost always unconnected and unorganized. Instances of pre-science find expression in the programme of alchemy and the speculations of Homer and Hesiod as well as those of Thales, Anaximander and Anaximenes. In other words, the period of pre-science was characterized by a mixture of spiritism, materiality, some dosages of mythology and magic. This is usually referred to as the first stage in the development of science. After some period, these principles and methods in magic, mythology and speculations are sieved by the introduction of a given
paradigm. For Thomas Kuhn, a paradigm is a system of principles and methods, axioms and precepts, conceptualizations and norms, values and ideals. These are to guide any given activity, culture or enterprise. Put together, these ideals and principles and values constitutive of a given paradigm bestow on any activity the character of science. By this understanding, Thomas Kuhn considers a given culture or activity as scientific, once such culture or activity is guided by a given paradigm. This was of course absent in the pre-scientific period of the history of human ideas. Any activity therefore that is not guided by a given paradigm, determining what is true and what is false in the activity, specifying what is rational and not rational in that activity, spelling out meaning and focus in that activity cannot be describe as scientific. The presence of such paradigm confers on any given culture or activity the description ‘scientific’. And so, the prefix scientific is attached to any system, form, activity, culture to mention but a few that retains an established paradigm. It is therefore evident that for Kuhn science is not just the accumulation of facts, tested by observation and verification as it is presented by the positivist’s sciences.

In the light of the foregoing, once an activity progresses from the pre-scientific period by embracing a paradigm, such activity is referred to as a science and the phase from pre-science is normal science. In other words, normal science is the phase in the growth of scientific knowledge characterized by the existence of a given paradigm. In Thomas Kuhn’s idea, the phase of normal science is established and activities therein are evaluated with reference to the paradigm. And so, it is not difficult to imagine what could therefore be referred to as scientific; as family life could be scientific, religious life could be scientific, so also with culture as well as any form of human activity. And as long as such activity is guided by established paradigm such activity is of the stage of normal science (Choi 2018). Of some importance is the fact that the idea of normal science aligns with the tradition, as tradition is a set of established principles and precepts, ideals and procedures by which actions, policies and thoughts are evaluated to be either true or false, rational or not rational and meaningful or not meaningful. Going through the history of science we have historical epoch and tradition that are guided by paradigms that confer normal science on such epoch. We have for instance, the scientific worldview of Ptolemy, Copernicus, Newton, Einstein and Max Planck. This worldview consists in established set of values, norms, principles and procedures – some given paradigm (Shrock 2019). Essentially, the success of a paradigm is not complete success, there are indicators understood largely as a promise of success which consists in normal science.

In the growth of knowledge, Kuhn also introduces the idea of crisis and revolution. By that he argues that the history of science is punctuated by the emergence of tradition constituted of given paradigm (Thomas & Thomas 2020). Aristotle’s worldview is an added example to the list already mentioned. According to him, this worldviews, paradigms, or forms of life usually come headlong with certain realities in nature that challenged the success and continued progress of such paradigms. Such opposition is referred to by Kuhn as crisis. As the paradigm faces the crisis, it is presented with a new emergent paradigm that is not just opposed to the existing one but constitutes a contradiction not a contrary and therefore presents the element of unseating the existing hegemony of paradigm. Such is the case of the Copernican against the Ptolemaic science. The emergence of a crisis situation is a necessary reality to bring about growth, change and progress as the new paradigm in a successful overthrow of the existing hegemony becomes a normal science. This normal science of course is employed in the evaluation and dissolution of problems in the history of knowledge. Yet, it is only preserved to be confronted by yet another opposing paradigm that brings forth through crisis and revolution another normal science. Thomas Kuhn presents thus:

Galileo’s contributions to the study of motion depended closely upon difficulties discovered in Aristotle’s theory by scholastic critics. Newton’s new theory of light and
colour originated in the discovery that none of the existing pre-paradigm theories would account for the length of the spectrum, and the wave theory that replaced Newton’s was announced in the midst of growing concern about anomalies in the relation of diffraction and polarization effects to Newton’s theory. Thermodynamics was born from the collision of two existing nineteenth-century physical theories, and quantum mechanics from a variety of difficulties surrounding black-body radiation, specific heats, and the photoelectric effect (Kuhn 1996, pp. 67).

For Thomas Kuhn, this is usually characteristic of the growth of scientific knowledge – a growth which is not necessarily lineal (Haliwell 2013). Thomas Kuhn’s position has as its crux the thesis that, since the history of science reveals differences and emergence of different paradigms to guide what is rational, to propose what is true and to instruct what is meaningful, science therefore cannot and should not be characterized by the principle of rationality. This is so because it does not possess a universal, transcendent, continues idea of truth, rationality or knowledge. And so, for him, to describe science as the paradigm of rationality or knowledge or truth is misleading. Science is just one form of life, one type of language game, a variant of conceptual scheme just like voodoo, other forms of religion, witchcraft and mythology. These are also guided by certain given paradigm. And if by scientific, it is meant an activity guided by paradigm these ones are also scientific. The positivist science does not reserve any uniqueness that makes it able to override other sciences.

THE QUESTION OF CONTINUITY AND DISCONTINUITY

A characteristic feature of Thomas Kuhn’s analysis of the growth of scientific knowledge is perhaps best represented in the idea of “continues discontinuity”. This rather paradoxical expression proceeds from the fact that by the ideas of Thomas Kuhn, the movement from one scientific epoch to another, for instance, from Ptolemaic to Copernican or from Copernican to Newtonian occurs by dint of revolutions creating discontinuities. In other words, when a given paradigm is overthrown by a new hegemony, there would be no way of comparing the two paradigms. There is no way, for instance, to compare mythology with positivism. This is so because there is no common unit of measurement. This is what is referred to as the principle of incommensurability. This principle privileges a continues discontinuity between paradigms and scientific epoch characterized by radical relativism such that what is true or meaningful or relevant or acceptable within one paradigm may appear in the next paradigm not just contrary but contradictories. There is therefore the tradition of discontinuity.

Talking of tradition, it is understood that certain realities run through and transcend different context. And so, the question here is, how do we establish a specifiable tradition that must run through all the scientific epoch in spite the tradition of discontinuity? In other words, how are we to locate the reality of continuity in Kuhn’s representation of scientific knowledge that progresses by way of discontinuity? Thus, we are left to ask about the place of normal science and revolution in the growth of scientific knowledge.

To be sure, the notion of normal science is required to establish a given tradition characterized by a specified paradigm. For according to Archimedes, if we must move the entire universe to spin, we must find a spot, otherwise we would never be able to make progress if there is no measurement ruler for determining progress. By the same token, revolution is necessary for change so as to enhance progress; otherwise everything will be stale, fixed and monotonous. There would be no change and there would be no progress. What this means is that, we require a reality of normal science and paradigm as bedrock and fixed foundation from which change can be launched. Furthermore, if everything were to remain at the level of normal
science and paradigm, life will be dull, stale and monotonous. Revolutions provide the needed alternative to bring forth progress. In sum, we require tradition and discontinuity, just as we require normal science and revolution.

TRADITION AND HUMAN INTEREST

As we accompany Thomas Kuhn in his historical analysis of the growth of scientific knowledge, a couple of conclusions are inevitable. One of such is that if science as an inquiry does not presents in its history a consistent flow of any form of rationality or method, then it does not have one universal transcending maxim of rationality and method. And so, it cannot be said to be the paradigm of rationality. Along with this conclusion is the position that science does not have any given universal method. Yet, it is also possible to conclude that science does not have any form of universal truth. However, it is argued in this paper that whichever of the historical epochs of the growth of scientific knowledge is considered, it is here argued that something traditional is common to all. In other words, be it Ptolemaic concept of scientific inquiry, Copernican worldview, Newtonian science or even the science of Albert Einstein and that of Quantum physics, one reality runs through, transcending and overarching historical, philosophical, socio-cultural context. This reality is here identified as human interest. For, whatever the nature and character of the scientific enterprise, whatever is the colour and shape of the inquiry, one thing remains constant. This is that they all aim at human interest. And by human interest here, it is understood, that which promote human benefit in terms of dignity and other forms of human flourishing (Edor & Odok 2010; Edor 2016). This is the thesis of this paper. To this end, any science worth its salt must aim at the essence of the interest of humanity with particular emphasis on dignity and natural law.

CONCLUSION

From the foregoing, it is easily arguable that Thomas Kuhn in presenting by dint of historical analysis, his position concerning the growth of human knowledge attempts an overthrow of tradition. Instrumental to his analysis are as mentioned above the notions of crisis and revolution, incommensurability thesis, discontinuity, and the absence of universality in science. The position in this paper is that although, going by the help of history the enterprise of science cannot be said to possess a given universal truth, meaning, knowledge, rationality and method it is true that going through the analysis, it is easy to recognize that there is certain definite assumption or presupposition or underlying precepts concerning the aim and focus of the enterprise of science. This aim being the flourishing of human interest must remain characteristic of every rational activity – be it positivist’s science, religion, mythology or mere speculations. To this extent, Thomas Kuhn must find it imperative to hold that even in the history of discontinuity, in the growth of scientific knowledge there is ahistorical reality of the aim for human interest.

REFERENCES


