IDEAS: Uniuyo Journal of Philosophy
and Multi-Disciplinary Studies
ISSN: 3093-009x
Vol. 1, No. 2, June 2025
ideasjournaluniuyo@gmail.com
www.ideasuniuyojournal.com

The Place of Values in Karl Popper's Conception of Scientific Discovery

N. M. Anyim
Department of Philosophy
University of Uyo
E-mail: nwachukwuanyim@uniuyo.edu.ng

Abstract

The relationship between science and values has been a subject of controversy among philosophers and scientists. Among supporters of different hues of empiricism there is a general wariness concerning the effects of values on scientific research. This wariness is connected to the fear of subjectivism in the sense that scientific theories could become ideological. In its extreme form, logical positivists proposed that scientific theories must be verifiable on the basis of their empirical content. This was part of their rational image of science which tended to introduce a dichotomy between scientific discovery and values. Karl Popper supported the notion of the rational image of science but from a different perspective. Popper was also wary of the effects of values on scientific discovery. The problem with attempts to eliminate values from empirical science is that it fails to recognize that science is influenced by certain cultural values. These values are both normative and theoretical in nature. The objective of this paper is to show that there is a link between science and values. This paper adopted the method of critical analysis. The paper concluded that supporters of the rational model of science, such as Popper, were wrong to reject normative values while accepting theoretical values as part of scientific discovery.

[Word Count 209]
Key words: Scientific discovery, values, logical empiricism, culture, truth, growth

I. Introduction

Human history and development have been impacted - positively and negatively - by the growth of scientific discovery. There is an optimism associated with science which sees the forces of nature as being under the control of man both now and in the future. This optimism has given rise to the attitude that man can determine or control his mortality. As Rorvick pointed out, "on every scientific frontier – be it physics, chemistry, physiology, genetics, electronics or biology – impressive and sometimes bizarre research is being carried out in strenuous pursuit of immortality" (139).

The promises and perils which Rorvick highlighted several decades ago have come home to roost in the light of the yet to be settled controversy concerning the origin of Covid-19 virus pandemic which brought the world to a standstill a few years ago. Thus, the view that science is the paradigm of rationality has come under scrutiny both by scientists and non-scientists. This explains why many scholars have raised alarm about the ideological imperialism of science. According to Midgley, this consists in the attempt to "extend scientific doctrines to provide a guide to life, a solution to all vast and difficult problems" (84).

Some important philosophers have tried to downplay the ideological aspects of science. Bertrand Russell for example, stated that the authority of science is unique because "it prevails solely by its intrinsic appeal to reason" (480). This is clearly a defense of the rational image of science which sees a demarcation between science and pseudoscience based on different principles such as verifiability, falsifiability, etc.

Karl Popper was one of the scholars who defended the rational image of science because he argued that empirical science needs to be demarcated from the ideological influences of pseudoscience. However, he also argued that science as a human enterprise is "mixed with our errors, our prejudices, our dreams and our hopes" (30). This is an interesting view because it implies that scientific discovery and human values can influence each other either positively or negatively. This view is plausible because man is a cultural being and scientific culture is merely an aspect of the overall culture of a given society.

The interplay between culture and values has been highlighted by Batista Mondin who argues that in the anthropological sense, "culture signifies that totality of customs, techniques, and values that distinguish a social group, a tribe, a people, a nation" (146). This interplay between culture and values has also resulted in changing the traditional conception of scientific philosophy. However, as Hans Reichenbach pointed out, "those who do not see the errors of traditional philosophy do not want to renounce its methods or results and prefer to go along a path which scientific philosophy has abandoned" (305).

Karl Popper characterized science as a discovery or a quest. This discovery is aided by some value principles. His conception of values and relationship with scientific discovery has generated controversies. These controversies present some problems in scientific methodology and theory formation. In addition, his conception of values is confusing as it seems, on the one hand, to promote empirical knowledge and, on the other hand, to destroy it.

II. The Concept of Scientific Discovery

Karl Popper's notion of scientific discovery was derived from his image of science which is analogous to the adventure of an artist who sets out on a journey to conquer new frontiers without a clear idea of where the journey would lead him. This explains why Popper's notion of scientific progress or growth was different from that of logical positivists. Thus, while logical positivists saw science as involving a context of justification, Karl Popper saw science as involving a context of discovery. In the book, *The Logic of Scientific Discovery*, Popper stated that "scientific discovery is impossible without faith in ideas which are of a purely speculative land" (38).

The implication is that, for Popper, there is nothing absolute about scientific knowledge. This view may seem not to be different from the views of logical positivists and inductivists but on closer examination it could be shown that Popper's position challenged some of the important aspects of empirical science such as the notions of scientific progress or growth, truth, testability, realism etc. The notion of scientific growth is viewed in different lights by defenders of induction on the one hand and by Karl Popper and critical rationalists on the other hand. Although both camps subscribe to the rational image of science, defenders of induction support the notion of justification while rationalists support the notion of scientific discovery.

Despite this division, both camps support realism as an integral part of scientific knowledge. Thus, their dispute may be viewed in some respects as superficial since the notion of realism separates science from other fields of human endeavours. This realism is part of the rational model of science. Newton-Smith (4) has enumerated the following conditions as part of the rational model of science:

1) The scientific community had as its goal the goal posited by the model.
2) On the evidence then available, the new theory T_2 was superior to the old theory T_1 (relative to the principle of comparison specified by the model).
3) The scientific community perceived the superiority of T_2 over T_1.
4) The perception motivated the members of the community to abandon T_1 in favour of T_2.

The above components of the rational model or image of science shows that the scientific community, despite differences of opinion on the methodology of science, agree that growth or progress is an important goal of science. This progress or growth occurs when the scientific community accepts that the new theory(T2) is superior to the old theory (T_1). The difference, however, is that while inductivists claim that growth occurs through the method of induction, Karl Popper and critical rationalists argue that it is through the method of falsification which relies on deduction.

The debate between inductivists and falsificationists may be considered as a false debate on the ground that induction is actually an incomplete deduction. Moreover, there is no way Popper and deductions can compare theories (T_1 and T_2) without relying on some form of induction. Therefore, scholars have come to accept that scientific discovery is enhanced by a combination of processes which involve both induction and deduction.

III. The Concept of Value

The concept of values occurs in different fields of human endeavour but in traditional philosophy it is used normatively to signify principles which are used to distinguish between good from bad conduct or right from wrong conduct. In the realm of philosophy of science, there has been some sort of controversy concerning the place of values in science which is supposed to focus on facts. Currently, it is safe to state that scientific research operates based on some values. As Goski (553) pointed out "any research worth the name has ethical implication".

Thus, the fact/value debate has lost some of its traction with the demise of logical positivism. However, this does not mean that some empirical scientists have lost their wariness with value issues being tied to their research. The implication is that supporters of the rational

model of science still claim that scientific theories should have empirical content which is intersubjectively testable. Among some scholars, this rational image of science has been toned down a bit to accommodate statements which are not solely and inductively testable.

In other words, even some logical empiricists such as Bertrand Russell realize that there are some assumptions of science which are not given in experience but which are logically and deductively valid. This is the reason that Dugald Murdoch (195) stated that "our conception of objective reality is not derived immediately from the senses; it is a product of the mind's organization of sensory data by means of concepts which the mind itself produces''.

Murdoch's view aligns with the views of Karl Popper even though some critics would claim that it opens the door to subjectivism in science. Karl Popper, unlike logical positivists, accepted that there is an intersection between science and values. This is because, like Thomas Kuhn, he acknowledges the role human culture or tradition plays in the general process of cognition. Indeed, Popper argued that values emerge with problems. It should be noted that Popper argued that scientific investigation or research begins with a felt problem and not with observation.

If Karl Popper is correct, it follows that man is a cultural being who shapes and is shaped by culture. As Mondin pointed out in his analysis of culture:

> Man is a cultural being in two senses: first of all is that he is the artifice of culture, but also… in that it is he himself who is the prime receiver and the greatest effect of culture (148).

This is the reason that Mondin went further to argue that "the dynamism of man is manifold: historical, emotive, logical, technological, cultural, social, economic, political, religious" (25).

Indeed, Mondin stated that an aspect of man's quest for self-transcendence is to view human values in terms of its link with Absolute Value. This is the theocentric interpretation of the notion of self-transcendence. Although secular scientists may ignore the theocentric conception of values it is arguable if they are not unconsciously guided by the same quest for immortality. The quest for transcendence generates its own dynamics and ramifications which may pose some problems for defenders of empirical science who associate scientific knowledge with objective knowledge.

Karl Popper had argued that scientific theories should be falsifiable and testable and had cautioned that science could become ideological if the caution was not heeded. This may be the reason that both Karl Popper and logical positivists (including inductivists) were of the view that objectivity should be one of the ideals of science. In other words, value judgments which are not testable should not be allowed to taint the final outcome of a scientific research or investigation. The basis for holding this view was the fear of making scientific theories to become subjective in nature.

The implication is that even though Karl Popper and logical positivists disagreed on a number of issues, they all agreed that normative values could negatively affect the objectivity of scientific theories. Moreover, they followed Hume in upholding the fact/value dichotomy. This, however, does not mean that they did not uphold other kinds of values. As we shall show in the

next section, both Popper and logical positivists (including inductivists) upheld the significance of some important *values* in scientific research.

IV. Scientific Discovery and Values

There are different kinds of values recognized in the history of philosophy. In traditional philosophy, it is not possible to ignore the significance of normative values which deal with principles which are used to distinguish good from bad conduct or right from wrong actions. Thus, there are many classifications of value which have been proposed by scholars. However, three major categories are quite helpful. Frankena (87-88) highlighted six major types of values which include: aesthetic values, ethical values, cultural values, material values, communal values and spiritual values.

These six kinds of values show that man is a complex and manifold being. This paper focuses on what Frankena called cultural values within which he named truth, knowledge, understanding, wisdom, honour and esteem as inmates. Among these six types of cultural values, two inmates are of particular relevance to this paper and they are truth and knowledge. These two types of cultural values can be described as theoretical values. The rest of the cultural values have not attracted much attention from scholars in the realm of philosophy of science.

Karl Popper and the logical positivists (including inductivists) accepted the notions of truth and the growth of scientific knowledge or theories. It is true that they disagreed on what constitutes truth and growth but they agreed on the view that they occur in science. As Karl Popper pointed out, "the scientist aims at findings a true theory or description of the world (and especially of its regularities or laws), which shall also be on explanation of the observable fact" (conjectures and refutation, 103).

Popper, in the early part of his philosophical development, tended to question the status truth in scientific research. His misgivings against the status of the notion of truth stemmed from his rejection of induction which was associated with the view that true theories are justified theories. His rejection of the view that scientific discovery is based on a context of justification was to ensure that science is not seen as a closed enterprise, but rather as study of ever-changing knowledge of phenomena.

Karl Popper later on accepted the concept of truth in science based on Tarski's semantic theory of truth. Ultimately, Popper claimed that truth should be regarded as a regulative principle. In other words, we cannot arrive at absolute truth in science but truth-like theories. This was what the termed verisimilitude. This concept has been criticized as problematic and not a better replacement for the traditional meaning of truth in science. In other words, scientists who follow the inductive procedure in their research are not likely to follow Popper's advice, as stated in "Replies to my Critics", that "we should not 'rely' on any theory, for no theory has been shown to be true or can be shown to be 'reliable'" (1025).

As critics have pointed out, this view seems far-fetched from the actual history of science. The history of science actually shows that there are some fundamental theories on which other theories derive their validity. In other words, some scientific theories are the foundations on which other theories are devised. It is therefore, difficult to argue that there are no such foundations. Indeed, Popper later on clarified that his aim was not to challenge such obvious truths like, "grasses are green" but to ensure that no scientific theory was seen as absolute truth.

Having shown that truth is an important *value*, let us examine another important theoretical value which many scientists and philosophers of science have focused on. The notion of scientific growth or progress is important to scientists from different orientations. What seems to be the problem is how it grows or progress. In his book, *Unended Quest* (115), Karl Popper argued that "our knowledge grows through trial and error – elimination". This view is part of his notion of conjecture and refutation as the hallmark of knowledge. If knowledge grows through a process of trial and error, the implication is that scientific theories are merely bold conjectures and not justified truths.

Scholars have pointed out that Popper's position rules out a justificational account of scientific knowledge. This means that no scientific theory is immune to criticism. For Popper, this critical attitude will help to ensure that science does not become authoritarian as pseudo-scientific theories have tended to be. Furthermore, there is tolerance of opposing views which ensures that scientific theories are evaluated solely on the basis of their ability to provide explanation for the occurrence of events in the universe.

It should be noted that Popper's account of the growth of science has been challenged by scholars who argue that induction is an integral part of the growth of science. To an extent, this challenge is legitimate because Popper himself later conceded that there is a "whiff of induction" in the comparison of theories. The implication, then, is that Popper, logical positivists and inductivists all agree that growth is an important aspect of science. Indeed, this is part of the rational image of science. It is interesting to note that Karl Popper himself acknowledged that he shared many things in common with logical positivists.

V. Evaluation

It has been emphasized in this paper that there is a link between scientific discovery and values. There are scholars who have argued that scientific research does not involve value issues in order for it to remain objective and free from subjectivism and relativism. This temperament was expressed by Ernest Chaim who stated as follows:

> Science, as long as it limits itself to the descriptive study of Nature, has not moral or ethical quality, and this applies to the physical as well as biological sciences. No quality of good or evil is attached to results of research aimed at determining rational constraints… (in Midgley, 74).

Einstein expressed a similar sentiment by stating that scientists are not supposed to be encumbered by emotional or subjective considerations in their research activities. This is to ensure that the researcher is sufficiently detached to ensure objectivity. Einstein stated that: For the scientist there is only "being" but no wishing, no valuing. No good, no evil – in short, no goal. As long as we remain within the realm of science proper, we can never encounter sentence of the type 'Thou shalt not lie' (In Midley, 75).

Although the views of Chaim and Einstein are questionable, it must be appreciated that their aim was to preserve certain ideals of science which differentiate it from pseudoscience. Moreover, they were focusing on eliminating *normative* values from hindering scientific discovering. This is also true of the views of many logical positivists and inductivists even

though they ended up promoting an image of science which eliminates the role of critical imagination in the process of cognition.

Karl Popper's position on the status of normative values was not very different from those of logical positivists and inductivists. He largely agreed with them that there is a dichotomy between facts and values. In this case, he was referring to normative values. Popper was just as cautious as inductivists and logical positivists about the danger of allowing normative values to influence scientific discovery and results. This concern is legitimate in the light of the hysteria and chaotic measures different countries took in their efforts to contain the Covid-19 virus.

In order to eradicate the virus, some of the measures that were adopted were not based on clinical results but on masshysteria. Indeed, government officials and scientists themselves put out statements which seemed to contradict each other. These statements and policies might even have led to more fatalities. This shows that to some extent it is necessary to evaluate the influence of normative values in scientific discovery.

The implication is that scientific discovery is a human activity which is not immune to socio-cultural norms. This is not necessarily wrong but it needs to be controlled in order to have results which are intersubjectively testable. Meanwhile, there is no controversy among scholars from different scientific orientations concerning the link between theoretical values and scientific discovery. For Karl Popper, such theoretical values include the concepts of truth and growth. These two values are important aspects of scientific discovery. What is arguable is whether they should be called values rather than, say, goals or objectives of science. Traditionally, values in philosophy have normative colourations in the sense of what is right or wrong, good or bad, etc.

VI. Conclusion

Scientific discovery cannot be separated from values because it is a human activity which deals with different problems concerning physical phenomena. In an attempt to provide explanatory theories about events, some values emerge. As Popper stated, values emerge with problems. The implication is that scientists cannot afford to ignore the normative issues which are associated with scientific discovery since there are unintended consequences which follow from scientific theories. To do so could endanger the society as a whole and not just the scientific community. This explains why some aspects of scientific research are guided by ethical rules and guidelines. Thus, there are normative values which are part of scientific discovery.

Furthermore, there are theoretical values which are integral components of scientific discovery. Popper identified truth and growth of knowledge as theoretical values. Even supporters of logical empiricism agree that these so-called values are important components of science. This means that values are integral components of scientific discovery. The question is whether these theoretical values are actually values rather than goals of science.

Works Cited

Albert Einstein, quoted in Mary Midgley, *Wisdom, Information and Wonder: What is Knowledge For?* London: Routledge, 1989.

Batista Mondin, *Philosophical Anthropology.* Rome: Urbaniana University Press, 1985.

Bertrand *Russell, History of Western Philosophy.* London: Unwin, 1979.

David M. Rorvick, *Brave New Baby: Promise and Peril of the Biological Revolution.* London: New English Library, 1978.

Dugald Murdoch, *Niels Bohr's Philosophy of Physics.* Cambridge: University Press, 1989.

Ernest Chaim, quoted in Mary Midgley, *Wisdom, Information and Wonder: What is Knowledge For?* London: Routledge, 1989.

Hans Reichenbach, *The Rise of Scientific Philosophy*

Berkeley: University of California Press, 1959.

Karl Popper "Replies to my Critics" in *The Philosophy of Karl Popper* Book II Paul A. Schlepp (ed). La Salle, Illinois: The Open Court, 1974.

Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* 3rd Ed. London: Routledge and Kegan Paul, 1969.

Karl Popper, *The Logic of Scientific Discovery*

London: Hutchinson, 1968.

Karl Popper, *Unended Quest*

Glasgow: Fontana, 1976.

Mary Midgley, *Wisdom, Information and Wonder: What is Knowledge For?* London: Routledge, 1989.

Philip S. Goski, "Beyond the Fact/Value Dichotomy: Ethical Nationalism and the Social Sciences" *Society* (2013), 50.

W. H. Newton-Smith, *The Rationality of Science.* Boston: Routledge & Kegan Paul, 1980.

William K. Frankena, *Ethics.*

Englewood Cliffs: Prentice-Hall, 1973.