Book Review

Philosophy and Sociology of Science – An Introduction

By Stewart Richards, England, Basic Blackwell, 1983

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The book 'Philosophy and Sociology of Science' is an attempt to integrate the philosophical, methodological, and sociological dimensions of science. The philosophy lays down the foundation of modern science with method of science emerging from it, whereas sociology guards and propels the scientific and technological advancement in ethically appropriate direction. Thus, both philosophy and sociology of science complement each other and serve as indispensable components of science and its practices.

The author of the present book Sir Steward Richards is a professional scientist as well as a zoologist who had been offered to take up two very unfamiliar courses at that point of time, viz., History of Science and Logic and Scientific Method, which had a great impact upon the author's professional career. The present book is written keeping in mind the relative degree of ignorance in these neglected spheres of science.

The book has been divided into two parts – Part I: Methods and Philosophies of Science, which includes five chapters, and Part II: Interactions of Science and Society, consisting of three chapters.

The first part of the book describes the structure of science in terms of scientific view of the world, and the incessant use of the term 'science' in various spheres so as to add certain dignity or value to it. A distinction between a scientific law and a scientific theory, which are mostly used interchangeably, has been accounted. The following excerpt from the book, clearly explicates this difference-

"Laws state invariable relations and regularities about the world which can be confirmed empirically by any observer, whereas theories 'underlie' laws and are not so accessible to direct test by sense perception. Theories thus leave room for personal opinion."

Part I also talks about the role of logic in the scientific argument. Logic, rational, empirical evidence, etc. are terms which are often symbolic of the scientific method, which are widely used in science for the formulation and verification of certain theories, scientific facts, or observation. This includes, induction, deduction, and inductive argument, however, the author in this part tries to bring to our notice the inherent nuances in each of these methods by giving various examples, for instance, take the argument:

All Englishmen are British.
All Yorkshiremen are British.
Therefore, all Yorkshiremen are Englishmen.

This has the form:

All As are Cs.
All Bs are Cs.
Therefore, all Bs are As.

In the above example, the two premises are true but the conclusion is false. There can be many more such instances and even others, where one or both of the premises is/are false, that leads to an invalid conclusion.

An extrapolation of the above processes is scientific attitude, popularly referred to as science in practice. Only a person who is well versed with the above mentioned processes and arguments of science can be regarded as a true practitioner of science. The author here explains in detail about the acquisition of scientific attitude by some of the eminent scientists, by taking valuable excerpts from their original work and autobiographies. For example, The works of William Harvey on the 'Circulation of blood', Stephen Hales on the 'Movement of Sap', William Wells on the 'Formation of Dew', and Emile Durkheim on the 'Social Causes of Suicide'. In each of these accounts, the author has reiterated the importance of original observation, experimentation, analysis, hit and trial method, eliminating the invalid by careful analysis, logic based on certain pre-conceived laws of nature and about the world.

In another subsection of part-I, the author helps us in developing some historical perspective about the scientific method, so as to study and understand the current position that is highly complex. Beyond the advocacy of the use of logic and inductive method, there emerged a novel hypothetico-deductive method, which fantasise science and gave ample space for ideas and 'happy guesses', as stated by William Whewell (1794-1866).

This was followed up by Karl Popper's Method of Falsification of Theories. He highlights the importance of even a single disconfirmatory statement to falsify a theory. Another method discussed at length by the author is Thomas Kuhn's 'Scientific Paradigm'. The various stages in the development of a new scientific knowledge have been explained in this account. Normal Science, Phase of Scientific Revolution, Paradigm Shift, and Construction of New Knowledge are the usual sequence of events.

Nature of science is another area where the author has tried to venture. The common thread that binds all the science and social science disciplines is the philosophy of science. However, the basic question or puzzle that the author tries to address is to find out the inherent nature of the difference amongst these disciplines. Are there merging boundaries between the physical, chemical and biological sciences, or can any one of the discipline such as physics subsume all the other disciplines, because it carries a universal predisposition, is the basic question being asked by the author. Here, the author tries to explain that although the basic principles can be derived from the physical sciences, but they cannot be stretched beyond a certain point, where the core subject takes over and provides with valid arguments and solutions to the problems. Thus, each subject has the propensity to contribute in a great way, and is at par with other streams.

The Part II of this book majorly deals with the interactions of science and society. The purpose is to examine science as an institution of the modern world. The author tries to build connections between the industrial and military applications of science and their consequent impact in economic terms. The growth of science in terms of number of people practicing it, amount of money spent on it, or the quantity of knowledge it produces has been depicted beautifully with the help of logistics and graphs. Besides talking in quantitative terms, the author has also ventured into the structural and functional aspects of science where an attempt has been made to take into account the external factors impinging upon the scientific practice such as societal, religious and political systems. Merton has purported four main ethos of science-Universalism, Communism, Disinterestedness, and Organised Skepticism, based on which all the prevalent scientific discoveries are to be analysed. The only way for scientific innovation is by means of scientific revolution. Now that it has been established that science is an integral part of technology that effects society, a famous American economist in his seminal study, The New Industrial State (1966), argues that it is the demands of technology which, more than any other factor, determine the major movements in economics, science, and society in general. But, where are the means to detect the feasibility of such technological advancements, and what determines them. Here comes the question of ethical dimension of science. Various eminent philosophers have tried to explain it in their own terms. Immanuel Kant (1724-1804) has defined two kinds of mental activities, those governed by pure theoretical reason and those stemming out from pure practical reason. The relationship between the scientific knowledge and human values is no more estranged, rather connected by way of guided activity, as advocated by Jacques Monod (1971). The author here tries to draw a deep comparison between the scientific society as it is, and …as it could be. Thus, liberating science from the grounds of materialism and aggrandisement, towards a more humanised and compassionate version. Science although always claimed by scientists as objective, and Cartesian, cannot be separated from its applied component that is technology, and hence cannot be taken as value-free or neutral. It cannot escape the dilemma of responsibility. In this context, the author has quoted several relevant and apt vignettes.

There has always been a site of conflict between religion, culture, and scientific practices. The author in the last chapter tries to address and resolve it in some way or the other. The major concerns being the social stratification of science, sexist discrimination, roots of disenchantment, clashes between the scientific theories and religious explanations of the same phenomenon, and last but not the least belief in the existence of God. All of the above instances generate the real food for thought and impel us towards an anti-science ideology; nevertheless the author tries his best to strike the right balance between the two.

Towards the end, I would like to congratulate the author for his imagination, insight, diligence, and courage to delve into this virgin area of science, and explore the unsaid and untold but very much indispensable aspects of science. The sequence of the chapters in the present book is being well thought of and is logically relevant. The use of vivid examples from all the streams, incorporating appropriate pictures and data sets at the right places aided in comprehension. By quoting the ideologies of some of the great philosophers and scientists, the author has tried to compile the different worldviews, which may immensely help in shaping our own understanding about these issues.

Each content area of the book has been dealt in a well-versed manner, and does not require any further elaboration.

Philosophy of science studied in the light of history offers the student a singular blending of arts and sciences, synthesis and analysis. Scientific achievement is almost invariably tied up with social goals. It is for this reason that no analysis of the scientific enterprise can be completed without the perspective of sociology. Only by examining specific features of the growth of science in society, in particular the nature of its tense relations with the great ethical and political issues of the day can the scientist assess with detachment the necessity and desirability of pursuing one kind of science rather than another when funds are insufficient to support both. Given the burgeoning complexities of the modern world, it is only with an awareness of the broadest social dimensions of science and technology that the individual scientist may formulate a policy which can optimise the balance between human beings and the world in which they have to live.

I sincerely recommend this book for all the science students, science student teachers, and science teacher educators for gaining a deeper level of understanding about the philosophical and sociological perspectives of science and in devising appropriate content knowledge for their learners.

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