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Social Science and Natural Science: An Analysis on Classification of Disciplines and Methodological Musings

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Abstract:

This article is an analysis on the classification of disciplines at one level and the methodological debates at another level. An in-depth look into the similarities and differences of methodologies followed by the disciplines that are set up under the names constituting binary conceptions as 'natural science' and 'social science', would enable us to see the issues in our conceptions of classification. The task is carried out by looking at the epistemological and ontological aspects of scientific research and knowledge production with reference to the debates that constitute the basis of methodology in any discipline. Thus, the discussion of methodological differences and similarities among disciplines that were divided into an oppositional binary, would aim to produce better scientific research possibilities that are interdisciplinary. It will also raise a basic question about science and the way disciplines are classified under any umbrella term hierarchically. Giving prominence to natural science disciplines and placing the humanities subjects as lower to them, is a common phenomenon in our society. Considering humanities subjects as non-science and other natural science areas only as qualified to be science, is not only the layman's conception but it applies to academics too. This scenario which came into existence through centuries from the Renaissance period, should be revised to obtain equal status for all disciplinary areas. No matter the topic of research comes under the customary division of disciplines as natural science or social science, it is impossible to make binary water-tight compartments in doing science for knowledge production. And such an argument constitutes the crux of this article, to revisit the methodology with reference to some thinkers who worked on philosophy of science. Such an investigation would allow us to broaden the ideas of science and scientific methodology, by eliminating the binary division of disciplines into science and non-science.

Keywords: Methodology, Humanities, Science, Philosophy of Science, Natural Science, Social Science

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I Introduction

Philosophers have been concerned with the definition and usage of the term 'science' from ancient times. Aristotle is known for the discussion on science in antiquity and there are many thinkers in the history of philosophy who thought what we call 'science' is to be understood with detailed analysis. The area termed as 'philosophy of science' initiates this analysis along with a discussion on how the disciplines are divided into the binary umbrella terms as natural and social sciences. In the early Greek period of knowledge production in the West, there was no disciplinary specialization named as science, other than few areas named as philosophy, mathematics, astronomy and physics. In ancient Indian thought systems that are beginning with Vedic and Upanishadic period also didn't mention any specialization which was simply called science. But in modern times we could observe severe tendency to divide disciplines in binary oppositional way under the umbrella terms as 'natural science' and 'social science'. This customary division of disciplines as natural science or social science, to make binary water-tight compartments is to be revisited for the purpose better knowledge production through interdisciplinary and multidisciplinary research projects. And such an argument constitutes the crux of this paper, to rethink the methodologies in explaining the material, mental or social world. Such an investigation would allow us to broaden the ideas of science and scientific methodology in knowledge production, by eliminating the binary division of disciplines into science and non-science.

Philosophers in the East and West thought about reality in a different sense than that of materiality, and called it as metaphysics. Metaphysical thinking makes philosophy as "the Queen of the Sciences", according to Immanuel Kant who wrote the most influential work in philosophy of science, the *Metaphysical Foundations of Natural Science* (1786). And for many centuries philosophy was considered as the mother of all disciplines, and even now the higher level knowledge production through research is done by philosophizing the disciplinary areas which were emerged later in modern period as part of fixing specializations. There was little distinction between philosophy, psychology and even the "hard" sciences of physics and chemistry, and these were considered as part of "natural philosophy".[1]

[1] Solomon, Robert C. 2006 in Paul A M Van Lange, ed. Bridging Social Psychology, Psychology Press.

An in-depth look at the similarities and differences in the ontology, epistemology and the methodology of the disciplines that are set up under the names as ‘natural science’ and ‘social science’, would enable us to see the issues in our conceptions on knowledge production. Over centuries beginning modern times, the specializations in knowledge systems stipulated the ‘natural science’ disciplines only as science. But later some philosophers of science argued the humanities subjects as philosophy, psychology, sociology, history, economics etc. are to be included as science too, and thus the term ‘social science’ came into existence. Though there are still more controversial debates on the differences between the terms as humanities and social sciences, and the disciplines that are under those umbrellas, the modern binary division of social science and natural science, is the main problem discussed in this article. Nevertheless, there evolved many other umbrella areas including disciplines under management, commerce, engineering, technology etc. that are not allocated into the fields as natural science or social science in academic departments, the general concept of such a binary categorization still exists strongly in the minds of people. So, the water-tight division of disciplines are interrogated in this article through the analysis of the methodological aspects based on which disciplines are considered as science and non-science.

With such interrogations, we could see the emergence of the areas called, philosophy of science and philosophy of social science. The philosophers of social science addressed the questions as what is the method of social science, whether it is same as natural science etc. It is with an interrogation whether a scientific investigation is possible of social world. And it is also with a question, if the nature of knowledge produced in natural and social sciences are the same or different. Philosophers of science investigated these aspects on the methodologies followed by the disciplines in natural and social science research. The epistemological and ontological aspects in any research constitutes the basis of methodology in the concerned discipline. Thus, the discussion of methodological differences and similarities among disciplines that are divided in an oppositional binary, would facilitate to produce better scientific research possibilities that are interdisciplinary and multidisciplinary.

II Science, Social Science and Natural Science

A basic ontological question 'What is science' had been a great concern for the philosophers. It is to understand the nature and scope of something called 'science' that evolved in Western academics by influencing the society and common life through industrialization which was

called scientific revolution. The definition, nature and scope of science, which science does not provide, became the main theme of investigation for the philosophers of science. And the arguments in questioning the nature, methods and reliability of science are not something that science can construct by itself because they are philosophical arguments. Philosophers of science started the investigation of the methods of research in varied disciplinary areas, with an attempt to explain the definition of science itself. 'Science as a distinctive enterprise is arguably the unique contribution of Western thought to all the world's other cultures which it has touched.'[2] It is quite evident from evolved history that the Western forces could influence the education systems and knowledge fields of their colonies.

With a statement that, understanding science is crucial to our understanding of our civilization as a whole, Alex Rosenberg- an American philosopher, also opines that all disciplines spun from philosophy. According to him,

"The history of science from the ancient Greeks to the present is the history of one compartment of philosophy after another breaking away from philosophy and emerging as a separate discipline. Thus, by the third century BC, Euclid's work had made geometry a "science of space" separate from but still taught by philosophers in Plato's Academy. Galileo, Kepler and finally Newton's revolution in the seventeenth century made physics a subject separate from metaphysics. To this day, the name of some departments in which physics is studied is "natural philosophy". In 1859 *The Origin of Species* set biology apart from philosophy (and theology) and at the turn of the twentieth century, psychology broke free from philosophy as a separate discipline."(Rosenberg, 2003:2)

Rosenberg explains how varied disciplines in natural science and social science came into existence through centuries, and how philosophy had been the base for every discipline, by giving examples from Darwin's discussion on species and Newton's laws of motion etc. This type investigation entails a clarity about what the basic discipline philosophy does. According to Rosenberg, philosophy is the discipline that attempts to address two sorts of questions. First, questions that the sciences—physical, biological, social, and behavioural—cannot answer: Second, questions about why the sciences cannot answer the former questions.[3] So

[2] Rosenberg, Alex. 2003, Philosophy of Science: A Contemporary Introduction, Routledge, New York and London. P.2

[3] Ibid.

that, the scientific question and questions about science are being asked by philosophers of science.

Along with an attempt to differentiate what science and philosophy do, the differentiation between the sub-sections of science as natural science and social science also need to be clarified for doing science research in a better way. In a preliminary analysis, one can say that natural science and social science differ in their objects of study. The objects of study for natural science are seemingly real, concrete or material, such as human body, weight, length, features of matter etc. We consider numbers and speed or motion etc. are concerning material objects and thus existing real. At the same time, the research or studies in social science disciplines are said to be dealing with abstract or conceptual objects such as society, religion, God, caste, class, economy, war, virtue etc. that are not existing in reality but are of only ideas. This initial understanding of the differences in the ontology of natural and social sciences is taken ahead by philosophers of science to argue that even the natural science disciplines are dealing with abstract concepts such as numbers, atoms, time, space etc. that are used to explain the material world considered as existing in a real manner. This discussion of differences and similarities between sciences termed as natural and social, is extended to the epistemological and thus methodological level too. Whether the methods of making knowledge differ for natural and social sciences is a question addressed then. The preliminary arguments are there among scientists as well as laymen that natural sciences are using scientific methods of observation and objective verification. But social sciences are understood idealistic to be using only rational/conceptual analysis, or even intuitive analysis on abstract entities . These assumptions to place the natural science and social science disciplines into binary oppositional categories are dismissed by arguments in the discussion of the philosophy of science.

There are various philosophical analyses done by thinkers to rupture the dichotomies ascribed by modern tendencies of fixing binary theorizations to explain world phenomena through developing disciplinary knowledge systems. An amazing contribution to draw a closure of discussion on differences and to enhance the similarity in all theories called scientific or non-scientific was provided by language philosophers in twentieth century. If we apply the philosophy of language developed by Wittgenstein, we could see that theories on observation and conclusion about the world and phenomena done by both natural and social sciences are only some language game. It is an important argument to note that all theories are made up of language in use with particular meanings and concepts ascribed to it. If language didn't exist

how can we make theories, is a question to be taken into account. But it is true that, the sun will rise in the East every day even in the absence of language. Human beings and other animals will copulate and make generations without using any language. Trees, birds, mountains, sea etc will exist without knowledge. But it is not obvious whether human beings will think to make sense of the world without language. Since language existed and humans argue thoughtfully, the humanities disciplines developed. When philosophers started thinking deeply and systematically, they used their capacity to critically think and understand the evolved disciplines of the knowledge system.

Philosophers critically examine the issue of scientific status that is given to disciplines to make them hierarchically ordered. The focus of natural science or the so-called scientific research is indeed on the empirical world, but the theories that they make about real-world facts are conceptual. Fiction writers, economists, politicians and historians are also dealing with the real world through their observations and analyses of observed data to make theories, but the difference is that their object of study itself is conceptual. Though the humanities disciplines, literature, fiction and poetry deal with the real world, it takes us to the imaginary and creative dimensions. We believe that natural science disciplines such as physics, mathematics, chemistry, biology etc. enable us to focus on real-world observation and to retain doubt and criticism and thus that only qualifies for scientific status. But the humanities disciplines that are recently known under the umbrella called social sciences, as economics, politics, history, sociology etc. are taken as less scientific in academia for the reason that they work upon imagined or conceptual basis.

Unlike the beginners of modern philosophy, August Comte derived the positivist method for social and philosophical enquiry, to assert the objectively verifiable knowledge as that of natural science. The metaphysical thinking of rationality that was prominent until then, took a different kind of empirical turning point called positivism in philosophy, to revisit the hierarchy of disciplines. Comte argued sociology is a more complex discipline than natural science disciplines, as the object of study is society which changes all the time. Society that is constituted by human individuals entails more complicated status and the study on it becomes the most difficult and scientific methods are mandatory. Though Comte's theory of hierarchy of disciplines would seems to be relevant, but the positivist methodology that subscribed thoroughly to objective verification received many criticism. The subjective analysis of human life and society was an ardent demand from thinkers on social science research methodology.

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Thus the question of subjective analysis in methodological debate generates the issue whether that could be involved in the scientific approach. Critiques of positivism seem to be leaving the term of scientific method in the recent trends of methodological debate and proceeds with new avenues called phenomenology, existentialism, hermeneutics etc in the field of humanities and social sciences.

The basis of empiricism and rationalism in the epistemological tradition that contributed a lot into the framing of methodologies also became blur in the latest debates. The endeavor to claim scientific method for social sciences would give an impression that it is more of an empiricism, though that is not the case. Empiricism could be traced back to the philosophers as John Locke, George Berkeley and David Hume who also discussed what is scientific knowledge. Scientists as Newton, Einstein etc. were highly influenced by the contemporary philosophers' critical investigations and they were in conversation with mainly rationalist philosophers on what was evolving in the name of science during the modern times in Europe and the US. The scientific revolution was much debated by the eighteenth-century Enlightenment period philosophers including the most famous rationalist philosopher Kant. The critique on the so-called science and its evolved disciplines, became stronger after watching the disasters that scientific inventions could cause to human life and the world. In the twentieth century after the World Wars, philosophers became more critical of 'the science' that had evolved from the Renaissance times in the Western world. This also could be taken as a source to elude interest in the claims of scientific method too.

But the discussions on methods of making scientific knowledge continued and the advocacy of unity of scientific method in social sciences got debated by later philosophers. This was also a response to the social, epistemological and ontological issues caused by science and to bring in the idea of methodological individualism instead of methodological holism propounded by natural science's stipulated rules in research and knowledge production. In the postmodern discussion, various thinkers as Michael Foucault put forward a relativism in ontology, and it suggested a methodological pluralism for social sciences.

III Philosophy of Science, Methodological Reflections

The term 'methodological' is taken in the sense that it allows a joint discussion of ontological and epistemological aspects in the process of making knowledge through research, and thus

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meaning to see a philosophical basis in doing science. That means in any research or process of knowledge production under any discipline we have to discern the ontological aspect first. The method to know something depends upon, what we think as something existing to be studied. This thought on ontology is what takes us to the making knowledge of 'something' that we thought to exist and to be known. Then comes the epistemological question of what are the means to make knowledge on that thing.

'For example in mathematics we take it for granted that numbers exist. But what is a number, do they exist for real, are ontological questions asked by philosophers. Philosophers have been offering different answers to this question at least since Plato held that numbers were things – albeit, abstract things. By contrast with Plato, other philosophers have held that mathematical truths are not about abstract entities and relations between them, but are made true by facts about concrete things in the universe, and reflect the uses to which we put mathematical expressions. But 2,500 years after Plato lived, there is as yet no general agreement on the right answer to the question of what numbers are.'[4] Discussing such issue and exposing presuppositions and predispositions of scientists in natural science is done by philosophers of science. It is only one way of doing philosophy of science according to John Losee.[5] He says there can be four views on what philosophers of science do. Another view is that the philosophy of science is the formulation of world- views that are consistent with, and in some sense based on, important scientific theories. On this view, it is the task of the philosopher of science to elaborate the broader implications of science. This may take the form of speculation about ontological categories to be used in speaking about "being- as-such"[6]. A third view is that the philosophy of science is a discipline in which the concepts and theories of the sciences are analysed and clarified. This is not a matter of giving a semi-popular exposition of the latest theories. It is, rather, a matter of becoming clear about the meaning of such terms as 'particle', 'wave', 'potential', and 'complex' in their scientific usage. [7]And he claims he would follow a fourth view in his writings on philosophy of science that might incorporate the previous ones and he state it in the following way. 'philosophy of science is a second-order criteriology. The philosopher of science seeks answers to such questions as: What characteristics distinguish scientific inquiry from other types of investigation? , What procedures should scientists follow

[4] Ibid
[5] Losee, John.1972/2001. A Historical Introduction of Philosophy of Science, Oxford University Press, Oxford.
[6] Ibid
[7] Ibid

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in investigating nature?, What conditions must be satisfied for a scientific explanation to be correct?, What is the cognitive status of scientific laws and principles?'[8]

With regard to scientific method and thereby conclusions, a certain judgement is based on another. That means, the existing conclusions lead to a new one. This is the case in philosophical stand points too. Just as we thought of in science, in philosophy also there are two primary types of methods that lead us to logical conclusions in a study/research– inductive (induction) and deductive (deduction) ones. "*Induction* is an inference from particular objects, phenomena to a common conclusion, from separate facts to their generalizations. *Deduction* is an inference from the common to the particular, from general judgements to particular conclusions. *Idealization* is the mental construction of beliefs about objects (non-existent or unrealizable ones) whose preimages still exist in the real world. The process of idealization is remarkable for (1) abstracting from the properties and relations being inherent to real objects and (2) introducing (in the content of the resulting notions) attributes that could not in principle belong to their real preimages. The following notions are obtained by idealization: "a point,'' "a line'' (in mathematics), "a material point,'' "a black body,'' "a perfect gas'' (in physics)."[9]

Karl Popper who was one of the most influential philosophers of science of the 20th century, made significant contributions to debates concerning general scientific methodology and the demarcation of science from non-science. According to him theories have the potential to be tested objectively and falsified. Only with such potential to be tested any research conclusion or theory would be scientific. He considered social science also should be objective rather than subjective. The refutation of subjectivity in social sciences and affirmation of objective knowledge production was the methodological point that Popper contributed to place social science as scientific as natural science. He is notable for his general proposals regarding falsification and scientific methodology, and methodological individualism in the social sciences. The notions of subjectivity by the phrases like ' I think' 'I believe' etc are not accepted by Popper. He considered the rationalist philosophers as Descartes, Russell etc. as believers in what they think. For the social sciences, Popper argued against the historicist attempt to formulate universal laws covering the whole of human history and suggested the need to see the contexts in choosing method in any study/research. And this is what is called

[8] Ibid,p.2
[9] Novikov, Alexander M., Novikov, Dmitry A.,2013. Research Methodology: From Philosophy of Science to Research Design, CRC Press, NY

methodological individualism against methodological collectivism, and it is also called situational logic according to Popper. Though the explanations of methodological individualism and negation of subjectivity are generating critical qualm, Popper's interventions enabled the enquiry into the existing classification of sciences.

Thomas Kuhn and Paul Feyerabend are the other two prominent philosophers of science in contemporary thought. Kuhn wrote the book 'Structure of Scientific Revolutions in 1962 and brought in a new perspective of 'paradigm shift' to explain fundamental changes happening in the concepts and theories based on those concepts and related practices in and after scientific enquiry. Feyerabend wrote 'Against Method' in 1975 and posed his critique against determinism and universality in scientific research. Thus the idea of methodological holism stipulated by modern science was questioned by philosophers of science in many ways, though they keep differences in their thoughts and arguments on methodology. Generally they are free from understanding the process of knowledge production through binary methods as objectivity and subjectivity. While Popper stood for methodological individualism, Kuhn considered the methods would change according to paradigm shifts. Feyerabend even turned against fixing a method.

While these philosophers of science discussed and revised the methodology of scientific research, social sciences were also thus analysed to update their methods scientifically. Anyhow All of them argued for that scientific study is possible about the social world. And they propose the redefining the ideas of science and scientific method. Through this investigation the emergence of the area 'philosophy of social science' happened as a subfield of 'philosophy of science ', by giving more scope for revisiting the procedures in which science was done through the ancient and modern times. Philosophy of social science focuses on those aspects arising from the studies of society, human nature, methodological individualism and holism, social ontology, objectivity, rationality and values etc. The term can also be used as an umbrella category which refers to philosophical studies of all the social sciences broadly conceived, such as philosophy of economics, philosophy of history, philosophy of anthropology, etc. It is quite obvious that the investigation of methodologies by philosophers of science and social science opened up the possibility of interdisciplinary research with broader methodologies.

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IV Conclusion

With an investigation into the debates on scientific methodology in research that are applied either under natural science or social science, it becomes obvious that we should gain more lucidity about what science means. Knowledge production in any specific disciplinary area through systematic observation, data collection, experiments and analysis could be seen as following scientific methodology. No matter the topic of research/study comes under the customary division of disciplines as natural science or social science, methodology could be referred as scientific. This argument was made possible through August Comte's positivism and the interventions of philosophers of science as Karl Popper, though those standpoints are criticized for various aspects. Thinkers of these streams contributed immensely to initiate the basic ontological questions such as what is science, what qualifies as science, what is the scientific method and whether all scientific theories produce permanent conclusions on truth/fact etc. This also paved path for questioning the hierarchy of disciplines in modern times.

Ontologically speaking, the differentiation of disciplines as science and non-science was based on the assumption that objects of study in natural sciences are concrete while the objects of study in social sciences are abstract ideas/concepts. Indeed, the objects of study in fiction and social sciences such as history, economics, and politics are non-material or conceptual, but they also are conceptualized by observing real-world concrete situations. And it is noteworthy that theories concluded through Induction and deduction in both natural and social sciences, are represented in language. An such language is constructed by ascribing meanings to words which are not at all connected to any material things. If we take a linguistic philosopher's view point, then objects than language doesn't exist and all things are explained in meanings of some words that claims to be conceptualized. From this understanding of language philosophy, the differences between disciplines in ontological basis doesn't make sense.

The epistemological investigation proceeding to methodological nuances would give us an understanding, that is mottled from the claims of modern science that are fixing binaries and hierarchies. It is notable that the natural sciences also use conceptual analysis along with empirical verification through observation. And thus, there are similar methodologies of analysis in scientific method for research in social and natural sciences. But social sciences also include different other methodologies such as hermeneutics, heuristics, social constructionism, deconstruction, discourse, phenomenological and existential analysis etc.

since the study of social world is more complex. It is more complex than studying static objects or motion of non-living objects, as social science and humanities research entails the study of changing objects as social, behavioural or mental practices and individual experiences etc.

If we look into the issues of classification of disciplines into natural sciences, humanities and social sciences, that pertain still in various higher education institutions, we would become conscious about the necessity to discuss the grounds on which it is done. It is yet another muddle that exists in academics on the question, how disciplines that were known as humanities should be termed as social science, and what all comes under each term. For example, some universities place philosophy in humanities and some others under social science. And courses in psychology during recent decade got the status of Bachelor of Science or Master of Science, to be taken under the umbrella of natural sciences with the development of neuro science. And the emergence of new departments of Life Science, Management and Commerce etc. also has been creating concerns on the way we fix allied subjects. Such scenario in the academic disciplines instigate the investigations into the criterions of classification of knowledge systems. And such an investigation is done in this article with reference to the methodological debates. Though the philosophers of science differ in their arguments, the discussions created by them contributes immensely into such investigation of the classification of disciplines into science and non-science hierarchically lacing science as higher.

With various examples of research questions dealt by science, it is obvious that the methodologies for natural science and social science overlap at times. It is impossible to make varied disciplines as water-tight compartments in the process of research on anything termed under material world or mental world. This understanding would allow us to broaden the ideas of science and scientific methodology in knowledge production, by eliminating the binary division of disciplines into science and non-science. Considering humanities subjects as non-science and other natural science areas as qualified to be science, is not only the layman's conception but it is held in academics too. Giving prominence to natural science disciplines and placing the humanities subjects as lower to them, is a common phenomenon in our society. This scenario which came into existence through centuries from the Renaissance period and Modern period, could be revised to obtain equal status for all disciplinary areas. Such an attempt could be done through an in-depth understanding of methodological debates.

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