The subjectivity in science philosophy essay

Before joining KTH, in addition before taking couple of courses like philosophy of science and Scientific Writing and Methodology, I have general concepts about science. In my basic understanding, any discipline that rigorously tested and supported by logical reasoning, objective evidences and mathematical proof is termed as science. Thus, what I supposed that, all the subjects taught as discipline of science in academic area such as computer system, astronomy, management, humanities and so on are the part of science. In general, while studying most of these subjects, the introduction part begins with paragraph explaining that the discipline as science. For example, “ Computing as a scientific discipline, now called computer science (CS), predates the invention of computer” (Gal-Ezer et al, 1995). Thus, I had perception that these all subjects are field of science since there is explicitly stated on the course literature as part of science. In addition these are thoroughly tested and observed before approving as curriculum. However, after taking classes of philosophy of science I was amazed that there is debate and controversy in defining science and pseudoscience. There is ambivalence perception between philosophers to categories many fields whether science or not; for instance computer science is science or pseudoscience. Furthermore, take an example of a field Astrology. Despite, most of philosophers agree that Astrology is a pseudoscience. They have different opinion in defining why it is pseudoscience (Thagard, 1978). Henceforth, my view is changed and interested to know more about the definition and criteria of science and to know about what values and force behind having such different perceptions. After getting overview of the course “ Philosophy of Science” and reading some papers from book I decided to explore the idea of subjectivity and

objectivity in science and how subjectivity contribute to science. Thus, in this essay I have explored how science is defined and what actually made scientific knowledge and theory. Furthermore, I have focused on, what values and factors divide the concept as subjectivity and objectivity? How philosopher's values and judgment (Subjectivity) is associated with science? And finally, how different philosopher perceived the subjectivity in science?

Science, Scientific Theory and Subjectivity

The term " Science" is derived from Latin verb " Scire" which means to know or to understand (Jahn et al., 2007). In Latin " scientia" means knowledge, hence science is the respectable kind of knowledge (Curd, p. 20). Whenever discipline is categorized as science then it must includes extensive thoroughly tested concepts, theories and principles, so that these knowledge can contribute to generate new values and theories. For example, Physics, Chemistry, Biology, Sociology, Anthropology and so on are science from where science practitioners can extract concepts and knowledge to generate new values and ideas. Thus, these subjects are source of knowledge and help to generate different hypotheses and later proof it through the logical reasoning to establish the new theory in the scientific community. Different innovations, discovery and theories are come to existence with the help of science with aforementioned process.

From the above definition of science, it can be conclude that science is the source of scientific knowledge. Similarly, scientific knowledge contributes to generate hypotheses and new ideas to bring new theory into existence in the scientific community. In that case scientific knowledge can be also viewed as social knowledge considering the opinion that these knowledge can be used

any time and make available furthermore to the scientific community. Longino, in her paper “ Science as Social Knowledge, 1990”, mentioned that scientific knowledge is social knowledge in the way we create and use it. To sum up, scientific knowledge is the foundation for scientific theory.

Scientific Theory is concept and idea which is tested practically and validated without refutation. According to Popper, “ falsifiability or refutability or testability” as the eventual criterion to ascertain if a theory is scientific (Curd, p. 7). At this point, theory is called scientific and valid till there is no evidence to dispute it. According to Kuhn, scientific theory should exhibits the features like accurate, consistency with currently accepted theories, broad scope, simple and potentially fruitful (Kuhn, 2006). Even scientific theory passes these entire features logically and technically, however, theory can still come to existence in different way and both could be accepted as scientific theory. There are many such examples in the history of science with explaining the same phenomenon but using different scientific theory and approach. For instance take an example of mass theory of Einstein and Newton.

In the last class of Philosophy of Science, Wah Sui talked about the Reductionism. In his Lecture he has mentioned the theory by Einstein and Newton for same subject Mass. According to him, Einstein is more advanced and broad than Newton’s for explaining the mass theory, despite, both contribution are recognized as scientific theory. Moreover, Newton’s idea for mass is mass(mo) itself (i. e., m= mo) whereas Einstein’s idea is mass(mo) itself in addition to effect of the light(c) and velocity(v) (m=). In my opinion, these types of difference exist between different scientist is due to the

different values, perception and judgment they have and approach they use the existing scientific theory. This values, perception and judgment are elements of the subjectivity. I have explored more detailed about subjectivity in the later part of this essay.

There is no doubt about the role of objectivity to form scientific theory but, here my point is, subjectivity may also play crucial role for the formation of scientific theory. In fact, general conception of science is almost same as reduction (Breaking complex problem into smaller and manageable pieces). That conception leads to the distinction between “ hard” and “ soft” science, indeed, this classification can be grouped depending on the possibility of amenable (Rosen, 1991). To be more precise, discipline like sociology, anthropology, biology and et cetera are almost rigid for amenable to the reductive approach and hence grouped to soft. Whereas, fields like Physics and Chemistry are flexible to adapt reductive approach hence grouped to hard science. In this point, Kitto summarized that hard science is based on reality and related with objectivity while soft science is just provide subjective viewpoints and not doing real science (kitto, 2009). Although, this is not satisfactory distinction for him, it seems there is the kind of relation between soft science and subjectivity. At the end, I want to quote, “ Over the greater portion of its long scholarly history, the particular form of human observation, reasoning, and technical deployment we properly term “ science” has relied at least as much on subjective experience and inspiration as it has on objective experiments and theories” (Jahn et. al, 2007). And here my assumption, on the basis of my former experience in teaching and education, is subjectivity contributes to form scientific theory at the

beginning and goes under-process using induction and deduction scientific method to establish as new scientific theory. More clearly, subjectivity plays vital role to form hypotheses for new theory which can be proved later by using different scientific method.

Objectivity and Subjectivity

Objectivity, in general, is the truth and fact in real world which has particular characteristics and features and can be described more specific and concrete way. So with the objectivity view, all methods and procedures should be same for the particular model. According to Max Weber, objectivity of science should be featured by public norms that is accessible to all and interpreted by same way (Weber, 1949). However all philosopher do not agree with this view. They claim that this is the traditional view of the objectivity which excluded the subjectivity. For instance, McMullin in his paper, " Values in Science", argued with this view of Weber. McMullin claimed that value-judgment has crucial role in science (McMullin, 1982). Furthermore, Logino in her paper, " Values and objectivity", illustrated about objectivity that it can be viewed as two different senses. First, science provides the real view of the objects in the real world which is truly objective. Second, objectivity deals with the modes of enquiry which is also the science since this practice is achieved by non-discretionary and non subjective criteria for developing, accepting and rejecting the hypotheses and theories that make up the view (Curd, p. 171). The second view of Logino indicates that subjectivity plays major role in theory development and choice. Thus, Objectivity reflects real science, indeed, achieved from the scientific method

by evaluating and testing the hypotheses. And subjectivity plays significant role to generate hypotheses.

Now my concerned is how hypotheses are formed? Hypothesis is assumption about the new theory and concept. Scientist proposed new theories through hypothesis. Hypothesis, which is usually unique, creative and innovative, is generated through existing scientific theory and real world data. Subjective factors play crucial role in the invention of new theories however objectivity confirms the subjectivity factors by test and justification (Kuhn, 2006). The positivist remarked the objective of science to accept hypotheses and theories. Meanwhile, they allow subjective and non empirical element in scientific inquiry with clear differentiation of discovery and a context of justification. The context of discovery is the components of subjectivity such as surrounding circumstances, dreams, guesses, and other aspects of the mental and emotional life of individual scientist and hence they are source for novelty. While context of justification filters these generative factors to ensure only observable consequences. Thus, positivists confirmed subjectivity factors involvement in the initial development of hypotheses with ensuring observed reality (Curd, p. 172). For example, Newton discovered the gravitational forces, (well know story – Newton thought why apple fall down), which resembles with the idea of context of justification. Furthermore, in context of justification, Logino agreed with positivist saying only observable factors are taken into account from context of discovery during hypothesis formation. Thus these views support subjectivity in science.

Subjectivity and objectivity are two opposite concept in terms of values and knowledge. Aforementioned concepts suggest that, first, objectivity is the reflection of real attributes of objects which can be testified and justified. It characterized the real science. Second, subjectivity is the state of one's values, perceptions and judgment. Thus it is cognitive process and primarily achieved by perceiving mind from its surrounding contexts. To illustrate, for example the objective information contained in the book such as letter, symbols, illustrations can be arranged in different form however subjective information received from the book could be depended on the reader's interest, ability, attitude, and way of perceiving system. Similarly, if we try to quantify the information displayed by brilliant sun set or wonderful waterfall in terms of optical frequencies or amplitude, then we will fail to describe how beautiful the scene is. We hardly described the optical frequencies or amplitude of beautiful scene rather we use the more descriptive adjectives and some time we use pseudo-quantitative terms to impress our expression (Jahn et al, 2007). At this point, some time subjective and objective specifications may twist. Thus, subjectivity is broad and in many cases its impression can lead to the knowledge of objectivity however " inclusion of subjective information within the framework of science clearly constitutes a huge analytical challenge" (Jahn et al, 2007).

Subjectivity from different context

So far, I have explained that, subjectivity plays role to contribute the scientific theory. Now to illustrate furthermore I have highlighted the different views from Logino's paper " Subjectivity and Objectivity".

Scientific theory is acquired from the individual values, knowledge as well as from the society. According to Kuhn, subjective factors such as personality, education and group commitments, play crucial role in theory choice however those values should be simple and relative problem-solving ability (Curd, p. 173). Here Kuhn focused on the contextualist analysis of evidence. According to Logino, Kuhn view is not sufficient to guarantee the objectivity of individual because for Kuhn these intellectual activities are carried out in the context of paradigm to convince science community. Logino came with further analysis by two shifts of perspective. First is to return to the idea of science as practice which means approved activities by someone within scientist. Second is the scientific method as something practiced by social groups rather than individual (Curd, p. 174). From the later view of Logino, it indicates that science and scientist involve in some kind of subjectivity in acquiring knowledge from the society. From the words of Marjoorie Green, social character of science can be viewed as three aspects. First, scientific discipline as the social enterprise where individuals exchange their ideas instruments with each other. Second, scientific inquiry requires education, which means practitioner scientists learned from context and practice with the help of established scientists. Third, scientist made communities in society which continuously contributes scientific knowledge in the communities (Curd, p. 174). Thus scientific knowledge is the product from the group effort of scientists and mostly credited by scientific inquiry within the scientific community.

Scientific knowledge, in relation with social character, is made through peer review. Peer review is the mechanism to validate the knowledge or theory to

make eligible in the scientific community. However peer review is the citation done by another person hence it is individual process within social process. Thus individual judgment and influence will affect the knowledge and this may bring another point of view leading the author to revise and present revise version (Curd, p. 175). Hence the trend of peer review which was active since twentieth century is not free from subjectivity.

Scientific knowledge is the result of group effort of large community of individual. In the process, hypotheses and assumptions were made at first and later transformed to scientific knowledge by group effort of large number of scientists (Curd, p. 176). The group effort can be represented by first, three aspects of social characters as described by Green and second, peer review. Whenever hypotheses are made public and allow it to examine, there is possibility of intersubjective criticism (Curd, p. 177). According to Longino, there are number of ways to criticize the hypotheses such as, how data were collected, whether data support conclusion and whether hypotheses are logical and consistency. To address these issues, Logino came up with the idea as empirical data or observation needs interpretation of data and this in fact imports background beliefs (Curd, p. 178). Moreover, background belief is again promotes subjectivity hence Logino further clarified her views as, science is social hence this society will necessarily remove the subjectivity from background belief. However she said the criticism should be constructive during hypotheses formation otherwise there will remain individual’s subjectivity (Curd, p. 179). At this point Logino confirmed the subjectivity in science and equally she validated her idea with objectivity in science like Kuhn as, science is objective in such a way where

hypotheses and theories are accepted or rejected on the basis of observational or empirical data (Curd, p. 180).

Thus, these all explanations confirm the subjectivity in science. Subjectivity in science can be also explained in terms of values in science. Longino, in her paper “ Can there be a Feminist science?”, stated that there can be two kinds of values in science, constitutive values and contextual values. Constitutive values are internal to the science and these values are the source of rules to determine the factors to accept scientific method (Longino, 2005). The values described so far, personal social and cultural values fall in the category of contextual values, however if the values refer to the cognitive, then can be termed as constitutive. If scientific values are cognitive in nature then it can be termed as constitutive otherwise contextual values (Curd, p. 213). Thus, to ensure the objectivity in science, those constitutive values should not be included in the scientific work. However Logino argued that construal of the distinction cannot be maintained (Longino, 2005). Constitutive values are hard to separate from the contextual values in the structuring of scientific knowledge. To do that with constitutive value has to be determined separately for different theories and filed of science (Longino, 2005). Thus, this scenario also confirms the subjectivity in science.

Conclusion

Subjectivity and objectivity in science are two essential part of scientific theory. Subjectivity plays important role in science while creating hypotheses and assumption and meantime objectivity filters the subjectivity factors to make scientific theory. There are different analysis and evaluation

made by different philosophers such as Longino, Kuhn, McMullin and so on to prove the subjectivity in science. And most of them agree that subjectivity factors are involved in the time of hypotheses development. Furthermore, they all have the central idea regarding the background belief which is obtained from the context of discovery. However they all do not agree with each other while analyzing and evaluation about the subjectivity in science and hence they have different mode of analysis. In this article most of the time I have covered the view of Longino about the behavior of scientific theory formation.

In summary, subjectivity is the source for creating innovative, creative scientific theory. It helps to generate the new hypotheses and assumptions for scientific theory. It is the solid base for scientific knowledge and hence part of science. In addition, subjectivity continuously influence the scientific knowledge which cannot be separated or restricted in science however can be verified and justified with objectivity.