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Analysis of Hacking's Response to the Thesis of Incommensurability

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Abstract: *As a representative of the new experimentalism, Hacking opposes the anti-realism of Kuhn, criticizing the reference theory of Putnam and responds to the thesis of incommensurability. He argues that scientific practice should be valued and puts forth the proposition "Experiment has a life of its own". The experimental realism of Hacking has broken the tradition of theory-dominance, maintained scientific realism and defended the rationality of scientific theory. Hacking's response to the thesis of incommensurability is a scientific practice-oriented philosophy, which has an important enlightening significance to the development and research of contemporary practical philosophy.*

Keywords: *Ian Hacking, Incommensurability, Reference theory, Experimental realism*

1. Introduction

Incommensurability is a quite controversial thesis between scientific realism and anti-realism. From the perspective of the development of incommensurability, Thomas Kuhn first claimed the rationality of incommensurability by leaving his reflection on the linguistic philosophy. After that, Hilary Putnam responded to incommensurability with his reference theory from the standpoint of linguistic philosophy and social history by leaving the scientific practice. Whereas Ian Hacking emphasized scientific practice from an experimental realism point of view, and thereby cleared up arguments on incommensurability. This paper aims to analyze Hacking's interpretation of incommensurability to come up with its theoretical significance to practical philosophy.

2. Incommensurability and Scientific Rationality

The definition of "incommensurable" in the Oxford Dictionary of Philosophy is that "In the philosophy of science two theories are said to be commensurable if the claims of one can be framed in the language of the other. When two theories are incommensurable there may be no neutral standpoint from which to make an objective assessment of the merits of the one versus that of the other."[1] The term "incommensurability" was used by Kuhn and Feyerabend in philosophical semantics, thus making this concept, which stemmed from Greek mathematics, become popular in the philosophy of science and become an important and influential concept. Kuhn first introduced the concept of incommensurability in The Structure of Scientific Revolutions, which is referred that "What differentiated these various schools was not one or another failure of method-they were all 'scientific'-but what we shall come to call their incommensurable ways of seeing the world and of practicing science in it."[2] Kuhn believed incommensurability refers to the incommensurability between the new paradigm and the old one in the development of science. That same year, when The Structure of Scientific Revolutions was published, Feyerabend also presented the term "incommensurability". Unlike Kuhn, he confined the discussion of incommensurability to semantics, while Kuhn discussed from non-semantic factors, such as paradigms, scientific revolutions and Gestalts.

It is in view of the foregoing that different scientific theories use the same term, but it means different things, such as Newton's classical mechanics and Einstein's relativistic mechanics use the same concept of "mass" with different meanings. Hacking gave a description of incommensurability. It has been said that successive and competing theories within the same domain "speak different languages". They cannot strictly be compared to each other nor translated into each other. The languages of different theories are the linguistic counterparts of the different worlds we may inhabit.[3] With the continuous development of scientific theories, the meaning of scientific terms changes

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constantly based on the incommensurable topic. Scientists use the same reference to discuss different things in different scientific theories and development paradigms, the resulting people cannot accurately understand the scientific theory terms in other paradigms. So it is difficult to objectively compare scientific terms in different paradigms and to find a reasonable standard to make a contrast, which causes the scientific rationality to be questioned.

3. Hacking's Interpretation of the Incommensurability

Hacking insists that philosophers interpret the concept of incommensurability in metaphorical way and they have no idea what it means. It is a useless attempt for philosophers to work to find an accurate measure by which to compare scientific theories. Hacking interprets the meaning of incommensurability and thinks that the "incommensurability" has three meanings: topic-incommensurability, dissociation, and meaning incommensurability.

3.1 Topic-Incommensurability

The first one is the topic-incommensurability. Nagal came up with the basis for comparisons between scientific theories in the Structure of Science, taking the accumulation of scientific knowledge for granted. He drew the following inferences: From time to time one theory T is replaced by a successor T*. When is it rational to switch theories? The new T* ought to be able to explain the phenomena that T explains, and it should also make whatever true predictions are made by T. In addition, it should either exclude some part of T that is erroneous, or cover a wider range of phenomena and predictions. Ideally T* does both. In that case T* subsumes T.[3] However, Kuhn and Feyerabend criticize that theory, demonstrating that Nagel did not state the possibility of theoretical changes since subsequent theories might put to use new concepts and study new problems. Hence, the new theory T* and theory T often transformed between each other and they were engaged in different works. Hacking still assumed that the thesis incommensurability was a historical issue because that competing theories could not be able to comprehensively compare their success or failure for only partially overlapping due to the complexity of historical cases. The new theory T* could probably be comprehensible if its successors learn it as historians or interpreters.

3.2 Dissociation

The second one is the dissociation. With the development of history and changes of theories, previous theories are impossible for successors to comprehend, resulting in disconnection. Hacking made two distinctions on that. An old theory may be forgotten, but still be intelligible to the modern reader who is willing to spend the time relearning it. On the other hand some theories indicate so radical a change that one requires something far harder than mere learning of a theory. [3] For the former, modern readers can still learn and understand the theory in its historical background, though the old theory has been forgotten. The latter is not, because of a change in the way of thinking. Hacking further expanded the above viewpoints by taking P. Laplace and P. Paracelsus as examples. He claimed that modern readers can still understand Laplace's works although some theoretical terminologies has been changed. But for Paracelsus's works, readers who were proficient in the language in which it was written cannot understand exactly. This is because that Laplace is an 18th-century physicist, while Paracelsus is a 16th-century professional alchemist. The former works are more scientific, while the latter tends to another way of thinking that is contrary to modern times. Modern readers can't comprehend Paracelsus's work for the differences in thinking mode and reasoning style, resulting in the dissociation said by Hacking.

3.3 Meaning Incommensurability

The third one is the meaning incommensurability. The thesis of meaning incommensurability generates from the process by which unobservable theoretical terms acquire meaning. There is no common measure for any two theories that employ theoretical terminology because in principle they can never discuss the same issues. There cannot be theoretical propositions that one theory shares with its successor. [3] Hacking suggested that thesis incommensurability and dissociation are historical issues, while the meaning incommensurability is a philosophical one. The meaning incommensurability is an inquiry into the meaning of terms. It cannot be explained clearly, but may lead to a dead end of idealism. The responds of Hacking to the incommensurability of meaning depends on Putnam's

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reference theory, which Hacking assumed that theory completely avoided the thesis of incommensurability of meaning.

4. The Decomposition of Incommensurability by Experimental Realism

Based on Putnam's reference theory, “the description of the meaning of a word should be a finite sequence, including grammatical markers, semantic markers, paradigms and extensions”.[4] When use a proper noun referred to a thing or person in communication, it also refers to a thing or person, thus forming a chain of transmission. Putnam claimed the scientific nouns should be named like that. The reference of scientific nouns is based on the historical social formation of cause and effect between us and these objects in scientific practice. So the nouns in mature scientific theories have references. With the development of history and scientific theory, we use the same reference, that is commensurable.

Hacking argued that Putnam's reference theory denied the incommensurability of meaning from linguistic philosophy and social history, but Putnam did not make a distinction between theory and actual condition in scientific practice. Hence, Putnam's reference theory was inadequate to solve the crisis of scientific rationality, owing to he failed to handle the relationship between scientific theory and natural entity well by leaving scientific practice. Putnam's philosophy cannot conduct scientific practice with correct methodology though it was based on the reflection of language. Hacking thought that terms such as incommensurability, derived from thinking of philosophers about the relationship between language and reality, not only couldn’t offer a useful understanding of reality, but also leaded to a dead end of idealist. Consequently, reference theory responded splendidly to the incommensurability, but it should be further explored by experimental realism. Hacking said that “Philosophers of science constantly discuss theories and representation of reality, but say almost nothing about experiment, technology, or the use of knowledge to alter the world”.[3] He was against for the dichotomy between action and thought. He argued that obsession with representation, thought and theory was at the cost of intervention, action and experimentation. So, Hacking proposed a further decomposition of experimental realism to thesis of incommensurability by turning from representation to intervention.

First, Hacking distinguished two kinds of realism: realism about entities and realism about theories. The realism about entities refers those theoretical entities do exist. The people who oppose realism about entities think that the theoretical entities are a logical construct of fiction. The realism about theories means that theories in mature science are true, or nearly true, which are closer to the truth than previous theories. Anti- entities realism argues that theories are at best valid, sufficient and acceptable, but not credible. Some philosophers in history believed realism about entities rather than realism about theories. For instance, the Medieval Christian philosophers believed in the entity of a God, but they could not propose any positive and comprehensible theories of God in their principles. While some philosophers, such as Bertrand Russell, believed realism about entities on theoretical topics and opposed that on entities topics. Hacking presented in Experimental and Scientific Realism that the majority of experimental physicists believed in realism about entities and the support of realism about entities was repeatedly emphasized in that paper.

Secondly, as the opposition to the philosophy of theoretical superiority, Hacking proposed creation of phenomena. He indicated that the task of scientists was to describe the phenomena they discover in nature in the past, but the core part of theories should be the phenomena created by scientists by taking Hall effect as an example to illustrate the distinction between phenomenon and effect. He believed that Hall did not create effect, but created phenomenon. The effect can only exist with a particular instrument, at least in pure state. Therefore, Hacking claimed that the effect was not discovered by Hall since it did not exist before being produced by Hall in the laboratory. It was strictly created by Hall. There would be no such phenomenon without proper operating experimental facilities.

Finally, Hacking assumes that theory and experiment doesn’t have one-dimensional relationship. The experiments cannot be stated only from the view of theory. Theory does not play a leading role on experiments while the experiments are not to construct theories. Hacking proposes “Experiment has a life of its own”, which highlights the experiment itself as a practice to liberate experiments from the representationalism tradition of the old theoretical superiority. Sankey evaluated the above viewpoints that “If sciences keep using more reliable approach, the understanding of the world will inevitably increase moving forward.”[5] As a consequence, the experimental realism of Hacking clears scientific practice of theoretical problems and removes barriers for scientific development.

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5. Conclusion

The experimental realism presented by Hacking from the scientific practice point of view is significant to modern contemporary practical philosophy and scientific research. On the one hand, Hacking's experimental realism partly clears up the conflict between realism and anti-realism on the topic of incommensurability, breaking the top priority of theory in philosophical research for a long time. It reconstructs the relationship between experiment and theory, which actively boosts the promotion of scientific practice philosophy. On the other hand, scientific practice of Hacking leans more toward to the practical meaning of experiment, technology and laboratory physical instruments. He puts too much of an emphasis on the importance of operation, and even advocates restoring scientific practice to the degree of engineering.[6] This shows that Hacking's experimental realism avoids the theoretical dilemma of incommensurability, but he overemphasizes on experiments, which leads to the other extreme. Also, it lacks fully realization of the influence in scientific theories on scientific practice, so that the factual results obtained from experiments are completely separated from various theories. In brief, we should combine the practice with scientific theory of scientific experiments, unifying theory and practice to provide a reasonable solution to problems in scientific development and offer reasonable explanations for scientific activities.

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