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Discussion on the Methods and Approaches of Building Unified information Science from Kuhn's Paradigm Theory†

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Abstract: Thomas Kuhn's paradigm theory tells us that the science itself has a certain structure and the development of science has its own laws. His historicism research methodology in philosophy of science provides us a research approach having much referential values for investigating, predicting and programming the process and prospect of the development of Unified Information Science. And the paradigm shift of science firstly needs a breakthrough in its philosophical core-ontological presupposition. Therefore, this article will discuss how the development of Information Philosophy in China provides an opportunity for building the Unified Information Science from the perspective of paradigm theory, analyzing what necessary theoretical foundations that paradigm theory provides for the integration of Information Philosophy and Unified Information Science.

Keywords: unified information science; information philosophy; paradigm theory

1. Introduction

The unification of information sciences means that an information science paradigm forms. Then, what is paradigm? Kuhn did not give an explicit definition on paradigm. But we can understand it by analyzing its typical constituents. According to Chalmers' illustration, we can summarize that a paradigm mainly has three basic parts: 1. basic laws and theoretical assumptions and the standard methods of their application and instrument manufacture and usage technologies; 2. the general metaphysical principles; 3 the general methodological regulations. Here, we have to notice that, from the perspective of information philosophy, the establishment of scientific laws and theoretical assumptions, not only needs the inference of scientific inference, but also needs the assist of philosophical abstraction thoughts. And the construction of general metaphysical principles and methodological regulations also needs the relevant scientific researches to be their experimental foundation. All in all, the science and philosophy cannot be completely separated, and they mutually integrate, depend and synergistic develop.

Prof. Kun Wu believes the development of science has experienced three main paradigm shifts, which are three revolutions of science and technology. The first one is dominated by entity realism, which has been completed; the second one is dominated by field and energy realism, which we are experiencing; the third one will be dominated by the complexity information system world view, which has not been completely formed. Through investigation, we can find that every main paradigm in the history of science owns those constituents mentioned above. So if information sciences want to become a unified paradigm, it'd better also has the three constituents.

Just like the entity realism construct the Newton paradigm's philosophical foundation, and field-energy realism construct philosophical foundation for the electromagnetic field theory, relativity and quantum theory, I believe that the dual-existence and evolvement world theory of information philosophy provides the unified information science a philosophical foundation. It will play the roles of the general metaphysical principles and the general methodological regulations. So according to the paradigm theory, if we want build the unified information paradigm, combining the information philosophy and information science is necessary. Then we will talk about how to combine them.

2. The metaphysical principle of unified information science: What is information?

Before examining the metaphysical principles for the unified paradigm of information science, let us first briefly look at the metaphysical principles of the paradigm brought about by the first two revolutions in science and technology. The first scientific revolution has laid the way for scientific materialism to explore the world. It can be said to have inherited the consistent claim of the materialist philosophers since the ancient Greek period. The world is made up of particles of weight (mass) - physical atoms. The second technological revolution began in 1830s that originated from the concept of "force line" and "field" proposed by Faraday in the explanation of electromagnetic induction and completed in the mark of the establishment of Einstein's theory of relativity and the development of quantum mechanics and modern cosmology. The development of the new science broke down the establishment of the first revolution of science and technology in the ontological assumption. It believes the most basic elements that make up the world are no longer mass particles with mechanical movement, and instead it should be the energy that is more fundamental than the particle and exists in the form of field. Field energy replaces the solid substance with rest mass to become a new basic reality that makes up the world.

"The third revolution in science and technology broke out in the middle of the twentieth Century and there is no sign of an end to it. The third revolution in science and technology is mainly marked by the emergence of an emerging group of disciplines that can be called a unified name for information systems and complexity science as well as the emergence of corresponding new scientific paradigm, scientific world view and scientific thinking mode" [1]. In the third scientific revolution, information as a subject has been widely discussed in different disciplines and fields. Communication information, theoretical physics information, chemical information, biological information, social information, computer information, information technology, information economy and information society are discussed around the information. Then, what is information? Each subject has its own interpretation or definition of information, but it does not produce a unified conclusion. We can feel that the study of information should eventually be unified into a whole framework for common research. In order to extend the widest definition of information, we must rise to the height of philosophy and not confine ourselves to specific scientific fields. In philosophy, how do we define it? Just as Wiener said "information is information. It is neither matter nor energy" [2]. This shows us the way that information should be regarded as an ontological existence. It is independent of substance and dependent on substance as well. The philosophy of information which is now rising in China is devoted to such an aim. Professor Wu Kun's definition of information is given as following "Information is the philosophical category of indirect existence of signs. It is the self manifestation of the way in which matter exists and the state of being" [3].

3. How information philosophy becomes a general methodological requirement: the transformation of science into philosophy

If the ontological theory of information philosophy is the core hypothesis of the paradigm, it needs to provide general methodological provisions for the specific scientific work in the paradigm. Where does such a rule come from? It requires a kind of distillation from concrete to abstract and from special to general that means

the core concept of information science should be abstracted and summarized from the perspective of information philosophy. "A true scientific philosophy cannot be divorced from and superior to science and it must be based on science. The basic nature of science in philosophy determines that science can exert influence on philosophy from the bottom to up. When science itself has changed and developed, the philosophy based on science will inevitably change or develop accordingly or sooner or later. All the philosophy that is alive and capable of embodying the spirit of the times is based on the latest scientific developments of its time. The dependence of the development of philosophy on the development of science shows that science is the most powerful and basic motive force for the transformation of philosophy" [4]. As for information philosophy and information science, the methodology of information philosophy based on the summary of the results of the development of information sciences, and in turn the information philosophy provides a paradigm leading role for the establishment and development of general information science.

4. Without information philosophy, the information science cannot form into a unified paradigm: the criticalness of philosophy on science

Some people suggest to establish the unified information science, but the situation we face now is that information science is a collection of many disciplines, and those disciplines have a big difference with each other and it is hard to find an approach or method to unify them. Otherwise, because the information philosophy surpasses the concrete scientific disciplines, it can help to build a unified scientific paradigm by abstracting similarity from specific sciences. This is the criticalness that philosophy exerts on science. "The scientific general rationality having a more general trait can exceed the limitation of disciplines and jump into a higher level. Otherwise, we should know that those disciplines give birth to the general rationality. Hierarchical transition is a sublimation process of the general rationality itself…"[5] So, the unified information science needs information philosophy to complete unification, and the unification cannot be achieved in specific science level.

5. Conclusion

So, from the perspective of Kuhn's paradigm theory, if we want to build a mature unified information science, firstly, we have to come into the consensus on the general metaphysical principle—what is information? which depends on the contribution of information philosophy; then, we need to continuously transform information philosophy by using the advance of concrete information sciences, and regurgitation-feed the information science, providing methodological guidance for the sound and sustaining development of information science; at last, the information philosophy needs to continuously criticize the limitation of concrete information sciences, in order to overcome the difficulties for heading to unification and to acquire a more general philosophical theory; otherwise, we also have to notice that information philosophy develops not only by criticizing the limitation of concrete sciences, but also by criticizing the obsolete philosophical systems, thus it can break through the fence of thoughts brought about by old philosophies, and can become a vital philosophy theory, adapting the spirit of information era.

Reference

[1]. Kun Wu. *The Theoretical Foundation of Complex Information System*; Xi'an Jiaotong University Press: Xi'an City, China, 2010; P65

[2]. Norbert Wiener; *Cybernetics;* Jiren Hao, Translation; Science Press:Beijing,1963; P133

[3]. Kun Wu. *Information Philosophy: Theory, System and Method*. Commercial Press: Beijing, 2005; PP45-46;

[4]. Kun Wu. *The Transformations of Philosophy and Science*; People Press: Beijng. 2014; P99-100

[5]. Kun Wu. *The Transformations of Philosophy and Science*; People Press: Beijng. 2014; P103