computer sciences and mathematics forum

MDPI

Proceeding Paper

The Information Paradigm, Spanning All Levels of Human Knowledge †

Kun Wu and Zhensong Wang *

International Centre for Philosophy of Information, Xi'an Jiaotong University, Xi'an 710049, China; wukun@mail.xjtu.edu.cn

* Correspondence: zhensong@xjtu.edu.cn

† Presented at Forum on Information Philosophy—The 6th International Conference of Philosophy of Information, IS4SI Summit 2023, Beijing, China, 14 August 2023.

Abstract: The revolutionary development of human knowledge and the fundamental change of human civilization are impelled by the transformation of the scientific paradigm. We have enough reason to regard the middle of the 20th century as the beginning of a new human era. Since then, a new scientific and technological revolution has brought mankind into the new era of information civilization, accompanied by the rise of the information paradigm. This paper will be presented in the following four aspects: the information paradigm; the unified relationship of inner fusion of human knowledge developing patterns; the unified information science between heaven and earth; and a rationally constructed philosophy of information, which is the philosophical basis for establishing a unified information science.

Keywords: information paradigm; information science; information philosophy; knowledge

Citation: Wu, K.; Wang, Z. The Information Paradigm, Spanning All Levels of Human Knowledge. *Comput. Sci. Math. Forum* **2023**, *8*, 6. https://doi.org/10.3390/cmsf2023008006

Academic Editors: Zhongzhi Shi and Wolfgang Hofkirchner

Published: 9 August 2023

1. Information Paradigm

The information paradigm is a new theoretical and practical way of understanding and transforming the world.

We put forward a new theory of scientific and technological revolutions. Different from others, we distinguish those revolutions based on a new standard, and such standard is the coordinated change of scientific paradigm, scientific worldview and scientific way of thinking.

The corresponding three scientific and technological revolutions have different worldviews and ways of thinking. The first revolution brought us a worldview of entity realism and entity thinking; the second revolution brought us a worldview of energy-field realism and energy thinking; the third revolution brought us a worldview of complex information system and information thinking.

In the beginning, scientists thought that the world was made of material particles, which were named as entities in Aristotle and ancient Greek atomism. This is a way of thinking about entities and also an entity realism worldview. The development of Newtonian mechanics and atom-molecular theory in modern science is the scientific realization of entity thinking.

Later, science revealed that energy is more fundamental than mass. This is the rise of the second paradigm, energy-field realism and the rise of energy thinking. The relativity theory, quantum mechanics and modern cosmology are the scientific achievements of the second paradigm.

Now scientists have already realized that in order to have a comprehensive and deep understanding of everything in the world, it is necessary to investigate from the perspective of information in addition to the perspectives of mass and energy. This is what we called three transformations of the scientific paradigms, the scientific worldviews and the scientific ways of thinking.

The cognitive and practical ways that the information paradigm brings us can be divided into three levels:

The first level is to understand objects based on their structure, relationship, procedure and process, rather than simply from the perspective of mass and energy.

The second level is to regard structure, relationship, procedure and process as a dual-existing information encoding carrier, from which relevant information content can be deciphered.

The third level is the general symbolic processing of the corresponding structure, relationship, procedure and process, thereby constructing our cultural world in the information age and enabling intelligent and mechanical ways of information processing.

It is important to stress that there are many versions of the existing divisions of scientific revolutions in the academic circle. However, some of them are less convincing, and they cannot sketch a clear outline of scientific paradigms. For example, Mr. Floridi distinguishes the first three scientific revolutions by the name of Copernicus, Darwin and Freud and proposes that the information revolution is the fourth one [1]. This is a confusing division of scientific paradigms.

2. The Unified Relationship of Inner Fusion of Human Knowledge Developing Patterns

With the contemporary development of human knowledge, the information paradigm has become a brand-new basic scientific way for the transformation of contemporary philosophy, science, technology and engineering development. Nowadays, all areas, levels and aspects of human knowledge have been facing a comprehensive transformation and reconstruction by the information paradigm.

Based on this fact, we believe that the basic pattern of human knowledge development has a unified relationship. The developing modes of science, philosophy, technology and engineering are inherently integrated. We, therefore, disagree to make a sharp divide between science, philosophy, technology and engineering. This view is different from the development path of the philosophy of consciousness. Philosophy of consciousness, we believe, has been leading us to a dead end of philosophy. In Plato, the world is composed of three parts: one is real, including idea, form, absolute spirit or God; the other one is unreal and even vulgar and inferior, which is the material world; the last one is imperfect real, which are souls. Souls come from the world of ideas and combine with material objects. Thus, the philosophy of consciousness in modern times has its root in Plato.

Since Plato, philosophy has always tried to establish a link between the objective spirit and the human soul, and the material world only plays a role for containing the soul. After God was dispelled by the development of science, philosophers fell into a predicament of losing the source of the human spirit. Hence, they have to find the reason for noegenesis on their own. This turn in philosophy finally leads us into an ever-narrowing dead end. In epistemology, we were trying to find noegenesis in the structure of cognition; in the philosophy of language, we were trying to find noegenesis in semantics and in the philosophy of consciousness, we were trying to find neogenesis in intentionality. Following such a path, the field of philosophy has been increasingly shrinking, and finally, we have reached a dead end. Nowadays, the mainstream of philosophy is trapped in this dead end. Therefore, we have to change our thinking and find a way of reconstructing our philosophy, which is a new philosophy allying with science.

By examining the history of philosophy and science, we will clearly find that the development of general human knowledge is a process of the scientization of philosophy and the philosophicalization of science. Science and philosophy are internally integrated and unified, and they form a dynamic feedback loop in the process of their development. They have been always mutually regulating and promoting, reciprocally integrating and transforming, and accompanying each other in the process of development.

On the basis of the development of experimental science since modern times, the Newtonian “mass point” mechanics and chemical atomic theory developed the ontolog-

ical theory of entity realism created by ancient Greek philosophers; the relativity theory, quantum mechanics and modern cosmology provide the most direct scientific basis for the establishment and development of the ontological theory of energy-field realism; the birth and development of contemporary information science provide a scientific basis for dual existence and evolution ontological theory proposed by the philosophy of information. The philosophical ontology theory of dual existence and dual evolution provides a scientific basis. From this point of view, the research of ontology has never stopped. On the contrary, with the development of human science itself, ontology has been integrated into science. In the development of human science, the exploration of metaphysics and physics always goes hand in hand.

Another equally obvious fact is that the development of human experimental science has also profoundly promoted the development of epistemology. For example, Francis Bacon (1561–1626), a modern British philosopher, criticized the rationalism philosophy and emphasized that true philosophical thought should be the product of a close combination of scientific experiments and human reasoning. He also proposed the theory that there are "four illusions" in the human mind that influence our cognition. The French philosopher and scientist Descartes (Rene Descartes, 1596–1650), the "father of modern philosophy", also tried to find the basis of mental activity from the physiological function and proposed that the pineal gland is an organ that combines body and soul. The Enlightenment thinker Julien Offroy de La Mettrie (1709–1751) used the achievements of medicine, anatomy and physiology of his era to explain the nature of mind activities, such as feeling and thinking. In the context of modern science, many epistemological theories were developed, such as act psychology, genetic epistemology, experimental psychology, psychoanalysis, Gestalt psychology and behaviorism psychology, Cognitive Science and virtual epistemology and Information Epistemology.

Those theories about human cognition, psychology or mind in modern or contemporary times have a feature in common, combining science and philosophy, and combining the external activities and internal activities of agents, rather than finding the mechanism of noegenesis from the purely inner part of the mind. Obviously, those theories embody a process of the scientization of philosophy and the philosophicalization of science. The study method of those theories corresponds with the study method of complex information system theory, which is the method of pluralism, synergetics, holism and emergentism.

3. The Unified Information Science between Heaven and Earth

Since the information paradigm has become a fundamental way of transformation in the development of contemporary human philosophy, science, technology and engineering, it is possible and reasonable to establish a unified information science that runs through all fields, aspects and levels of human knowledge.

We once put forward the assertion that unified information science is a completely new scientific system between heaven and earth, and the unified information science must be a theory about the interactive, integrated, holographic and unified development of contemporary philosophy, science, technology and engineering.

We believe that not only information philosophy has the property of meta-philosophy, but also information science has the property of meta-science. Nowadays, information science is no longer just a single discipline or an inter- or trans-disciplinary field, but a system of disciplines with many levels and many fields. The information paradigm can transform traditional disciplines in an all-round way. We have mentioned before that there are only disciplines that have not been transformed, and there are no disciplines that cannot be transformed. While traditional disciplines are mainly built based on the material paradigm, the world we propose now is with the dual existence of matter and information. The information world must be re-considered and positioned, so that all disciplines can be remolded.

We presented a system of unified information science in 1995 (Figure 1).

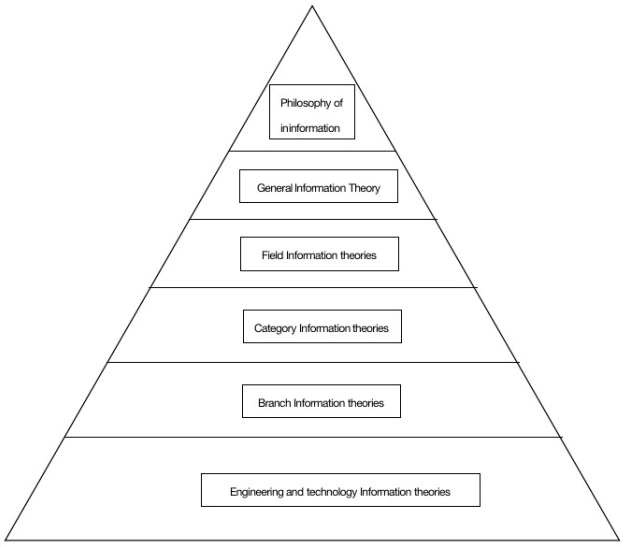

Figure 1. The structure of the modern system of information science.

The highest level is information philosophy, and the lowest level is engineering and technology study on information. We can see that information science actually runs through all levels of human knowledge. This is why we call it between heaven and earth, which means comprehensive.

Sciences in the information age, just like society, economy and life in this age, are facing a process of comprehensive informatization, which is the remold through information science. Because it runs through all levels of human knowledge, unified information science will be a modern scientific system with a brand-new significance.

In this brand-new scientific system, the philosophy of information presents a character of science, and the concrete information science technology and engineering practice present the charm of philosophy at the same time. At present, all human sciences and philosophies are faced with the task of transforming themselves with the information paradigm, which leads to the fact that the information paradigm will inevitably have an all-round transformation effect on the existing science and philosophy. Both science and philosophy are faced with the process of comprehensive transformation by the same unified information paradigm, so it is not only natural but also reasonable that science and philosophy have a trend of interaction, fusion and unification.

4. A Rationally Constructed Philosophy of Information Is the Philosophical Basis for Establishing a Unified Information Science

From the perspective of complexity, the relationship between different domains and levels of human knowledge cannot be separated. Taking the relationship between science and philosophy as an example, we can clearly see that science and philosophy are not two distinct and exclusive fields. On the contrary, they define, contain and integrate with each other. Otherwise, the unified relationship between different fields and levels of human knowledge cannot be simply regarded as an external connection but should be regarded as an internal fusion. According to the general understanding, philosophy is a pursuit of the broadest rationality, while common science and technology have specific experiential characteristics. However, it is impossible to completely separate general rationality and specific experience in human cognitive activities. The inner level difference of the universality of universal rationality defines the level of knowledge created by human beings and the relativity of the demarcation between philosophy and science.

Science is essentially made up of the principles of universal reason. These principles do not equal to a direct statement of facts acquired from observation and experimentation. It is some kind of philosophical thinking that help various factual statements rise to universal scientific principle. The reason why different scientific principles can be drawn from the

same set of factual statements lies in the differences in philosophical thinking possessed by scientists. In addition, the directionality and selectivity of scientific observations and experiments, as well as the design of general methods, are always mixed with a certain degree of rational thinking in the philosophical sense of scientists. So philosophy is in science, and science is in the regulation of philosophical thinking. The general reason for any kind of science is correspondingly permeated with a philosophical conception, and the general reason for this science should be regarded as the product of a combination of philosophical conceptions and relevant factual statements.

In the interaction between science and philosophy, concrete experience and universal rationality, there will be two effects: philosophy's criticism of science and science's transformation of philosophy: On the one hand, high-level universal rationality will affect the lower-level universal rationality from its own rational level. By conducting a critical examination, it is possible to discover the limitations of the underlying universal rationality. By eliminating the corresponding limitations of the lower universal rationality and excavating its universal character, the philosophy implements a rational critique of science. In the process, the reform and expansion of science itself will be triggered at the same time. On the other hand, by critically accepting the low-level universal rationality, philosophical theories or systems change their old views, which realizes the transformation of the low-level universal rationality to the high-level universal rationality. The transition is the transformation of philosophy by science, and such a process may constitute the progress, development and transformation of philosophy itself.

Without the discussion of the nature of information, we cannot figure out the universal character of the information paradigm and cannot make sure whether the philosophy of information and unified information science can be established. In fact, since the mid-20th century, starting with the work of Shannon and Wiener, the question of what information is and the technological applications associated with it has been a major issue for information scientists and philosophers. According to some relevant statistical data, so far, in information science, systems science, self-organization theory, complexity theory, physics, life science, many related interdisciplinary fields and different philosophical schools, there have been hundreds of standard and non-standard definitions and explanations about the nature of information from different levels and perspectives, and a generally accepted explanation has not yet been found. This phenomenon of general differences in information understanding has led some researchers to deny the possibility of the construction of unified information science and, at the same time, has adopted a fundamental denial attitude to the attempt of establishing a completely new philosophy, the philosophy of information. Even Mr Floridi, who emphasizes the meta-philosophical nature of the philosophy of information, expresses pessimism in his recently published paper about attempts to find a unified explanation of information. He emphasized that "Information is both a polymorphic phenomenon and a polysemantic concept. . . we can interpret information in many ways".

However, if you only see the general differences in the current research status of different disciplines and their branches in the field of information science and information technology, if you cannot go beyond this temporary limitation in development and if you are only satisfied with declaring that the explanation of the nature of information as universal difference, then the attempt to establish a philosophy of information with a meta-philosophical nature will be infructuous, and the attempt to seek a unified theory of information science with a comprehensive understanding on information will be futile.

In fact, unity and universality reside in difference and particularity. The presentation of differences and particularities of information at different levels and in different fields just shows the unity and universal character of it.

If it is quite natural that the definitions of information concepts show general differences in those specific disciplines and fields, then at the level of meta-philosophy, or at the level of unified information science, it is confusing to tolerate such general differences in information understanding. This makes one ponder the following two questions: One is

that information does not have such a universal character, and it is simply impossible to establish some kind of meta-philosophy or unified information science. The other is that although information has such a universal character, this universal character has not yet been found. Therefore, the established doctrines do not have the nature of meta-philosophy or unified information science.

To say that information does not have a universal character is obviously inconsistent with the development of contemporary science, technology, economy, society and even philosophy. Contemporary science has revealed that matter (mass), energy and information (or materials, energy and information) are the three basic elements that make up the world. The information paradigm has been widely used in science, technology, economy and social development across all levels and areas. In the field of general philosophy, especially at the level of the most basic theory of philosophy, the meta-philosophy of ontology, the fundamental position of information has been established.

In view of the above situation, it is unquestionable to establish a meta-philosophy of information and establish a unified information science. Hence, at the level of meta-philosophy or unified information science, how to deal with the ambiguity of information concepts in existing related fields? To solve this problem, we must first sort out and evaluate the existing information concepts with different opinions, divide their levels, analyze their perspectives, reveal their limitations, and on this basis, find out the universality of information and clarify the most general and essential nature of the information. And such an essential understanding must be realized at the level of meta-philosophy or unified information science, and such meta-philosophy must be contained in unified information science. Correspondingly, the true sense of unified information science must have a meta-philosophy as its paradigm core.

After more than 40 years of development in the Chinese Philosophy of Information, we put forward the view that "the division of the realm of existence" is the highest paradigm of philosophy. At the level of ontology, we treat matter as the direct existence and information as the indirect existence. In the equation, it is illustrated as "Existence = Matter (Direct Existence) + Information (Indirect Existence)" [2]. This is an ontological theory of dual existence and dual evolution. Based on this ontological foundation, the Chinese Philosophy of Information has established a systematic and complete philosophy of information with a meta-philosophical nature. This philosophy can well demonstrate the comprehensive nature of information science and information paradigm, spanning all levels of human knowledge.

Author Contributions: Writing—original draft preparation, K.W.; writing—review and editing, Z.W. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Basic research funds for central universities, Ministry of Eduction of P.R.C., *The Study on Philosophy of Information Science based on the dimension of Value*, Funding Number: SK2022013.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: All data have been presented in the main text.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Floridi, L. *The Philosophy of Information*; Oxford University Press: Oxford, UK, 2011.
2. Wu, K. *Philosophy of Information: Theory, System and Method*; Commercial Press: Beijing, China, 2005.