

The Leap from Artificial Science to Intelligence Science [†]

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Abstract: Intelligence science (IS) was founded by the CAAI (Chinese Association for Artificial Intelligence) in 2003. From numerous and complicated artificial intelligence theorem and technologies out a new, abstract science developed to define the deep concepts and create the foundational theorems on intelligence. It is an important contribution to science itself. IS is a natural and effective advance from AI and many other fields. This paper explains such necessity and significance. The CAAI and IS4IS-CC (International Society for Information Studies-China Chapter) has staged four Intelligence International Conferences on Intelligence (ICIS). The first ICIS was staged at Chengdu University of Technology. This conference series attempted to develop the foundations of IS. Currently, there are 194 universities in China have intelligence science and technology departments or offer related courses. This paper discusses the four ICIS and the education of IS. The four ICIS conferences are ICIS2016, ICIS2017, ICIS2018, and ICIS2020. Through this series of conferences, theoretical studies were collected, and the discipline kernel of IS was founded. We introduce some of these basic original theorems, including the author's phase theorem. The fifth conference is set to be held in Xi-an, and the main topic is "Information Science and Intelligence science". These approaches should be the prelude to future studies in intelligence science that should create a golden age for human beings.

Keywords: artificial intelligence; intelligence science; information science; ICIS; phase theorem



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1. The Formation of Intelligence Science

Intelligence science is a new science. It is a scientific spirit applied to thought, mental processes and phenomena and an emergent multidisciplinary direction of research. At the same time, it represents a long-standing tradition in oriental thought. After the success of science in grasping the rules of the natural world, and despite many false starts, science has finally begun to focus on intelligence. Hence, the East and West, science and art are linked, and it is from here that the scientific paradigm and a paradigm for civilization evolves.

In ancient times, human beings faced many challenges of survival. After a long period of evolution, it is now time to move from a survival mode to an outlook of how to live better and address the words of A. Feln: To think better is the challenge to our integrity. "Know yourself" is the inscription in the temple of Apollo. It can and should be taken to heart now more than in any other age. Intelligence Science was born at the right moment [1].

2. The Development of Intelligence Science

After first discussing the urgency of the foundation of intelligence science, I contributed the idea of organizing an international conference for the foundation of IS study to the President of CAAI, Prof. Zhong. Then, the first ICIS was held in the CDUT (Chengdu University of Technology), from 31 October to 2 November 2016.

There are various sciences and layers of the intelligence phenomena. In Figure 1, I place IS in the context of the whole panorama of human research. Intelligence science, which studies the inner mind, forms a symmetry with physics, which studies the outside world. How to integrate them into a more complete scientific structure should be the final

goal of ICIS series, and how to set the system of IS was the most urgent goal of ICIS2016. There are many deep exchanges and great creations that can be made. Firstly, we should figure out how to define intelligence and how to research it.

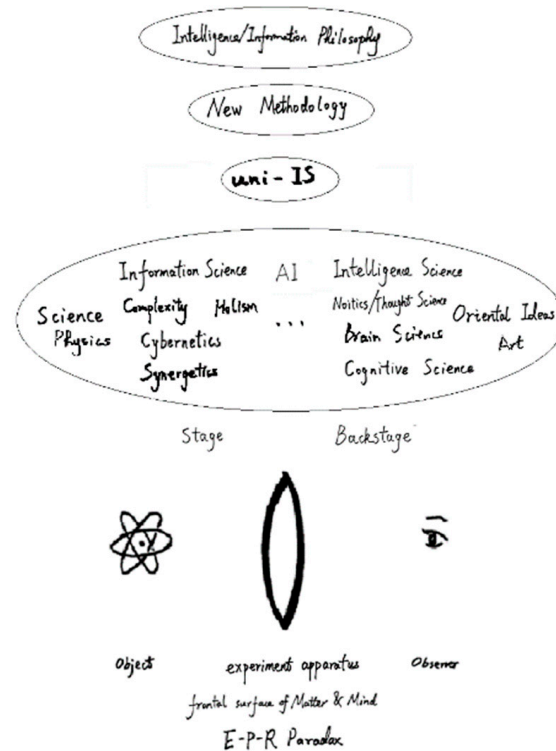


Figure 1. The study plan of intelligence science.

2.1. Four Conference on Intelligence Science

As an initiator I strongly suggested the president of CAAI to organize an international conference for theoretical research of Intelligence Science during a conference on IS education in Dalian, in September 2015. For theoretical physics help physics deeply.

2.1.1. ICIS2016, Chengdu

The First International Conference on Intelligence Science (ICIS2016) was organized by the CAAI and IS4IS (the International Society for Information Studies) and staged in Chengdu University of Technology. The author of this paper served the conference as the chair of the organization committee of ICIS2016. The general chair of ICIS2016 was academician Yixin Zhong (China), the co-chair was Prof. Pedro C. Marijuan (Spain), and the program chair was Zhongzhi Shi (China).

The conference invited 22 speakers from different fields concerning intelligence issues; however, there are still many aspects that must be approached in the next conference. From this viewpoint, we can understand why the study of intelligence is so difficult. Figure 1 is the map of the science presentation I gave for ICIS2016 to show the seat of IS and discuss the main task of IS. In Figure 1, “uni-IS” means Intelligence Science and Information Science is the goal of ICIS2016.

2.1.2. ICIS2017, Shanghai

The Second International Conference on Intelligence Science (ICIS2017) was staged in Shanghai Maritime University, 25–27 October 2017.

2.1.3. ICIS2018, Beijing

The Third International Conference on Intelligence Science (ICIS2018) was staged in Beijing University, 1–4 November 2018. there were four workshops in ICIS2018. One is Phase Theorem Workshop.

2.1.4. ICIS2020, Durgapur, India

Because of the COVID-19 pandemic, the ICIS2020 was held online from 24–27 February 2021. The program chair of ICIS2020, Zhongzhi Shi, presented a conclusion to the first ICIS—the ICIS2016, 31 October–1 November, staged in Chengdu, China—the basic theory of intelligence science must urgently be constructed. The goals of the conference are to carry out the theory of collective exploration and establish the discipline kernel of intelligence science.

2.1.5. ICIS2022, Xi-An

The Fifth International Conference on Intelligence Science (ICIS2022) should stage in Xidian University, 28–31 October 2022.

2.2. AI, Noetics and IS

In 1979, Prof. Xueshen Qian published Noetic Science, and in 2003, the CAAI published Intelligence Science, IS [2,3].

2.3. Two IS: Information Science and Intelligence Science

Two IS are interconnected and support each other. The IS4SI-CC created in 2016, and with CAAI sponsored the ICIS series together. The IS4SI2023 should hold in China.

3. The Original Theorems

There are many original theoretical studies are reported in the ICIS conferences. I first published the phase theorem in 2005 during the first World Congress on Universal Logic in Switzerland. The phase theorem was written in my book “the Frontiers of Intelligence Science”. (Science Press, 2014) as a chapter; There was a forum on phase theorem in ICIS2018, for which I was the chair [4].

The meanings of every object have many aspects, and any existing object in the world or in our mind diffracts information. Firstly, there are three basic concepts of the phase theorem—phase, logic and meaning unit. This allows for the discussion of three steps while we write. Language is a series of commands related to our cognitive abilities, a command series that our brains send to the outside world [5]. This is the essence and ways of language [6].

Definition 1. Phase is a relatively steady part in a divided field, or a new scene emerges from the condition of a stable state. Here I define phase in the finite division phase first [6].

The following formula is the formal description of phase:

$$M(p) \# M(p_1, L_1) \# M(p_2, L_2) \# \dots \# M(p_i, L_i) \# \dots$$

P is a point, an object, or a scene we analyzed, and M(p) is the meaning of P.

P_i is the phase that P describes in an actual field i, and L_i is the logic that the phase change should accord to in the field i.

is the infix operation, the basic formula is:

$$\text{inf ix: " \# ": } ((U \rightarrow X) \times (V \rightarrow Y) \rightarrow ((U \times V) \rightarrow (X \times Y))$$

Definition 2. Logical ways or trends of one phase changing in a field [6].

Definition 3. *A meanings unit exists in many different fields. It has a phase and a phase change direction in a field; this phase should change according to the actual logic in the field. That is the meaning of the existence. P in the field i [6].*

Notably, $m(p\ i, L\ i)$ are used. Additionally, $p\ i$, $L\ i$, and $m(p\ i, L\ i)$ are called basic meanings units. The ability for people to use language is the ability to measure, feel and organize these meanings.

I have used phase theorem to explain the essence of language, and then provide the dynamics and duty of language. Language manages the inner actions of cognition and feeling and sends semantic series as entities for the function of the mind and the outside world. It is the relationship and bridge between the mind and the outside world.

As a result, there are many new developments within the phase theorem.

4. Methodology of IS

The importance of methodology.

Ilya Prigogine (1917–2003) pointed out: “Western science and culture crisis has formed, because we describe nature as an automaton. Such view can not even give any differences between past and future” [7]. This is a diagnosis of Western science. In the modern information age, due to the rapid expansion of AI technology, such a question is the same and sometime even more pressing: How do we overcome this? In China, two scientific research directions provided early answers to these questions. In 1979, the famous Chinese scientist, Xueshen Qian, published Noetic Science. In 2003, the Chinese Association for Artificial Intelligence (CAAI) first introduced the concept of intelligence science. While scientists focus their studies on intelligence and integrate human factors within science, things are different, the new science is Intelligence Science.

What is intelligence? It is hard to define in simple terms. So far, we still do not have a unified formal definition of intelligence, although we can broadly grasp this concept by listing three definitions of intelligence [8].

Intelligence (in Chinese is: 智 Zhi) means the ability to distinguish and choose between right and wrong or kind and evil in the world. This is the main method to achieve good consciousness, called Bodhi Intelligence. This expression is a form of Buddhism [9]. How to integrate Intelligence and Heidegger’s concept “Thought”? [10].

We should go back to the source of different civilizations, different aspects of intelligence and both interdisciplinary and multidisciplinary types of science. At the beginning and during the development of IS, we should create and develop a new methodology. We should integrate reductionism and oriental thought as a new powerful methodology for new science and for new human civilization.

5. Conclusions and the Future of IS

IS is an emergent multidisciplinary direction of research. At the same time, it represents a long-standing tradition in oriental thought. After traditional science has finally begun to focus on intelligence, the East and West, Science and Art are interconnected, and the scientific paradigm and a paradigm for civilization evolves. New science should have its own new methodology [11]. There are many broad transitions that should happen during the growth of IS. We look forward to further IS research. Because of IS, human civilization should gain an opportunity to let science and philosophy, technology and art, Eastern and Western thought to be integrated and construct a newer and greater scientific paradigm [12].

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