Education Intelligence Should Be the Breakthrough in Intelligence Science

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Abstract. Intelligence Science (IS) is a new science witch is defined by the Chinese Association for Artificial Intelligence (CAAI) in October, 2003. To distract from Artificial Intelligence (AI) to Intelligence Science (IS) is a strategic transformation. That is significant contribution to science and should be confirmed by time very soon. It applies scientific spirit in physics study ago to study mental processes and phenomena. It is actually an emergent multidisciplinary direction. Science has finally focused intelligence field. That should start a new civilization age. The First International Conference on Intelligence Science (the ICIS2016) has been held in Chengdu, Oct. 31 to Nov. 1, 2016. It aimed at constructing the theoretical foundation of IS and focusing on Theoretical Intelligence (TI). Education Intelligence (EI) is another important breach of IS. From the view of intelligence traditional education and new human-computer interaction education are all examinations of intelligence science study. This paper will give a new understanding with the meaning of AI and discuss some original approaches in EI. They are "Xing", "FAI" and "BAI". FAI & BAI decompose normal saying AI as two steps that we can understand mind processes clearer. Education needs guidance and support from IS. On the other side EI should be one of the most urgent frontiers of intelligence science. EI should become the early breakthrough in IS study.

Keywords: Intelligence Science · Theoretical Intelligence · Education Intelligence · Xing · FAI & BAI

1 Intelligence Science

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." [1]. That is a diagnose for western science. Till nowadays in the information age because of IA technology and robot and so on, such question is the same and sometime even more serious. How to overcome it? Two directions of science in China have given an answer to this questions early. The famous Chinese scientist Xueshen Qian has put out Noetic Science in 1979 [2]. The Chinese Association for Artificial Intelligence (CAAI) has introduced the concept of Intelligence Science since

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2003. While scientists focus their researches on intelligence, and add factors of human to science, things are differently.

What is intelligence? It is hard to define simply. So far we still have not a unified formal definition to intelligence. Let us list three definitions of intelligence, then we can gain the main contain of this concept.

Intelligence (智 Zhi) means the ability to distinguish and choice with right or wrong, kind and evil in the world. That is the main ability to arrive consciousness, so it is called as Bodhi Intelligence. [3] This expression is form Buddhism.

Intelligence Science is the essence of life science. It is the core of information science and the frontier of modern science and technology. It connects with basic philosophy questions. This definition is put out by Zhongzhi Shi [4].

"Intelligence" parallels to a Chinese word "智能" now. But in ancient China, these two characters are not put together as one word. They are different two words. Xuncius (313 BC.– 238 BC.), ideologist, educator, he defined "智 in Chinese" and "能 in Chinese" as: "所以知之在人者谓之知。知有所合谓之智。智所以能之在人者谓之能。能有所合谓之能 in chinese" [5]. We can translate this statement as: Because of who owns knowledge is human, so cognizing means perception. And perceptions can be compounded that means "智 Zhi". "智 Zhi" is powerful because it belongs to human, that means ability, abilities can be compounded, so that means "能 Neng".

Such two independent concepts combine as zhi+neng and form a word as "Zhi-neng" and "Zhi-neng" means intelligence. Such an analysis is valuable.

From Artificial Intelligence (AI) to Intelligence Science (IS), the Chinese Association for Artificial Intelligence (CAAI) take a leadership. Intelligence Science was born in October, 2003 in the tenth academic annual meeting of CAAI. The first department of intelligence science was set in Peking University in 2004, till now there are more than 30 universities have set up their departments or majors of Intelligence Science and Technology. The number is still growing. IS has formed a new frontier line as philosophy, knowledge, theory, technology and education. It is a strategic transformation. There are many basic scientific questions we should face.

Heidegger mentioned his core concept "thought". He found and asked: Thought is always the same from time immemorial and flashes, whose amazement can deep learn it?" [6]. Who would be the challenger to learn thought? "Thought" implies that the rules of mind are always there, but we haven't taken them into account. It appears, runs and disappears so fast according to its own way, we have never mastered our own abilities deep and wide enough. Thought slips away like thunder that we are slow behind ourselves. Just as Becquerel found natural radioactivity in 1896, through their discoveries of two new elements, Curies' created radiology. Heidegger's voice about thought is meaningful, it radiates information from the center of our mind.

The way of thought is intelligence science. Thinking think itself, from AI to IS such a direction is not only an important contribution to science and to the whole human civilization the same. IS collects big questions of science together to resolve, such research should lead to a new golden era of civilization.

2 The Development of ICIS2016

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

There conference invited 22 speakers from different fields around intelligence. Even though there are still many aspects should wait for the next conference to approach. From this view we can understand why intelligence study is so hard. Figure 1, is the map of present science I gave before ICIS2016 to show the seat and discuss the main task of IS.

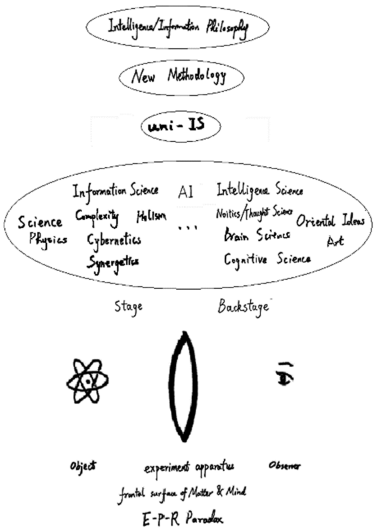

Fig. 1. The setting-out plan of Intelligence Science

We collected deep foundation questions. We prepared 13 open questions though has not opened it in the ICIS2016. We should discuss them in ICIS2017, Shanghai.

2.1 The Panorama of Present Science World

There are various sciences and various layers of intelligence phenomena. In Fig. 1, I install IS in the whole panorama of human research. Intelligence science which study mind inner, forms the symmetry of physics which studies outside world. How to integrate them into a more complete science structure should be the final goal of ICIS series. How to set the system of IS was the main urge duty of ICIS2016. There are many deep exchanges and great creations we should do. First we should figure out what is intelligence study.

In Fig. 1, if we stand in the seat y lower right corner as an observer, look from right to left, we can observe environment straightly or through the help of experiment apparatus. Human have many fruits of such observation, they are physics, new material, computer and so on. These form the front stage of science. But how about ourselves? How about the inner secrets of our mind? We ignore this back stage. Now we should pay attention to those behind our eyes. Though human have gained many knowledge about back stage, in the figure they are brain science, cognitive science and so on. But they are not complete and systematic. Science should focus to these areas with new ambition to integrate them as intelligence science. Here what we should emphasize are orient thought and art. Because there are so many fruits of explore with mind within eastern culture and art. We can carry forward them and integrate them into IS study.

Physics or say matter science is mature and science about human mind is weak. Intelligence research should be the next. Such study in different fields should first concentrate to a uni-IS state. This condition I call it enriched uranium state. That means we should abstract general laws from various wild collected fields, all these laws should contribute to construct the most final foundation of IS. By the way we can gain new methodology and expand our ontology. Finally intelligence/information philosophy should emerge be enriched. IS philosophy and IS should feedback each other. During this way new civilization should be born.

2.2 Intelligence Philosophy

Science emerges to its philosophy and the same time philosophy leads its science. The relation between philosophy and science is always so close that we cannot divide them simply. For example, AI sometime appears as AI philosophy. So is IS. And IS now is in its special mixture state of science-philosophy.

In ICIS2016, one of the 22 speech is delivered by Doc. Joseph Brenner. In his presentation he argue as: "the Intelligence is perhaps best described as a capacity for moral as well as material survival. Intelligence Science is a developing body of knowledge that has a unique philosophical dimension, since intelligence is above all a human phenomenon. Intelligence Science challenges the relative role of metaphysics and phenomenology in their implications for the society and the emergence of an Intelligence Philosophy. We thus can already, in its earliest stages, see Intelligence Science in its most theoretical as well as practical aspects as a 'Science-Philosophy' resulting from the convergence of the scientific and philosophical characteristics of intelligence, where intelligence is the conjunction of pragmatic and social capability defined above." [7].

There are many philosophies that we can regard as Intelligence Philosophy. For example, Rudolf Steiner's Anthroposophy, Jose Searle's Philosophy of mind, and so on. In this paper, we discuss Heidegger's core concept, "Thought". Though Heidegger himself did not know what is IS, but his views just were the early voice of Intelligence philosophy.

Heidegger described his significant concept "thought" as: "Perhaps there is a thought, which can exceed the difference between rationality and non-rationality. It is clearer than technology and science; It does not concern itself with normal benefits, but gets at itself necessity. But when we are asked the mission or aim of such thought, not

only thought itself, but also the questioning about it are not easy to make sure. From the view of the whole tradition philosophy history, it means that we urge need to receive education within such thought." [6].

"Which can exceed the difference between rationality and non-rationality" means such thought is strong inclusive and can connect difference aspects, just as from different angles we can see series colours in a piece of peacock feather. How can we approach the truth of human thought instead of rash judgments? "It doesn't concern itself with normal benefits" points the real intention and high quality of thought. What he described was the character of thought and the character of life the same. It has qualities of equality, naturalness, life, etc. Our thought is our teacher. It is the resource of IS.

2.3 The Structure of Intelligence Science

During the preparation of ICIS2016, the term "theoretical intelligence" was made sure first. As an organization committee chair the author had to look for support. While persuaded my classmates to support the ICIS2016, I said: "Our major is Theoretical Physics while we were young students in university. Parallel you can understand now what I devote myself to is Theoretical Intelligence. Intelligence science has existed for 13 years and there are more than 30 universities have set such majors. But we has not a academic conference to specially discuss the basic questions of IS. So ICIS should be such an original explore to create the basic theorem system of IS."

So we can naturally gain a structure of IS, like that of physics. They should be Theoretical Intelligence, Art Intelligence, Police Intelligence, and so on. Then human civilization should has great develop and change with the growth of IS.

Everything has the incompatible characters of independent and integrative both meanwhile. Instead of forming farther division of work, In fact different aspects of civilization are calling each other to integrate. For example, New Biology is put out by America Academy of Science in 2009. It proposes that biological sciences should make more connections with sciences of non-living [8].

ICIS2016 aimed for the foundation of intelligence science. The theoretic Intelligence is very difficult like theoretic physics. It is even more difficult. That is nice ICIS2016 has begun focus to set it.

Nils Bohr was a scientist who worried about the unity of human knowledge. His effort started from physics upwards try to touch and unite humanist. "Our developments bring the news of human intercommunity questions, means the development of science would never result the divide of social science and natural science. The old question, scientific uniformity is put into a new view." [9] Bohr believed such two kinds of knowledge can be united by the characters root in human common plight. On the other hand, Heidegger used philosophical sense "Though" to wake and lead science. The two directions both point to the truth of our inner mind, that is IS.

With the first saying of "theoretical intelligence", the preliminary structure of IS emerged. The second one is education intelligence (EI).

3 Education Intelligence (EI)

During the preparation of ICIS2016, we have held 10 times small academic seminar with the help of JoinNet, a kind of Home-meeting software. After made sure theoretical intelligence branch, we felt huge press from education ask for IS theorems that I put out the term: Education Intelligence (EI). We believe many education fruits which existed already are very precious can be absorbed from the view of IS. The developments of EI should contribute many principles to IS study.

The author has put out the Phase Theorem in 2005 and bend myself to create this theorem science then [10]. There are some approaches belong it can vest to EI.

3.1 "Xing" and a New Understanding of AI

I confirmed a concept "Xing" and try to assign it as an operator of AI science 2008. Literature critic Jiayin Ye in her book, Appreciation of Good Poetry, introduces the concept "兴 Xing". This Chinese character sounds as "Xing". It can nearly translated as make a metaphor, excite, react, rebuilding or relief. She studied the exchange between poem and reader. Confucius said in his Analects: "诗可以兴 in Chinese". It can be straightly translated as "Poems can Xing/can be Xing-ed." She mentioned an aesthetic reception theorem developed from Germany: A work, if nobody can understand it, even it is nice, but has not life, can be regarded as an art fact, it is a product of art only [11]. "Xing" is also an inter fix of object and subject. It is the frontier of cognition. It means poem lines course something happen in a person's mind while he/she read. Something changes innermost as respond. What are such changes? It is not only an aesthetic issue but is also a cognition issue and a complex life process. Instead of random, it is actual and expectable.

"兴 Xing" means the processing fully or partly transform the inner structure, states or function from one condition to another one. Such exchange result should happen between two entity, homogeny things or neterogeny things, there is medium or there is not medium. From this view we should learn that the concept AI should have a more generation definition: that AI is an intention and process to transform some structure form one condition to another one. The target and the source should be nether homogeny nor neterogeny. So "Xing" is a verb. It is not only limited in Chinese ancient literature critic, it is the complex processing to make heterogeneous homogeny.

With Guangjian Zhang who put out Similarity Theorem [12], we discussed "Xing" and "Similarity" many times. He enjoys the concept "Xing" and believes that Phase, Xing and Similarity should become the keys to deal with the secrete of the world. He encourages me frequently to finish the phase theorem round with the center concept of Xing.

3.2 FAI & SAI

Form the view of Xing, Artificial Intelligence (AI) has its new meaning. Xing is a process to gain anther heterogeneous homogeny. Then AI should be the sub-processes within

Xing. AI is just a kind of Xing which connects with human mind. We can resolve AI as two types.

Figure 2 shows the two types of AI. AI means the way from matter to mind and from mind to matter both. Thus I define FAI as the first step of AI, it means from matter to mind, FIS learns form environment then gains impress, construct memory, triggers some inner logics in brain and so on. As the second step of AI, SAI accords to some intention, to prepare things in our mind, recall the entities and abilities in brain to command, to change or product manufacture. We can go on try to define AIA means the abilities to do AI and AID try to measure the degree of AI. These concepts can help us to deep understand and master the essence of artificial intelligence.

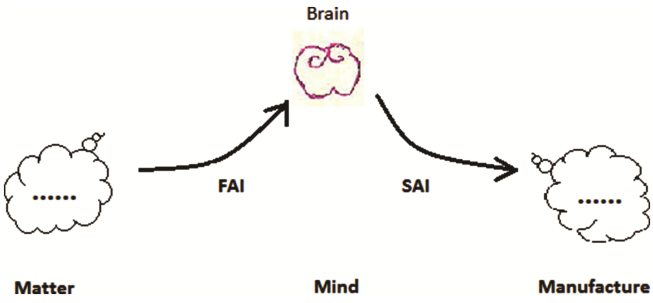

Fig. 2. Two types of AI

The book of Jean-Pierre, "Conversations on Mind, Matter, and Mathematics" inspired me deep [13]. According the title there are three M, we can give a sequence: Mind, man, mental, brain and so on belong to M1, mind; Matter, machine and so no belong to M2; Mathematics, mechanism and so on belong to M3. So FAI & SAI are jumps between Mind and Matter. M3 is the bridges or tool of such exchanges. Mathematics joins FAI and SAI, or say M3 is the middle stage between M1 and M2.

FAI and SAI always are mixed together and happen meanwhile that we almost regard such a multi-process as one reflection only. If we think so and try to give a simple model to match, it is impossible to master the truth. FAI and SFI need more inner mechanism. Now hot technologies of AI are just SAI and always ignore FAI. They are not full AI. Then we can answer the question why machine leaning is difficult. Because machine has not a automatic FAI process, it is not a real learning.

AI is a special kind of Xing which connect with human mind. The essence of AI is a kind of intention or operator during our thinking. How does "information" appear in such a multi-process? In FAI, our brain gain and react the information from outside. And in SAI, our brain send out information to outside.

From this review we can gain different sense with civilization. For example, literature is FAI, painting, design, dress are SFI. In ICIS2016, we has founded the Society of Scientist Poets (SSP). What we should do is art and science both, for poetic is smart FIS.

While met Xuncius' thought of "Zhi" & "Neng" up I found it support the analysis of FAI & SAI. Such a divide should help us answer David Hume's question too.

David Hume (1711–1776) was a philosophy. Hume asked how to transfer from "be" to "ought"? [14].

4 EI Should Be the Breakthrough of IS Study

Why should the breakthrough of IS study be Education Intelligence? What is the purpose of education? they are efforts let young people inherit human civilization and help them develop it. Education should train students that they can become quality member satisfy society need. Education should help individuals as full as possible to development their talents and characters. So education is large scale Xing and full with AI process. EI is the practice frontier of cognitive and Xing. From the view of IS there are so many exchanges happen during the process of education that we can look them as the examinations of intelligence science study. IS should support, guide and create new education.

4.1 Education and Intelligence

Education is an intelligent career. It is a great alive intelligent system with so many intelligentsias and young peoples join in all over the world. Why education is great and hard not only for it connects with resource and economy of the world, above all it is because education connect with human being's hearts, characters and intelligence.

There are very strong strains within such a system. Higher education is the important place to do science and humanities, it contributes scientific and cultural fruits to society and age.

Because of the limitations of human's ability, different history, cultural backgrounds, and so on. we can arrange different kinds of intelligent phenomena.

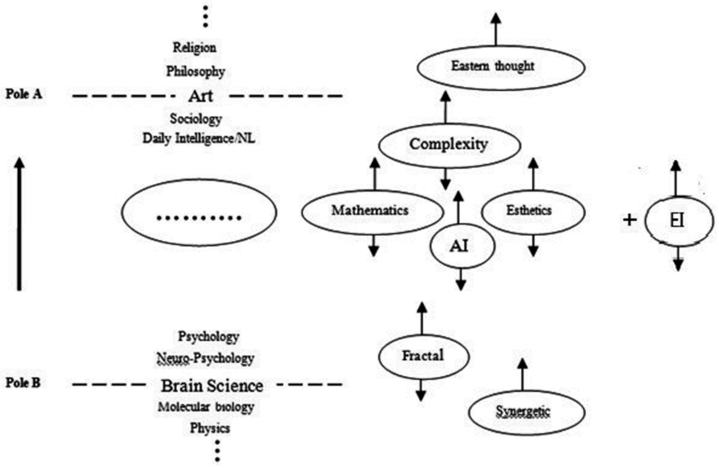

Fig. 3. A Pole and B Pole in the intelligence spectrum

Figure 3 shows the two poles of intelligence. From the bottom of physics layer, molecular biology through psychological, to daily intelligence/Natural Language, sociology, and up to religion layer, the complexity is growing. The lower end is basic biology and brain layers. So I call it the B Pole of Intelligence. The upper one arrives art and advance intelligent modality. We use A Pole of Intelligence to indicate it. The two phases of intelligence are so different that the ways to research are very different also [15].

I gave such a structure in 2008, in Conference on Intelligence Computing. This time for discuss the relation between ES and IS I add "EI" in. "EI" is at the right of Fig. 3. Education is a globe space-time where exchanges within different layers are happening ceaseless. EI can support study material to IS. And the mechanism slip up or down between two different intelligent layers should appear while we embrace the will of IS research. EI becomes the dynamic of such integrity.

4.2 What Should EI Contribute to IS

As for the breakthrough of IS study, it should be NLU (Natural Language Understanding), mathematics, literary criticism, AI technologies or some other field. Why do we forecast it is EI though it is a new branch of IS? Some educators jointed ICIS2016, the are normal but responsibility educators came from different education phases. They let us felt the strong press beat the core of IS. They were so urgent to gain the principle of intelligence and a united theorem system for education. I felt that just the real inexhaustible dynamic for IS study. such a power even do not allow scholar delay in theoretical state. The intension of enthusiasm was stronger beyond academic condition.

Education is a field that need the theory of Intelligence deep and most urgent. On the other hand, education it real big complete data.

IS recall the human factors back and EI face full enough persons with rich characters. Classroom are IS laboratories the same. Specially now age, with the using of computer, Internet, multimedia and other man-machine interaction technologies, distance education, embodiment teaching are the frontier of EI and lead revolution to traditional education. These are not tool and technology only, they lead our attention arrive the core of object and subject, such new approach is IS philosophy and IS study both.

As an educator of years, I has accumulated many practices and organized many creative actions. All of these should be integrity with IS view. How to introduce such a view and persuade teachers to practice, and how to collect different discovers are all questions we should consider. Such a education or say IS study is even a great systems engineering. There is a long way to go ahead.

5 Conclusion

Like the blooming of a flower, which petal should bloom first? The most imperative one should be the first. Scientists have gradually focused on intelligence. Chen Lin's topology cognition theorem inspirits us to integrate it from global view [16]. The challenge of such an integration needs intensive interdisciplinary study. Educators should be regarded as the IS researchers. We should pay more attention to the two types of AI,

FAI & SAI. Such view can help us pay enough attention to the actual mechanism of thought.

William Jams said: "To have a glimpse of what consciousness is would be the scientific achievement before which all others would pale." [17] The future works are going on to refine the direction and thought of IS. On the other hand we should differentiate such great IS study task to more fields. By the way we should do integrity IS with AI, Complexity, Information Science, Noetics Science, consciousness study and so on. Intelligence philosophy and intelligence science should exchange more and help each other.

Prigogine put his attention to China. In the Chinese version of his book "End of Certainty: Time, Chaos, and the New Laws of Nature", in the preface he wrote: west science and philosophy emphasize the duality as subject and object. This is inconsistent with the Chinese theory that man is an integral part of nature. My book should closes modern science to Chinese philosophy. The nearer we approach the intersection of two culture the more confirmed that we should consist the analysis viewpoint which is proved very successful, and try to present the law of nature which enclose nature spontaneity and human creation. The aspiration of this book try to elaborate such a synthesize. Along this way there are many development since this book was published 1996. In the end of this century, what we should face is not the end of science, but the production of new science. To my sincere wishes, Chinese young scientists can contribute to establish such a new science [18].

IS is such new science. We should burden its huge weight and join east and west together. For such a researcher has double responsibility for the two cultures.

IS and EI study should strong support education, world peace and the Long live of human civilization.

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