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The Development of Cognitive Science and Philosophy of Information—From Anthropocentrism to Naturalism †

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Abstract: The emergence of Floridi's philosophy of information has been directly pushed by the emergence of classical cognitive science and it attempts to provide us with a computational and representational epistemology and ontology. They share some common points: 1. anthropocentrism on cognition; 2. Cartesianism on knowledge; 3. nativism on semantics; 4. methodology on computationalism–representationalism. However, the development of cognitive science is deviating from Floridi's philosophy of information, as the core concept of representation has been gradually abandoned in more and more cognitive studies, corresponding to the movement of situated, embodied, embedded and dynamic study in cognitive science. Thus, a new philosophy of information should emerge to accommodate the new development in cognitive science. Moreover, Wu's PI satisfies the demand of this trend, which I will defend in this article.

Keywords: cognitive science; philosophy of information; naturalism

1. Introduction

Floridi believes that the Philosophy of Information is the third turn in philosophy. The first turn came from the development of science before the 17th century, which redirected and narrowed philosophers' attention from ontology to epistemology. The growth of information society afterwards led modern philosophy to its second turn, from epistemology to philosophy of language and logic. The third turn towards philosophy of information concerns "the nature of its very fabric and essence" [1] (p. 25), which Floridi argues should become a new autonomous domain for philosophical study. He also advocates that the concept of information is equally important and fundamental to other philosophical concepts like being, knowledge, life, meaning, intelligence, etc. In Floridi's account, we can see that the development of philosophy has been heading down an ever-narrowing path. Everything peeled off from the "philosophical apple" should have become a part of science, and philosophy is exclusively left with information.

2. The Emergence of Philosophy of Information

The emergence of philosophy of information originates in the "demiurgic turn" [1] (p. 23) and is an instant outcome of the computational revolution. On the one hand, by the former, Floridi means that modern philosophy experienced a watershed, symbolized by the death of God. From Descartes to Kant, the task of epistemology was to decrypt and to decipher the message of the world from God. Even scientific studies from Galileo to Newton were guaranteed to be meaningful, at least in principle, due to their theological background. However, after the death of God, the loss of "the

great programmer of the game of Being" [1] (p. 20), who would take the responsibility of making sense of world? "Already in Hume, and very clearly in Kant, making sense of the world is a heavy burden left entirely on the shoulders of the I" [1] (p. 20). This trend had become especially evident in German Idealism and reached its culmination in the phenomenology of Heidegger. However, since those idealists failed to provide an appropriate explanation for the existence of meaning, the linguistic turn promptly and also inevitably appeared to take the responsibility of searching for the basis of meaning. The analytical philosophers traversed a syntactic, a semantic and a pragmatic landscape to re-semanticize reality, but the result is still unsatisfactory. "The incomplete deicide generates a sense of semantic suspense: what meaning will the world take, once the gods have been completely excluded from the game of giving sense to it?" [1] (p. 22). Thus, according to Floridi, contemporary philosophy has been dealing with the problem of how to take over the generation and management of meaning after God retires. This is the initial motivation of his semantic information approach. However, the difference between his PI and the past philosophy is the fact that PI advocates an approach of construction, conceptualization and semanticization of reality rather than only analyzing, reconstructing and vindicating its description. On the other hand, the latter notion—i.e., the revolution of computationalism, especially the advent of the computer—has become the direct impetus for the emergence of PI. When "I" replaced God to play the role of making sense of our world, the development of information science and technology and the flourishing of information society extended the human information processing ability. Therefore, we can say that Floridi's philosophy of information builds a subjective and informational world with computational tools. It describes the "universe as informational structure for a cognizing agent" [2].

It seems that PI has a close relationship with cognitive science. According to Floridi himself, the philosophy of artificial intelligence is the premature paradigm of PI. Some information scientists also believe the emergence of PI is "based on the results of the advances in the information studies and the development of computing technologies and theories" [3]. From my point of view, I believe that the emergence of Floridi's PI has been directly pushed by the emergence of classical cognitive science. They share some common points: 1. anthropocentrism on cognition; 2. Cartesianism on knowledge; 3. nativism on semantics; 4. methodology on computationalism–representationalism. In classical cognitive science, the mind has been seen as an information processing system. It receives information from outside, processes and stores it inside, and outputs instructions, making the agent produce behaviors. The mental representations work as vehicles of semantic information and basic components of information processing by the mind. Computation is the method of manipulating those mental representations by the mind, specifically including a function and algorithm. The computational manipulation of those semantic-bearing mental representations within an agent generates intelligent behavior. Thus, just like genes in biology and quarks in quantum physics, mental representations have been treated as the building bricks in classical cognitive science. According to Floridi, those meaningful "bricks" come from meaningless data. Thus, data are the preformed fabric of information, and he simply suspends the foundation of data, just like Heidegger suspended the world of substance. The difference between Floridi and Heidegger is that, while Heidegger believes in nothing objective, Floridi believes that data are objective. This is a kind of Platonism, as mentioned by Floridi himself [1] (p. 43). Moreover, the study of information is the study of intentionality, when information is meaningful, and intentionality is direction of meaning. Therefore, mental representations, as the carriers of semantics, also present the intentionality of agents. This is why I believe Floridi's PI is a result of classical cognitive science and it attempts to provide us with a computational and representational epistemology and ontology.

3. The Development of Cognitive Science

However, the development of cognitive science diverges from Floridi's PI, as the core concept of representation has been gradually abandoned in more and more cognitive studies, corresponding to the movement of situated, embodied, embedded and dynamic study in cognitive science. As I mentioned, intentionality is closely related to mental representation. While some philosophers started their studies on the naturalization of intentionality [4–6], mental representation has been

dispelled. Their research program has been called the "naturalization of information" [1] (p. 32) by Floridi. A non-representational cognitive study tries to understand the body as the medium between the world and the agent [7–14]. Moreover, some other philosophers try to combine Merleau-Ponty's phenomenology with embodied cognition [15–17]. However, phenomenology aims to resolve the subject–object predicament after the "incomplete deicide" and "unsuccessful rescue" in modern philosophy. Thus, it suspends the objective world in order to answer the question where does meaning come from? It comes from the subject and happens inter-subjectively. Floridi's approach is similar, but he does not eliminate the objective world, which is the raw data world, also called environmental information by other philosophers, like Dretske. Thus, even though phenomenology seems like a natural ally to non-representational cognitive science, it will not only lead to a subjective idealism, but is also supposed to eliminate or reduce information itself. However, the development of information science and technology reveals to us a more and more clear informational worldview. The information does exist, but cannot be treated as the property of matter or energy. The apparent evidence is that matter and energy are conserved, while information is not. Just like Wiener advocates, "Information is information, not matter nor energy. No materialism which does not admit this can survive at the present day" [18] (p. 132). Of course, since Wiener wrote this, information has experienced various ways of being understood, from syntactic to semantic and to (very recently) pragmatic. Nevertheless, information still plays a vital role in cognitive science. When information (from a semantic standpoint) has been treated as subjective, it just means that we do not have to reduce the information into the material world if we plan to naturalize intentionality.

Does this sound strange? How could we keep information ontologically existent when we try to naturalize it? This is a kind of Aristotelian proposition. The information exists as objectively as matter. Just like the Aristotelian doctrine of hylomorphism, while "hylo" means "matter" and "morphi" means "form", information exists depending on matter. It is different from Wheeler's pan-informationalism [19], while the latter believes that information is the fundamental existence. This Aristotelian view presents an account in which information can be naturalized, and it exists ontologically. Moreover, cognition happens only in the information world. While the information world originates in and depends on the material world, the cognizer is able to know the real world to some extent. Let me call this the naturalistic approach in philosophy of information. It can fit non-representational cognitive science better than phenomenology not only because it advocates a dynamical cognitive activity, but also because it preserves information as an ontological existence, while the information is a pivotal concept in cognitive science. Furthermore, I believe this naturalistic PI can serve better to explain the philosophical foundation for situated, embodied, embedded and dynamic cognitive study. In addition, it will get rid of the anthropocentric trait in Floridi's PI. This naturalized study on philosophy of information is advocated by Wu [20–22], who also advocates PI as a kind of meta-philosophy, but differing from Floridi's approach. In brief, while Floridi builds PI as a top-down constructive informational world, Wu believes the informational world evolves from the bottom up. Moreover, he distinguishes the information world into three hierarchies as evolving steps, which is similar to Dretske's classification on intentionality hierarchies. Wu proposes that the information can be reduced to the natural world (but not to the material world), while Floridi believes information is non-reducible. Furthermore, the mind exists in a higher level of information activity, while the objective and omnipresent information has a Gricean natural meaning [23]. It is in this sense that I include Wu among the naturalists. Furthermore, he also advocates that the information paradigm should be dominated by unified information science, which has the concept of information as its metaphysical kernel. In addition, such a unified scientific paradigm has been suggested by some information scientists [24–26]. This is why I believe that Wu's philosophy of information is promising in the naturalized study of cognition and can serve better as a philosophical foundation for non-representation cognitive science, and also can be treated as a revival of Aristotelian ontology in such an information-centric age.

Finally, two diagrams (Figures 1 and 2) are displayed to illustrate the difference between Floridi and Wu's PIs.

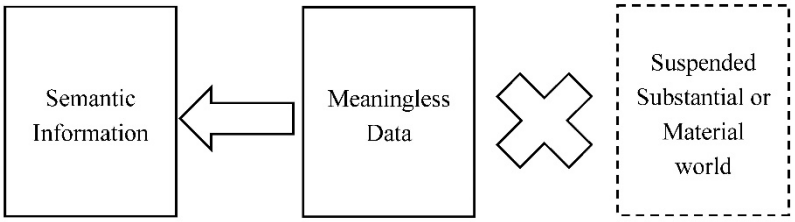

Figure 1. Floridi's Platonic PI. The meaningless data are a platonic objective world in Floridi's PI. When they have been captured and absorbed by a cognitive agent, they turn into semantic information. Semantic information is the precondition of knowledge. Moreover, the semantic information-based knowledge system constitutes the real structural world.

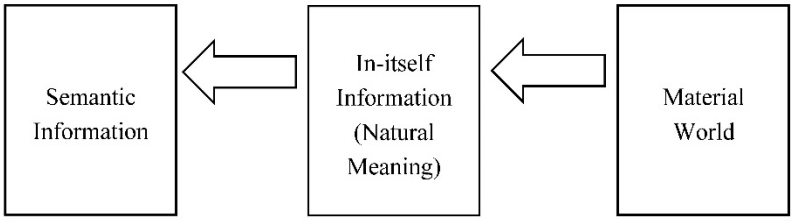

Figure 2. Wu's Aristotelian PI. According to Wu, the natural world does not equal to material world. The natural world actually includes the material world and the informational world. Furthermore, the informational world is derived from the material world, so it can reflect the material world to some extent. Moreover, the informational world can be divided in to subjective and objective information worlds. The objective information is not meaningless data. It has a Gricean natural meaning. The semantics evolve from such a natural meaning. Therefore, the relationship between information and matter in Wu's PI is just like the Aristotelian relationship between form and matter, even though Wu does not refer to form in terms of information.

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