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Viewpoints on the Fundamentals of Information Science †

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Abstract: In this paper, the author starts with a critique of Wiener's advocated concept of information and provides new definitions for a series of fundamental concepts in the fundamentals of information science. Furthermore, a fresh interpretation of several fundamental issues in information science is presented, thereby establishing a distinct and innovative foundation for information science.

Keywords: concepts in information science; definition; fundamentals

1. The Term "Information" Wiener refers to Is Not a Scientific Concept

Wiener once said: "Information is information, neither matter nor energy. Materialist perspectives that fail to recognize this cannot persist in today's world" [1]. With the dissemination of Wiener's viewpoint, the term "information" has gained unprecedented recognition. However, today I want to assert that the term "information" Wiener refers to is not a scientific concept but rather a complete pseudoscientific concept. This is not only because the information here confuses the ontological concept of information with the epistemological concept of information but also because it reverses the logical relationship between ontological information, epistemological information, and highly abstracted and generalized causal relationships of information. However, merely relying on these statements is insufficient to convince people that the term "information" Wiener refers to is not a scientific concept. Therefore, I will employ a proof by contradiction to demonstrate this.

Since all things in the world can be true or false, the objective world composed of these things can also be divided into two distinct categories: the real objective world and the false objective world [2].

2. Ontological Information Is Inherently Embedded within Infon and Forms an Organic Fusion with Them

Infon are fundamental concepts in the foundational theory of information science, classified into two basic categories: material state infon and energy state infon. Both types possess distinctive characteristics and shared attributes (as I am limited by the scope of this article, no further discussion will be conducted). As a collective term for common sense and secrets about the existence or transformation of infon, ontological information, contained by the infon and together form an organic fusion. Organic fusion implies a state where the two are inextricably linked. As long as infon exist, the ontological information that is inherent to them naturally exists. Similarly, as long as ontological information exists, it implies the presence of the infon that embody it. The survival and existence of the one are both necessary for the sufficient conditions of the other. Regardless of who or what methods, measures, or means are employed, it is impossible to separate ontological information from the infon. This inability to separate them is the primary reason for the non-independence of ontological information. The non-independence of ontological information is its most significant property, and other properties it possesses are either determined by this characteristic or closely related to it.

Even though ontological information and infon share many commonalities, they also possess distinct characteristics. One prominent distinction is that infon adhere to the law of

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information particle conservation and therefore have conservation properties. In contrast, ontological information inherent in infon follows a constant growth trend and does not exhibit conservation properties. There are two reasons for this. Firstly, it stems from the evolutionary nature of material state infon. Since the Big Bang, material state infon have undergone continuous evolution from particles to atoms, from inorganic matter to organic matter, and ultimately to living organisms. As a result, the ontological information inherent in material state infon naturally experiences constant growth and cannot be conserved. The second reason for the lack of conservation properties in ontological information is the variability of material state infon (biological organisms). As biological organisms undergo variations, the ontological information they embody also undergoes changes, therefore making it impossible for the overall concept of ontological information, including the information inherent in living organisms, to be conserved [3].

3. The Process of Cognition Undertaken by the Subject of Cognition towards the Object of Cognition Is the Origin of Epistemological Information

Similarly, recognizing the need for defining certain concepts, and considering the fact that the majority of concepts have a hierarchical structure, I have proposed a new method for defining concepts from the perspective of conceptual hierarchy. This method defines a concept as a "collective term for certain concept". The following statement will hark back to the subject after making these explanations.

First of all, the cognitive subject. Two aspects I would like to highlight: Firstly, all living beings (vertebrates) that possess a brain, including material state infon (humans), are cognitive subjects. Secondly, cognitive subjects exhibit a hierarchical structure in terms of their evolutionary level and cognitive abilities. At the highest level of this hierarchy are material state infon (humans), followed closely by primates and dolphins, which also possess certain cognitive abilities and intelligence, while the lowest-level cognitive subject is the material state infon (fish).

Secondly, the object of cognition. The object of cognition can be classified into two categories: one is the information subunits that serve as the objects of cognition and the closely related field of ontological information; the other is the II-type cognitive information created and invented by human cognitive subjects to express the Type I cognitive information generated in their own brains.

I discovered that the interior obtuse angles of beehives are identical to the bond angles of covalent bonds between carbon atoms in diamonds, both measuring $109^{\circ}28'$ after conducting a comparative study. My cognitive process, similarly, falls under the category of indirect cognition, and the resulting knowledge remains an outcome of indirect cognition. However, regardless the result of direct or indirect cognition, it is undeniable that both represent epistemological information. Therefore, I assert that the cognitive process undertaken by the knower towards the known is the origin of epistemological information. In other words, the cognitive process is the genesis of epistemological information.

Finally, epistemological information. when all the individuals, including myself, as knowers, have not yet expressed the cognitive results related to beehives using representational means before they are formulated, those cognitive information regarding the beehives that exist solely within the "black box", such as the brain, are referred to as Type I epistemological information. It is evident that Type I epistemological information lacks independence, universality, visibility, conservation, and heredity. However, Type I epistemological information possesses evolution and truth-falsity or probability. Hence, Type II epistemological information does not possess independence in terms of its generation but independence in terms of its existence. Type II epistemological information can exist in the world and within human society independently, known and understood by their descendants. Thus, from a holistic perspective, Type II epistemological information demonstrates relative independence.

There are three main reasons why Type II epistemological information lacks conservation if we delve into it in detail. Firstly, the generation and disappearance of Type I

epistemological information, which serves as the represented content, within the "black box" of the brain, is not conserved. Secondly, the generation and disappearance of Type II epistemological information, which serves as the representation within human society, is also not conserved. Thirdly, with the growth and evolution of individual human beings and human groups as knowers, both the Type I and Type II epistemological information they acquire are in a state of constant increase. It is precisely due to these three reasons that Type II epistemological information, as a representational means, cannot be conserved.

I believe there are precisely two definitions when it comes to the definition of epistemological information, each from a different perspective. One definition can be formulated from the perspective of conceptual hierarchy as follows: "Epistemological information is a collective term encompassing both Type I and Type II epistemological information". The other definition can be formulated from the perspective of conceptual properties as follows: "Epistemological information is the unity of the distinct characteristics of Type I and Type II epistemological information, as well as the synthesis of their commonalities". It is evident that epistemological information possesses all the properties associated with Type I and Type II epistemological information, serving as the carrier and embodiment of all these properties [2].

4. There Are Only Two Definitions for Highly Abstract and Highly Generalized Information

First and foremost, it should be noted that in the foundational theory of information science, only highly abstract and highly generalized information can be referred to as "information". Any other concept cannot be referred to as information, as it would inevitably lead to conceptual confusion.

For the concept of information as a shorthand for highly abstract and highly generalized information, I have provided two definitions based on the perspectives of conceptual spectrum and conceptual properties. The first definition posits that information is a collective term for ontological information, which encompasses all information subsumed by ontological information, and epistemological information carried by material-state information subunits (vertebrates) exclusively. It can also be referred to as a collective term for ontological information and epistemological information. The second definition, based on the perspective of conceptual properties, states that information is a unified entity of the respective characteristics of ontological information and epistemological information, as well as a synthesis of all their commonalities. This implies that any property possessed by ontological information and epistemological information is inevitably possessed by information itself. Information serves as the carrier and embodiment of all these properties. I believe that besides these two definitions, the existence of a third definition that is concise, standardized, and adheres to aesthetic principles is unlikely, which means the previous situation of the existence over 150 definitions through the Wiener information concept will never reoccur. It must be pointed out that prior to the emergence of the method of defining information based on conceptual spectra, no one could comprehensively encompass all the characteristics of ontological information and epistemological information, as well as all their commonalities, within a concise and precise definition, and this is the reason such ridiculous phenomena occurred in the past. This indicates that all scholars, including Mr. Wiener, who defined Wiener information in the past, were blindfolded and inevitably committed the logical fallacy of hasty generalization. For example, although Wheeler was referring to "the ambiguous and vague" of Wiener information when he said "It from bit", he essentially referred to ontological information, excluding epistemological information—this is one of the main reasons why he committed the fallacy of hasty generalization. Furthermore, when he made that statement, he relied only on the non-independence, reality, and universality that ontological information possesses (which is also why his viewpoint was confusing and gained widespread agreement), without rely on other properties that ontological information possesses, such as the lack of conservation. In conclusion, based on these two aspects, it can be said that Wheeler committed the

fallacy of hasty generalization. Moreover, the term "information" is inherently a product of the human brain, so ultimately, Wheeler's viewpoint is a form of subjective idealism. Although Wheeler did not recognize these problems when making the above-mentioned statements, we cannot ignore them today. Similarly, when Shannon said "information is the elimination of uncertainty", although he was also referring to the ambiguous and vague of Wiener information, he essentially referred to epistemological information, excluding ontological information—this is one of the main reasons why he committed the fallacy of hasty generalization. Furthermore, when he made that statement, he relied only on the relative independence, fluidity, non-conservation, and truth or probability that epistemological information possesses, without considering other properties of epistemological information, such as the lack of universality and non-heredity. In conclusion, based on these two aspects, it can be said that Shannon also committed the fallacy of hasty generalization. Fortunately, firstly, communication belongs to the scope of epistemological information and is basically unrelated to ontological information. Secondly, the properties of epistemological information that Shannon relied on are mostly related to communication, while the properties that he did not rely on are either unrelated to communication or of little relevance. Therefore, this is the fundamental reason why Shannon's theory can still be successful despite committing the fallacy of hasty generalization. Even though Shannon did not recognize these problems at that time, we cannot ignore them today. Moreover, the case of Shannon also tells us that in scientific research, we cannot have a narrow view and seek complete blame because the existence of some errors does not necessarily affect the correctness of the theory.

Next, I would like to discuss another historical event. Although scientists like Shannon and others did not discover the fact that both ontological and epistemological information are constantly increasing and not conserved, they unconsciously adhered to this fact by using "negative entropy" to represent Wiener information. We should acknowledge that this is indeed a genius's choice if we replace Wiener information with information that is highly abstract and generalized, as we can easily prove that information, as a highly abstract and generalized abbreviation, is in a state of constant increase and not conservation, which bears a striking resemblance to the phenomenon of entropy increase in thermodynamics. The difference lies in the fact that entropy in thermodynamics represents disorder, and its increase signifies the increase in molecular disorder. In contrast, the growth of information represents an increase in orderliness. For example, the growth of ontological information indicates the advancement of the evolution level of material-state information subunits, representing an increase in their orderliness. The growth of epistemological information, on the other hand, signifies the continuous improvement in the cognitive ability, level of understanding, and acquired knowledge results of the cognitive subject in the process of cognition of the cognitive object, namely the increase in cognitive orderliness. Therefore, as the collective term for both ontological and epistemological information, information is inevitably in a state of constant increase in orderliness, and this situation can naturally be represented by "negative entropy" [2].

5. Here Are Several Points in the Fundamental Theory of Information Science That Are Not Elaborated Upon

①. Information science needs to have its own core disciplines; otherwise, it cannot be considered a true scientific field without its own established and specialized branches.

②. Every discipline within information science should have its unique research subject, which is essential for its identity and existence.

③. Every discipline within information science should have a well-defined and clear conceptual framework, scope, principles, and laws that are specific to that discipline. These are the essential components of its structure.

④. Every discipline within information science should develop its own standardized academic language that is both rigorous and aesthetically appealing. This is one of the signs of maturity.

⑤. The fundamental theory of information science is a branch of information science itself. It represents a specific aspect of the philosophical theory of materialistic information, and the two are equivalent. The concept spectrum of information, which refers to highly abstract and generalized information, is the object of study within this theory.

⑥. Every discipline within information science should be capable of providing convincing explanations for the entire objective world, including human society, or for specific aspects or parts of the objective world. This ability is a measure of its value and significance.

⑦. Every discipline within information science should strive to incorporate as many scientific elements as possible from relevant theories that existed before its inception, including those that are compatible, while excluding erroneous components. This is also one of the criteria for determining its scientific validity.

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