Ontological information - information as physical phenomenon

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Ontological information is information conceived as a natural phenomenon, i.e., as an element of physical world. We will denote such information with the predicate "ontological" as in "ontological information", as well as by the symbol "I_O" and the indexed term "information$_O$.".

The properties attributed to ontological information in (Krzanowski, 2020) reflect its physical nature. We claim that ontological information is characterized by epistemic neutrality (EN), physical embodiment (PE), and formative nature (FN).

The property of epistemic neutrality[1] (EN) means that information$_O$ has no meaning by itself. From specific ontological information, an agent may derive something (some value) that has significance for that agent's existence or functioning. The same ontological information may result in a different meaning for different agents. Likewise, this information may have no meaning at all to some agents. However, an agent can in principle be any system, whether organic or artificial, if it senses ontological information or the organization of natural phenomena. Natural agents (i.e., biological systems) have been shaped by nature to perceive nature's properties, including organizational properties, but artificial agents are of our own making of course, so in a sense, they also have biological origins. We are therefore creations of nature, which are not separated from it. We are built to interpret nature, not to falsify it, and evolution assumes this, because it is likely that organisms that fail to correctly perceive the environment will not survive. This is also the general idea for building our artificial agents.

The property of physical embodiment (PE) means that information$_O$ is a physical phenomenon. So, it may be conceptualized in a matter–energy-information complex[2] (one that is indirectly implying Aristotelian hylemorphism), and it is fundamental to nature (i.e. whatever exists physically contains information). The claim that "ontological information is a physical phenomenon" means several things. Ontological information is not an abstract concept in the way that mathematical objects, ideas, or thoughts are abstract. Ontological information does not belong to the Platonic realm of Forms in either the classic or neo-Platonic sense. Ontological information is real, observable, and measurable. Thus, we can claim that information exists much like other physical phenomena exist, because they exhibit the same class of properties (quantifiability, operational properties) as physical phenomena do. Furthermore, it seems that whatever exists in a physical sense contains information, so there is no physical phenomenon without information.

[1] A concept is "epistemically neutral" when it does not have intrinsic epistemic import, or in other words, it does not mean anything by itself.

[2] The matter-energy-information complex has a status of a conjecture but not of a theory.

Finally, the property of formative nature (FN) means that information is responsible for the organization of the physical world, so information is expressed through structures/forms and the organization of things[3], but information is not a structure itself. Organization is a fairly broad concept that may be, and is, interpreted as structure, order, form, shape, or rationality (if perceived by a cognitive entity). We do not posit that information is structure, although this has been claimed several times. The problem with such a statement is that we do not know precisely what a structure is and what kinds of structures we would associate with information, as well as how this would be achieved. Information is certainly not the visible structure or shape of an object, but we concede that the shape or structure of an object is how information discloses itself or how we sense its presence. Thus, the shape of a tea cup is not information, but information is being expressed in the shape of a tea cup.

The more thoroughgoing discussion of information$_O$ is provided in (Krzanowski, 2020; 2020a; 2020b). The interpretation of ontological information (in particular its causal potentiality) in the context of the general theory of information (GTI) developed in (Burgin, 2010) is provided in (Burgin and Krzanowski, 2021).

References

Burgin. M. (2010). *Theory of Information.* New York: World Scientific Publishing.

Burgin, M. R. Krzanowski. (2021). Levels of ontological information, *Proceedings*, IS4IS 2021.

Krzanowski, R. (2020). Ontological Information. Investigation into the properties of ontological information. Ph.D. thesis. UPJP2. Available at http://bc.upjp2.edu.pl/dlibra/docmetadata?id=5024&from=&dirids=1&ver_id=&lp=2&QI=

Krzanowski, R. (2020a). What Is Physical Information? *Philosophies*. 5. 10.3390/philosophies5020010

Krzanowski, R. (2020b). Why can information not be defined as being purely epistemic? *Philosophical Problems in Science* (*Zagadnienia Filozoficzne w Nauce*). 68. P. 37-62.

[3] The synonymity of the terms "structure", "form", "organization", and "information" should not be accepted *a priori* despite the fact that these terms are often used synonymously.