

Review of: "Infodynamics, a Review"

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This is a review of studies on the interaction of information with the physical world, revealing a lack of fundamental contradiction among proponents of Infodynamics, particularly the eight authors cited by the present author. According to him, these researchers emphasize different aspects, emphasizing the interconnectedness of energy and information in living systems. The relationship is described as triggering synergistic chain reactions leading to increases in negentropy, representing useful information, or decreases in information entropy. Infodynamics aims to explore the delicate balance between energy and information using empirical methods, recognizing that obtaining information and separating useful information from noise both require energy.

The concept acknowledges that energy and information, while intimately entangled, follow different laws of nature. Infodynamics recognizes various forms and dimensions of information, including its role as the opposite of thermodynamic entropy (negentropy), a trigger of free energy, a reserve (redundant information), structural, enformation, intropy, entangled, encrypted information, or noise. These dimensions represent overlapping functional properties focusing on different aspects of information. In contrast to studies on information entropy that often quantify only one dimension, Infodynamics seeks to design empirical studies to address these limitations. The review suggests that studying the workings of sexual reproduction, its evolution through natural selection, and its role in powering the continuous increase in information and energy in living systems could provide valuable insights.

The review is written very well, and it can be read fluently without interruptions.

I find only some minor things that can be improved.

1. The review is very discursive. I think some concepts should be better quantified.
2. Pag.2. Definition of "Intelligence". I think it is also related to the ability "to make the right decisions", "right" in the sense of providing the best advantages to the related individual.
3. Pag.3. "Encrypted information". Here there is not a definition, but just a list of examples.
4. I believe that the results by Vopson and his second law of infodynamics would merit something more than the short commentary. Probably this should be extended also to the other authors, as well. I know that something more is said in the section "Synthesis and Propositions," but it is just a criticism about the possibility that "the second law of infodynamics" cannot be a "law." By the way, for me, it seems more a semantic criticism than an effective one.
5. Pag. 9. "A single click on a button can release the energy of an atomic bomb." This is partly correct but not fully

correct. To arrive at the “release of an atomic bomb,” a chain of complex steps is needed, where the “click” is just the end of the chain. So the real associated information is much longer than a simple “click.” So, actually, in a practical sense, the amount of information goes with the amount of energy of the process. Being essentially a geophysicist, I find a sort of analogy when considering the cumulative seismic strain (and not the simple final strain) that produces the rupture of a fault.

6. Pag. 10. “Information senescence.” This is a very nice and original concept: I would ask to extend this part and the comparison with entropy.
7. Pag.11. “This is a very serious limitation as no single dimension can compare a spider with an elephant.” I do not agree: if we consider just the (linear) size as the only dimension, we are capable of clearly distinguishing between the two animals. Of course, if we are interested in a more comprehensive difference between the two (e.g., the shape of their body), we need to consider some other dimension. By the way, in theoretical science, often the concept of “dimensions” is replaced by that of “degrees of freedom,” especially when we cope with dynamics. I noticed that this possible analogy is never mentioned in the review.
8. Pag.11, I think the last line of the paragraph starting with “Properties of information” merits something longer about the concepts of “Novelty-Redundancy: Context dependency: Specificity, Fine Graininess, Value which is equivalent to usefulness,” since the connections among the various concepts need some more explanation.
9. Pag.12. “Interestingly, the lower the rejection rate, the more articles were published in the journal”: I think you should replace “Interestingly” with “Obviously,” because it is obvious. If you reject less, you have more articles.
10. Pag.13. Here there is the example of the Journal Qeios that, to reduce noise with respect to (significant) information, asks for an average of 14.5 peer reviews per article. This is analogous to statistics when you improve the number of samples in order to have an average which is less contaminated by noise (in statistics, we say it tends to its “expected value”).
11. Pag.13. The paper is very well written with very few mistakes: here there is one. Please correct “The very short existence of Qeios mean “ with “The very short existence of Qeios means “.
12. Pag.14. “Total information and useful information can be empirically quantified independently.” The use of “useful information” is something intriguing, being the qualification of “useful” for information can be subjective because its utility depends on the point of view (observer) and some other things, such as the context, the boundary conditions, etcetera.
13. This final suggestion can be taken or not, being related to something I published: I find some interesting connections with the concept of mine, “geosystemics” (e.g., De Santis 2009; De Santis et al. 2019). Geosystemics is a comprehensive, holistic approach to see our planet where information is fundamental as a general proxy of either particle or energy transfer occurring during many geophysical phenomena, such as earthquakes and volcanic eruptions.

References

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