Review of: "Thermodynamics, Infodynamics and Emergence"

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In this manuscript the author addresses the huge problem of emergence (I trust he means “of complexity”) by calling in the scenery energy and information and tailoring a new attracting (for me) term, i.e., infodynamics. I am particularly engaged in this problem, which, in my opinion (an opinion shared with excellent colleagues of mine, such as Prof. Antonio Vella) should shed light on the emergence of human consciousness, besides life as a phenomenology. I would remove the scholastic introduction about energies and thermodynamics, as they are bothersome and I am afraid they did not move any interest in the readers of the article. When the author introduces the concept of dissipative structures, he refers quite exclusively to thermodynamics and chemical-physical laws. I would like to know how information is considered in this landscape. A suggestion comes from the Abstract, when the author reports: “Emergence, information and energy are interrelated properties of nature: it takes free energy (energy that produces work, designed as F) to acquire information, and it takes information to increment free energy. Useful informationΦ( ), is the one that increases free energy, and differs from information not producing free energy or producing entropy…” I am bewildered about the concept of “useful”. Useful to what? Does the author believe to the concept of necessity and teleonomy in his description of living phenomena and emergence? In this circumstance, emergence of complexity should bear an “information” able to maintain it and to “drive it” towards a teleonomic project. What the author thinks about?

In my opinion, this is perfectly impossible if information does not move within the dissipation with the same mood: a dissipative mechanism. Only dissipative systems create order (low levels of entropy) within an apparently disordered system, i.e., objects with information and memory. And only if even information possesses a dissipative phenomenology, the emergence of complexity can occur, because n this circumstance the emergence of complexity “gains” degrees of freedom respect to rigid, clock-like mechanisms driven by necessity and “revised” by chance.

I suggest to read and cite:

1. Miller WB Jr, Baluška F, Reber AS. A revised central dogma for the 21st century: All biology is cognitive information processing. Prog Biophys Mol Biol. 2023 Sep;182:34-48. doi: 10.1016/j.pbiomolbio.2023.05.005.
2. Chirumbolo S, Vella A. Molecules, Information and the Origin of Life: What Is Next? Molecules. 2021 Feb 14;26(4):1003. doi: 10.3390/molecules26041003.