

Peer Review

Review of: "Science in Light of the Analogy of Being"

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(1) The author states that the complexity of a system as a whole, which consists of many combined interacting parts, generates emergent properties. He then relates the relationship between the whole and its parts to the so-called concept *analogia entis* (the analogy of being). This concept supports ontological for the whole, and at the same time permits some reductionism.

(2) The author subsequently goes on to justify the validity of the above paragraph using several well-known physical concepts. Let us evaluate the validity of the analysis the author used for the justification. I have skipped the introduction because Aristotle got many things wrong, and connecting Aristotelian thinking to the foundations of QM is strange and desperate, to put it mildly. But my review is independent of the above-said negation.

(3) Section 2 is not needed at all. For example, take an isolated atomic hydrogen as a whole system. The properties of this atom cannot be deduced by studying its parts, which are an electron and a proton, individually. In particular, the existence of quantized atomic energy levels, orbital angular momentum, photons with energies determined precisely by the quantized atomic energy levels, and spin-related interaction cannot be deduced from the atomic hydrogen parts. However, permitting the concept of reductionism to a certain extent is still valid because the charges and the spins of an electron and that of a proton do give rise to fundamental properties of this atomic hydrogen, namely, the separation between energy levels (Coulomb repulsion in the presence of Coulomb attraction) and energy level splitting due to interacting spins. Indeed, the whole is more than the sum of its parts, and we know exactly why: due to interacting parameters (charges and spins) and wave-particle duality when an electron is allowed to interact with a proton. These interactions are missing when an electron and a proton are evaluated individually, and also when we only allow them to interact as colliding particles without the wave-particle duality.

(4) Anyway, from Table 1, it seems that the author attempts to understand whether his paragraph (see (1) above) can be applied to connect the concept of nation (composed of humans) to atoms. This is a meaningless attempt for two reasons. (a) Even if it can be done, the content would be without any useful details and would be too generalized with too many definitions that will only grow, but without any quantitative, systematic, and unambiguous relationship and understanding. For example, see (3) above, which contains both quantitative details and understanding. (b) Compared to (3), the author's attempt would fail because the microscopic details that are useful to us, with microscopic quantitative details that could provide understanding of reality (ontological), will always be missed. The only option left for the author is to push for purely epistemological analysis. If this is the case, then I surrender because such knowledge can be interpreted in many different ways, and this would lead us to guesswork. Guesswork always gives rise to endless arguments without end because all interpretations can have their own logic and arguments as supports.

(5) But never mind, let us move on. Next, the author talks about the double-slit experiment. The author states incorrectly that QM predicts interference for accumulated individual photons and other molecules. QM did not predict those; QM is interpreted to justify the measurements. And there are many interpretations, and I am not going to go into any of them. Next, the de Broglie wave (dBw) refers to the wave property of a quantum particle. Again, dBw is related to QM interpretations. It is true that experiments have confirmed the presence of interference patterns for photons, electrons, atoms, molecules (sizes 10^4 Daltons), even when they are detected individually. But one forgets one thing: For photons, the interference patterns from light (an EM wave that is composed of many photons and is detected simultaneously on the screen) are different from the interference pattern obtained from detected individual photons. Hence, the author invoked the double-slit experiment incorrectly to justify his constructed paragraph, (1). Paragraph (3) is sufficient to justify (1). The author, like many physicists/mathematicians/chemists, could not tell the difference between what QM actually predicts and what is actually deduced from QM interpretations. Hence, the confusion.

(6) In conclusion, as expected, the author's conclusion supports what I have discussed in (4), see (4)(a) and (4)(b).

Declarations

Potential competing interests: No potential competing interests to declare.