

Peer Review

Review of: "Emergence ex Machina: Correlates of Consciousness"

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This paper explores the complex and interdisciplinary discourse surrounding consciousness. Herzog & Herzog discuss various perspectives on the matter, specifically focusing on possible testable correlates of consciousness: computational, physical, biological, neuronal, and behavioral. The work aims to synthesize diverse viewpoints and assess the feasibility of studying consciousness through scientific methodologies while acknowledging the philosophical challenges of the field.

The manuscript is impressive in its scope, carrying out an ambitious review of multiple theoretical frameworks, spanning neuroscience, physics, philosophy, and computer science. It is thus thought-provoking and could serve as a useful gateway for readers who would like to dive deeper into any perspective on this topic, or for those who would like to widen their current perspective to other fields of study.

However, I feel this work could greatly benefit from improvements in clarity and scientific backing:

Clarity: The ambitious breadth that this paper attempts to cover naturally comes at the expense of the depth that could be afforded to each topic. Nevertheless, I feel that revising the text with reader clarity in mind could significantly enhance its impact – even if it means removing certain details that are not essential to the core message. Unpacking ideas and improving their logical flow would make them easier to follow. For example, sentences like “Possibly, they operate on the level of dendritic resonance to produce hologram-type phenomena” or “Complex root systems deploy coordinated growing for resource optimization and competition” introduce terms without sufficient context or explanation. Reconsidering how these ideas are introduced – or elaborating on them where necessary – would improve readability. Additionally, I was missing clear statements in the introduction and conclusion sections describing the paper’s objectives and key takeaways. These would make it easier for the reader to hold on to the larger picture of the paper while reading through the details of it.

Scientific justification: The manuscript contains several bold claims that lack sufficient scientific support. Statements like “*cellular structures are capable of proto-sentience*”, “*observable consciousness emerged only in the highest mammals*” and “*organismic levels of fungi, plants and some other lowest multicellular life forms ... are not supposed to be conscious in certain ways*” are presented without citations or empirical justification. These are controversial topics that are difficult to empirically validate and are a source of ongoing debate in the field, and so a more nuanced and evidence-based approach is warranted. Furthermore, even when references are provided, the language could be adjusted to better reflect topics that are still open and studied. For example, the sentence “*it is argued that bound conscious experience is first found on the level of cell and not cell ensemble [51]*” could be worded as e.g. “*an argument has been made*” or “*one argument proposes that*” to convey to the reader (especially the naïve one) that this is one stance and not necessarily the consensus in science. Of course, if there is more than one work supporting such a claim, it would be good to add references to them as well.

Overall, this manuscript is a valuable and ambitious contribution to the literature on consciousness research. Clarifying its core arguments, strengthening logical transitions, and ensuring that claims are sufficiently justified scientifically would greatly enhance its impact.

Declarations

Potential competing interests: No potential competing interests to declare.