

Peer Review

Review of: "From Coherence to Control: A Non-Systematic Approach to Multi-Parametric Phenomena"

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General comment

The author undertakes an exploration of the foundational principles underlying scientific inquiry, moving beyond the traditional paradigm rooted in control, predictability, and the isolation of variables. The central investigation focuses on how complexity and systems far from equilibrium challenge the classical notions of scientific observation and understanding. Instead of seeking to dominate or suppress fluctuations within systems, the author emphasizes the importance of coherence emerging from inherent instabilities. This shift involves reconstructing the epistemological framework to recognise that natural order often arises not from the imposition of deterministic control but through an attentive participation with phenomena characterised by variability and spontaneous self-organisation. The research delves into how non-equilibrium conditions serve as fertile grounds for the emergence of new forms of order, structures, and patterns, highlighting that instability and fluctuation are not mere noise but crucial carriers of meaning and coherence. A significant part of the investigation revolves around integrating insights from various disciplines, including physics, biology, and philosophy, to elucidate how geometry, dynamics, and feedback loops facilitate the spontaneous emergence of order amidst turbulence. The author draws on classical and contemporary scientific theories to demonstrate that the traditional focus on equilibrium and control potentially limits the depth of understanding of natural phenomena. Instead, embracing the unpredictable and the transient enables a more accurate depiction of processes such as morphological development, self-organisation, and life itself, which are inherently rooted in activity far from equilibrium. The work emphasises a philosophical reorientation, proposing that the act of scientific observation should evolve from imposing order to recognising it. This entails shifting from a perspective where the scientist acts as an external controller to one where the scientist

becomes a participant, attuned to the signals of coherence that fluctuate within systems. The role of the observer is thus recast as an active participant who co-creates understanding through a participatory approach, listening and responding to the natural unfoldings of phenomena rather than attempting to force them into preconceived frameworks. The main take-home messages from this research articulate that the future of scientific exploration involves a deeper appreciation for complexity, fluctuation, and the emergent geometries that underpin the organisation of matter and life. It highlights the importance of humility and receptivity over control and manipulation, acknowledging that coherence and order often become visible only through the recognition of patterns within chaos. The paper advocates for an epistemology that values variability and diversity in experimental processes, suggesting that understanding grows not through enumeration or rigid models but through resonance and meaningful engagement with the phenomena under study. It ultimately invites scientists to view themselves as companions in a dialogue with nature, emphasising that the most profound insights are those that arise from a shared participation with the processes that inherently resist control. This approach has implications beyond scientific methodology, touching on the ethical and philosophical considerations of how knowledge ought to be pursued in an increasingly complex world. It asserts that scientific progress should be measured not only by an increase in predictive accuracy but also by the depth of understanding, which encompasses the subtle and often transient signals that reveal the true organisation of natural systems. It reinforces the idea that human cognition and intuition remain irreplaceable in deciphering the significance within the apparent chaos, and that machines, while adept at mastering precision, cannot replicate the human capacity to see coherence where others perceive randomness or disorder. This perspective ultimately revises the role of scientific inquiry into a more participatory, humble, and interpretative act that aligns with the dynamic and interconnected nature of reality itself. The article addresses an interesting and relevant topic and offers a thoughtful contribution to the ongoing discussion in the field. The manuscript is generally well developed and clearly written. At the same time, a number of minor revisions would improve clarity, presentation, and alignment with journal guidelines before the paper can be considered ready for publication. Addressing these relatively small points would strengthen the overall quality and readability of the manuscript without requiring substantial changes to its core argument or contribution.

Specific comment

The author explores how scientific understanding can be expanded by focusing on coherence emerging from systems far from equilibrium rather than traditional control. The work emphasizes that natural

order often arises from instability and fluctuations, which serve as carriers of meaning. It advocates shifting from a controlling observer to a participatory one who recognises patterns within chaos. The key message is that true understanding involves resonance and engagement with phenomena, not rigid prediction. Ultimately, it highlights the irreplaceable role of human intuition and discernment in grasping complex natural processes. The article addresses an interesting and relevant topic and offers a thoughtful contribution to the ongoing discussion in the field. The manuscript is generally well developed and clearly written. At the same time, a number of minor revisions would improve clarity, presentation, and alignment with journal guidelines before the paper can be considered ready for publication. The authors will find more detailed comments below and in the annotated pdf, which provide guidance for specific and targeted revisions.

1 - I understand that this is a commentary paper and that a catchy and somewhat provocative title may be appropriate. However, in its current form, the title does not clearly convey what the author is actually proposing or arguing in the paper. A better balance between rhetorical appeal and descriptive clarity would help readers immediately understand the focus and contribution of the commentary.

2 - In my opinion, given that this is a commentary paper, the abstract should place stronger emphasis on the implications of the argument being advanced. Highlighting more clearly what the commentary means for ongoing debates, practice, or future research would help readers immediately grasp the relevance and purpose of the contribution.

3 - The author may consider providing an institutional email address rather than a personal one, as this is generally preferred for academic correspondence and can help ensure credibility, traceability, and long-term accessibility.

4 - I wonder whether keywords are required for indexing this paper, as none are currently provided. The author should check the journal's author guidelines and, if keywords are expected, include an appropriate set to support indexing and discoverability.

5 - At the beginning of the introduction, where the author states "[...] The scientific method was born from a radical act of simplification [...]", to better contextualise the concept of natural complexity simplification in the recent and international literature scenario, I suggest citing here the following papers dealing exactly with the so-called Simplexity:

- DOI: 10.1016/j.xinn.2025.100954

- DOI: 10.3390/systems13040247

- DOI: 10.3390/biomimetics9060322

6 - The frequent use of hyphenated constructions and long dash punctuation is characteristic of text produced with the assistance of large language models such as ChatGPT. I am not opposed to the use of such tools, but I encourage the author to use them with care and to revise this type of stylistic pattern so that the language remains natural, precise, and consistent with conventional academic writing standards.

7 - The author should also consider Goldsmith's work 'A simplicity principle and its relation to ease of crystallisation' and the works of Falegnami et al.:

- DOI: 10.1086/626111

- DOI: 10.1016/j.heliyon.2024.e41033

8 - In the "2. Non-Equilibrium as a Source of Order" section, the manuscript productively frames order as a consequence of sustained flux, yet it slides between physical order parameters and semantic meaning when it states that each fluctuation is a candidate for meaning. That move invites a category error unless the text specifies what kind of meaning is intended, whether it is informational compressibility, observer-relative interpretability, or functional relevance. The attached work on conceptual artefacts argues that meaning and selection are themselves describable as mechanisms of simplicity operating over complex substrates, including the idea that higher-level constructs can compress complexity while extracting usable significance for action. A constructive revision would state explicit criteria by which a fluctuation becomes salient for an observer, and would treat that salience as an artefact mediated by context and selection filters rather than as an intrinsic property of the fluctuation. This would also align the argument with the simplicity perspective that simple observable regularities can be produced by complex internal dynamics without requiring that the system itself carries semantic intention.

9 - In Section 3, the author proposes geometry as a grammar, but it remains largely metaphorical and risks treating geometric form as an explanatory endpoint rather than as a mediating constraint that still requires a causal account across scales. The biomimetic argument in the attached brief communication is helpful here because it explicitly ties emergent simplicity to multiscale structure-function relations and to how complex interactions among constituents can yield simple functions at the level of use. A constructive improvement would translate the claim about geometry into a more operational bridge principle: specify which geometric invariants or boundary constraints are expected to govern which classes of emergent macroscopic regularities, and clarify what would count as evidence that a geometric description is functioning as a compressive conceptual artefact rather than as a poetic re-labeling. This

would also connect naturally to the call for a shared lexicon and conceptual constructs that can be carried across disciplines without relying on analogy alone.

10 - In the section entitled "4. Coherence, Disorder, and the Ethics of Complexity," the ethical register is invoked through appeals to beauty, wonder, and wholeness, yet the ethical content remains under-specified as soon as the text moves from epistemic humility to normativity. The attached work on emergent simplicities stresses that engineering practice often aims to conceal complexity behind simple interfaces, and that this concealment introduces design tensions related to usability, competence differences, and what is rendered visible or invisible to users. A constructive revision would treat ethics as the governance of complexity compression: articulate when simplification is legitimate, when it becomes a distortion that erodes accountability, and how designers and scientists should document what has been hidden, for whom, and with what operational consequences. The attached paper on language and resilience offers a concrete mechanism to anchor this, since it frames natural language as a stabilizing and coordinating medium in sociotechnical systems and shows how knowledge conversions can sustain adaptive performance. Bringing these ideas into the section would shift ethics from an aesthetic posture to testable commitments about communication, traceability of decisions, and the conditions under which intelligibility is achieved without mutilation.

11 - In Section 5, the portrayal of the experimentalist as selector of reality is philosophically consistent with participatory epistemologies, but the proposed principles are presented as a personal methodology without the kind of validation and intersubjective scaffolding that would make it portable across laboratories and domains. The attached conceptual artefacts paper is relevant because it treats such organising concepts as design outputs that require explicit construction and validation practices, and it highlights how a lexicon can discipline interpretation rather than merely decorate it. The attached resilience paper adds an even more actionable template by describing iterative, recursive knowledge conversion activities within the WAX framework, including the role of influence and bias in shaping what becomes explicit and actionable. A constructive revision would therefore reframe the experimentalist's selection not as an individual intuition to be trusted, but as a structured conversion process in which choices of apparatus, parameters, and observations are externalised into artefacts that can be interrogated, recombined, and internalised by others. This would preserve the section's central insight about participation while improving methodological rigour and transferability, and it would also clarify how coherence-based reproducibility can be demonstrated without collapsing back into classical control.

12 - The author has appropriately acknowledged the use of large language models in the preparation of the manuscript. This transparency is appreciated and consistent with emerging norms in academic publishing. At the same time, it remains important to ensure that the final text is carefully reviewed and edited so that it reflects a coherent scholarly voice and conforms to standard academic style and conventions.

13 - The declarations at the end of the manuscript are repetitive.

I hope my comments will help the author.

Best regards

Attachments: available at <https://doi.org/10.32388/ZXNFD5>

Declarations

Potential competing interests: No potential competing interests to declare.