

Peer Review

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

H. G. Solari^{1,2}

1. University of Buenos Aires, Argentina; 2. CONICET

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

by Ion Sandu

This commentary is an interesting work elaborated after a life in Science (so we are told). The discussion addresses a concern that has been raised since the popularization of “Artificial Intelligence” (AI) and “Large Language Models” (LLM) like the (now popular) chatbots.

Actually, the commentary has been produced with the aid of one of those chatbots (under the author’s supervision).

There are several aspects of this work that would benefit from a second version.

Let me suggest matters that the author can improve (I follow the sequential order of the paper).

0. Title. While the abstract gives a fair summary of the work, the title connects with the experience of the author as a laser physicist. As such, I am afraid it will not attract the attention it deserves. The abstract states that “coherence, rather than control, defines the frontier of understanding” and the work revolves around this idea. While “coherence” and “control” are words in the title, “understanding” is not. Multi-parametric phenomena appear as laser physics jargon instead.

1. Introduction.

The narrative regarding Galileo, Bacon, and Newton does not seem historically correct but rather an oversimplification that attempts to introduce early, in historical time, the idea of control, which can be verified in Bacon but not in Galileo nor in Newton. The striking differences between Galileo’s view of

science and Bacon's view, the inner view of a producer of understanding and the outer view of a politician seeking material benefits from science, are completely erased.

Although we can understand how the human being missed some relevant references, whether they are either recent or written in a foreign language, we have to be severe with the chatbot since chatbots are known for even inventing non-existing references.

Had the author read [1,2] (or the discussion in the current preprint [3]), he would know how science changed from understanding into an instrument during the second industrial revolution. The author's historical account represents an oversimplification that goes against his proclaimed intentions.

The author does not realize that "science" means different things at different moments of civilization. In such form, he separates science from social development, making the intricacies of their interrelation a unidirectional action in which science is not (epistemologically) influenced by society. The outer view of science advocated by Bacon becomes indistinguishable from the inner view of Galileo, Newton, Faraday, and others. Since the difference is clearly observable by reading these authors' main works, we have to suspect that the observation advocated in the conclusions has not been used in constructing the present work.

The author states "That phenomena could, at least in principle, be detached from their environment, rendered stationary, and made reproducible. But not all phenomena oblige." He certainly is correct in this remark. In chapter V of [2], it is demonstrated that such unitary evolution of quantum systems requires quantum systems to oblige with this isolation requirement, an assumption that immediately produces the known "measurement paradoxes" of quantum mechanics. Because of the precision of the statement, it deserves being cited.

The discourse based upon Haken, Prigogine, and the Brussels' school represents an old conception, popular in the late 1970s and early 1980s. Since then, the nonlinear out-of-equilibrium view progress stagnated. Mathematical theory developed after ergodic systems and nonlinear dynamics (especially low dimensional) advanced the view that determinism and nondeterminism coexisted and they were often a matter of changes of order in idealization (a matter that Galileo would have not objected to). An infrequently cited paper by the Brussels' school made rather remarkable connections between these views [4]. Reproducible structures lie behind the instabilities. What we highlight, be it chaos or order, is a choice, perhaps just to sustain Whewell's fundamental dialectic: "[I]n all human KNOWLEDGE both Thoughts and Things are concerned. In every part of my knowledge there must be some thing about

which I know, and an internal act of me who know. [...] [Man is] interpreting the phenomena which he sees. He often interprets without being aware that he does so.” [5]

2–4. Sections 2, 3, and 4.

We can certainly do without this collection of quotes. It is a social activity that wastes the reader’s time. It is text without context, concepts without conceptualization, i.e., void.

5. The Experimentalist as Selector of Reality.

In this section lies part of the novelty. The author presents three elements that guide experimental practice: ontological alignment, methodological reduction, and participatory observation. The three are well taken, especially the third one that is often forgotten.

The remark: “The experimenter does not vary parameters in a rigid grid, but in a spiral — observing, adjusting, converging.” is well aligned with the view of dialectical thinkers. It can be found in C. Peirce and R. García (as cited in [1,2]). Actually, non-dialectic thinkers often see dialectic as progression in spirals. The idea goes back at least to Goethe’s “rational empiricism” (see [6]).

6. Epilogue — The Apprenticeship of Understanding — Science in the Age of Intelligent Companions

As with everything that revolves around the much-propagandized AI, the apportions must be taken as food for thought. Some of the author’s thoughts are well aligned with very old but still current ideas presented by C. Peirce [7] (see [8]).

7. Acknowledgments

Commenting on acknowledgments appears, on first inspection, inappropriate. However, the author recognizes “assistance of a conversational artificial intelligence system (OpenAI GPT-5) in the conceptual organization, linguistic refinement, and structural synthesis of this manuscript.” Thus, the manuscript serves itself as an example of the cooperation between AI and scientists envisioned. In this respect, it is interesting to observe that three sections of the paper are irrelevant. The relevant sections (5 and 6) are clearly based upon the author’s personal experience and rational elaboration. Thus, the apportions of the chatbot contribute to making the paper worse rather than better. A practical result that makes us doubt the wisdom presented in the epilogue. The evidence indicates that AI, at least for the time being, might very well contribute to the degradation of science, and the division of labor proposed in the epilogue implies further dehumanization and a retrogress of critical thinking.

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Declarations

Potential competing interests: No potential competing interests to declare.