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APPROACHES BASED ON COMPLEXITY ARE INADEQUATE TO SOLVE THE MIND-BODY PROBLEM

LAS TEORÍAS DE LA COMPLEJIDAD NO RESUELVEN EL PROBLEMA MENTE-CEREBRO

Carlos Blanco[1]
Universidad Pontificia Comillas (España)

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Abstract: This paper aims to offer a broad criticism of the underpinnings of the so-called "complexity-theories" in their approach to a problem that has puzzled philosophers and scientists for centuries: the relationship between mind and body. We will pay special attention to the ideas of Alicia Juarrero, a distinguished exponent of this explanatory model, whose epistemological implications will be outlined in regard to her diffuse understanding of causality.
Key-words: Complexity, mind-body problem, reductionism, causation, self-organization

Resumen: El artículo plantea una crítica general de los fundamentos subyacentes a las denominadas "teorías de la complejidad", al menos en su tratamiento de un problema que ha desconcertado a filósofos y científicos a lo largo de los siglos: la relación entre la mente y el cuerpo. Presta especial atención a las ideas de Alicia Juarrero, exponente distinguida de este modelo explicativo, con el objetivo de discutir las implicaciones epistemológicas de su proyecto, sobre todo de su difusa comprensión de la causalidad.
Palabras-clave: complejidad, problema mente-cerebro, causalidad, reduccionismo, autoorganización.

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[1] (cbperez@chs.upcomillas.es) Profesor de filosofía en la Universidad Pontificia Comillas (Madrid). Entre sus libros más recientes destacan *Conciencia y Mismidad* (Dykinson, 2013), *Lógica, Ciencia y Creatividad* (Dykinson 2014) e *Historia de la Neurociencia. El Conocimiento del Cerebro y la Mente desde una Perspectiva Interdisciplinar* (Biblioteca Nueva, 2014).

Adherents to the so-called “complexity-theories” tend to sharply criticize the traditional conception of causality (which they attribute to Hume and Newton), caricatured in the image of the “billiard-ball,” because “it has failed as a general theory”[2]. It is interesting to notice that they do not advocate a refinement of the traditional idea of cause in Newtonian physics through the less deterministic approach that can be found in quantum mechanics: they argue that the traditional view is utterly incorrect both in its fundamentals and scope; therefore, it needs to be abandoned. They claim that there is a “new scientific framework,” based upon the study of complex dynamic systems, which offers a persuasive, alternative view on causality that may solve the difficulties associated to its traditional understanding by modern philosophy.

However, what does this “new scientific framework” consist of? Apparently, this conceptual revolution should be inspired by a parallel scientific change of paradigm, which would gravitate around notions like “emergence,” “positive feedback,” and complexity. For example, Juarrero claims that “complex adaptive systems are typically characterized by positive feedback processes in which the product of the process is necessary for the process itself”[3], some sort of Spinozan *causa sui* which, in her view, stands in radical contrast with Aristotle’s philosophy. Global dynamics apparently regulate and “constrain” the lower-level parts.

How does she support these somewhat speculative claims? Moreover, what new understanding of “causality” do her claims generate? Only intuition, and discomfort with the standard mechanistic model that can be found in most branches of the natural sciences, lies at the heart of her proposal.

First of all, even if it were true that new properties emerge and exert a “feedback” influence on its constituent parts, would it actually revolutionize our idea of causality? In no ways it would. The cause would still be there. Such a feedback mechanism would simply refer to the fact that the over-all disposition of the parts may be significant for their present and future states, but it does not alter their “past” constitution: linearity is not lost. Juarrero cannot show how this could occur.

After all, there is no “mystery” in understanding the possibility that wholes as such may have influence on their parts: this can be fully explained by ordinary science. Since Juarrero is not appealing to quantum principles or to more obscure aspects of subatomic physics, like the Einstein-Podolsky-Rosen paradox, one may wonder from which theoretical discipline she can draw her evocative conclusions. Perhaps her conclusions are based on the study of non-equilibrium dynamic systems. But it is necessary to bear in mind that non-equilibrium dyna-

[2] Juarrero, A., 2000, “Dynamics in action: intentional behavior as a complex system”, *Emergence* 2/2 25.

[3] *Op. cit.*, 26.

mics does not violate the traditional understanding of causality (unless it should occur in the elusive realm of quantum physics). Rather, it simply recognizes the capacity of certain complex systems to produce ordered structure when they act outside of equilibrium[4]. Trying to caricature the traditional scientific idea of cause as a mere set of "collisions" is entirely misleading. Modern science, except in some mechanistic conceptions, did not reduce everything to a collision-paradigm: causality alludes to the evidence that any given state stems from a previous state[5]. "Cause" is actually a philosophical rather than a scientific conception. The fathers of modern science spoke in terms of forces and energies rather than causes; the idea of "cause" corresponds to a more epistemological understanding of the operative principles of modern science.

It is possible that some adherents to complex system theories may be confusing causality and determinism. However, even in a non-deterministic universe, causes would still be necessary to relate different states to each other. And even if some sort of "backwards causation" (or "top-down causation," which is equally striking) were possible, we would still have causation. But causation involves relating two states in terms of an antecedent state and a subsequent one. There is no way of avoiding this structure if one wants to understand the physical universe. In an intentional world, we still find causes, even if they should be understood "intentionally:" someone has to "cause" volitions, thoughts, and feelings.

According to Juarrero[6], in complex systems, unlike classical thermodynamics, time matters. This consideration can be found in Ilya Prigogine's work[7]. I have no objection at all: it is clear that in biological systems "history," so to speak, is essential for the understanding of how things have evolved. But what does this have to do with causation? Are these historical "critical points" uncaused? We cannot escape the dilemma posed by causality and intentionality by simply appealing to an idea of "self-organization," which is still causal in nature.

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[4] For an introduction to the science of non-equlibrium systems, see the classic work by Prigogine, I., 1968, *Introduction à la Thermodynamique des Processus Irréversibles*. Paris: Dunod. For a more updated account, see Mauri, R., 2013, *Non-Equilibrium Thermodynamics in Multiple Flows*. Dordrecht: Springer.

[5] We shall not delve into the vast discussion on the interpretation of the idea of cause. M. Kistler, 2006 (*Causation and Laws of Nature*. Routledge: London), offers a thorough depiction of the principal models. Broadly speaking, we support an understanding of causation which interprets it as a set of relations between events in space and time. It is susceptible to an ultimately scientific translation in terms of physical and chemical quantities (energy, momentum…).

[6] For a more detailed account of her view, see Juarrero, A., 2002, *Dynamics in Action*. MIT Press: Cambridge MA. A more recent defense of her approach can be found in Juarrero, A. – Rubino, C.A. (eds.), 2008, *Emergence, Complexity, and Self-Organization: Precursors and Prototypes*. Goddyear: ISCE Pub.

[7] See Prigogine, I., 1979, *La Nouvelle Alliance: Métamorphose de la Science*. Paris: Gallimard.

For Juarrero, a new 'type' of entity appears, one that is functionally differentiated. The newly organized hierarchy constrains its components' behavior top down by restructuring them "in previously unrelated ways"[8]. But where is the problem? What challenge does it pose to the traditional scientific conception? Is Juarrero appealing to simultaneity or to the birth of entities "out of nothing"? An "entity" constitutes a conceptually artificial division, but still no entity "is created out of nothing," and nothing appears without a previous constraint. A truly self-cause would imply an *ex-nihilo* birth of a cause: this could only be accepted, *in extremis*, in the conceptual realm.

Is there a mystery regarding the interaction between the whole and its components? Does any scientific problem arise from admitting that the whole equals the sum of its parts *plus* its interactions, so that these mutual interactions have an effect on the component parts? In my view, no real problem emerges. Also, there is nothing enigmatic about auto-catalytic process, "self-caused" processes like self-division. There is no "self-cause" operating in those processes. Biology has progressed without the necessity of any explanation based on "self-causation." It is clear that those self-replicating processes have a "cause" which impels a certain behavior, even if it is originated by the living being itself instead of a chain of stimuli.

In summary, self-organization[9] does not violate causality. If by self-organization we understand the capacity of certain systems to dispose of their own energy, I cannot see in which sense a violation of the traditional idea of causality occurs. The cause is interior, and it may be related with the quest of the state of highest energetic equilibrium. The emergence of new features and properties poses no mystery at all, for the fundamental principles of conservation of energy are not violated. Therefore, there is no escape from the "causal" viewpoint. Otherwise, the process must be interpreted to be uncaused, an unacceptable hypothesis. Also, self-causality is a contradiction in terms[10]. No self-cause arises in the universe, with the possible exception of intentions and the "first" hypothetical cause in the beginning of the cosmos, back to Big Bang.

Against the potential objection that our criticism shows proclivity to "reification", we may also understand that properties are contemplated as

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[8] Juarrero, A., 2000, "Dynamics in action: intentional behavior as a complex system", *Emergence* 2/2, 31.

[9] For an overview of the concept of self-organization and its role in the study of brain dynamics, see Cosmelli, D. – Lachaux, J.P. –Thompson, E., 2007, "Neurodynamical approaches to consciousness," in Zellazo, P.D. – Moscovitch, M. – Thomspn, E. (eds.), *Cambridge Handbook on Consciousness*. Cambridge University Press: Cambridge, 736-738.

[10] The only dimension in which it can be accepted is the sphere of intentions. However, rather than in terms of self-cause, we should speak of a new "first cause," as if the universe started again from zero; at least, and taking into account the level of understanding achieved by our current neurobiological knowledge, we must still adhere to a provisional division between causes and intentions, until science does not offer a convincing explanation of intentions as neurobiological causes.

"functions," which can be explained in terms of the underlying structure. It is true that the theory of complex dynamic systems aims to deal with an unavoidable fact: the increasing complexity that takes place in certain levels of reality. It evidences that reality is hierarchically organized into levels, some of which exhibit greater complexity than others, so that new properties emerge. But it is also a fact that their emergence can be explained scientifically. Again, the greatest change comes after the birth of consciousness, and, in any case, the use of categories like "complexity" and "self-organization" should be taken as merely descriptive, "metaphorical" tools, not as explanatory instruments.

The fact that biological systems possess a higher degree of "control" over their internal processes, a certain endogenous "emancipation" from the environment (in such a way as to develop that which Jakob von Uexküll called "*Innenwelt*")[11], does not contradict the laws of causality. Higher complexity involves enjoying a larger number of possibilities, of "itineraries" which can be followed "equipotentially," without violating fundamental causal principles. However, this "multiple realizability" does not break causal ties. Also, we should notice that the number of "realizations" is never infinite: therefore, an "absolute" freedom does not appear at all. Irreversibility, as important as it may be far from equilibrium, does not violate causality, nor does the existence of "critical points" which radically reshape the evolution of a certain system.

Again, "abrupt appearance" (as in the case of Bernard cells and B-Z chemical waves, two classical examples used in discussions concerning complexity and the emergence of order) does not imply self-causation, at least in the way in which Juarrero seems to understand this transcendental category. The impossibility of "predicting" an event does not mean that it has emerged uncaused. Also, the dependence on the context does not mean lack of causality. Clearly, the more complex a system is, the more sensitive it can be to constraints and influences arising from the surrounding environment. But "causality," the exchange of energy to generate the new state, is not broken. Natural history may require a more sophisticated understanding than in the case of standard thermodynamic systems (in which reversibility is the key note). It may even demand a novel philosophical approach. However, it does not imply that we should accept a "rupture" of causality or a violation of conservation principles. The "freedom" for self-organization or "*autopoeisis*" of certain biological systems is always limited: they enjoy "degrees of freedom," never absolute freedom. Only in a situation of real "absolute freedom," a freedom emerging *ex nihilo,* utterly unlinked to any previous state, this rupture could be accepted. As we have highlighted, only in the case of consciousness can we find this potential situation. In any other example, the scientific view of the world, the explanation of the structure and functioning of the universe in terms of the

[11] See Von Uexküll, J., 1909, *Umwelt und Innenwelt der Tiere*. Springer: Berlin.

relationships such as causes or interactions between its components, is not changed at all.

Constraints and conditional probability do not alter the scientific image of the world. Perhaps due to a failure in certain expositions of evolutionary theory, which depicted living beings as mere automata reacting to stimuli and suffering random genetic mutations *then* selected by nature, some authors, like Stuart Kauffman, have insisted on the "self-organizing" capacities of living beings[12]. But this self-organization does not break with the scientific vision of the world. It refines it. Juarrero seems to be appealing to a more transcendent "rupture" which cannot be accepted in any realm -with the possible exception of the human mind-.

Conclusions

Top-down causation does not solve any problem but complicates it. It introduces a mysterious power which acts "top-down," while this process can be fully explained through traditional causation: there is no "rupture" of linearity, for the final result always stands as the effect of a previous cause.

I am sure that proponents of emergentism and the theory of complex systems (as applied to the mind-body problem) are inspired by the noble aim of linking causes and intentions in a broader scientific picture. They protest against scientific reductionism and they look for an integration of both matter and mind. However, from taking refuge in vague conceptions with no clear scientific utility nothing can be gained at all. Science has advanced by virtue of a rigorous understanding of the causal relations that bind the different states of nature. No vaporous notion has been admitted: no superfluous concept remains in a truly scientific worldview. Ockham's *entia non sunt multiplicanda praeter necessitatem* is as valid today as it was in the 14th century.

The only realm in which a notion nowadays "elusive" to ordinary scientific analysis can be admitted is the universe of mind. We do not know if mind will always remain beyond such analysis. What we do understand is that there is no need to use radical concepts with low explanatory potential in the sphere of matter, where standard scientific methodology fits quite well.

[12] Kauffman offers a compelling exposition of his approach in Kauffman, S., 2000, *Investigations*. Oxford University Press: Oxford.

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