Open Peer Commentaries

on Fritjof Capra's "The Organization of the Living: Maturana's Key Insights"

Integrating Autopoiesis into a Scientific Account of Embodiment

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> Abstract • Maturana's radically innovative concept of autopoiesis can, and should, trouble existing accounts of embodied cognition. Just how this concept can be further developed is still uncertain, as witnessed by ongoing confusion in the literature on embodied cognition, with its uncomfortable vacillation between describing embodied beings as humans, organisms, animals, or systems.

Autopoiesis and metaphysics

« 1 » Fritjof Capra's target article provides a succinct overview of several of the interrelated concepts Humberto Maturana's work has introduced in considering the condition of the living being, grouped around the central and novel concept of autopoiesis (§18). The development of these ideas from earlier work that focussed on the nervous system up to the mature form of Maturana's theoretical stance are outlined. In this progression, the centrality of the nervous system recedes somewhat, and the central object of concern that emerges is the embodied being, prototypically represented by a single cell in the biochemical domain (§6).

« 2 » The body of work centred on Maturana has proved remarkably seminal in later developments in theories of embodied cognition generally, enaction (in the subsequent work of Francisco Varela, Evan Thompson and others), and in sociology (e.g., Niklas Luhmann, §54). Yet Maturana's work retains a character distinct from these subsequent developments, and he largely remained aloof from such subsequent developments. The unique self-containedness of Maturana's writing, in which he typically cites only his own work, ensures that it has an internal consistency (albeit one that develops over time), but it remains somewhat distinct from the more densely interconnected web of scientific literature in which citation practices serve to comingle arguments and their associated foundational assumptions.

« 3 » To better understand what we have gained from Maturana, I wish to consider this distinct character of his work as a whole, and how it relates to the very large claim that in Maturana's theory "[f]or the first time, we have a scientific theory that unifies mind, matter and life" (§59). Here, it seems, the demon of Descartes has been slain. However, to point to Descartes and his particular brand of substance dualism is somewhat imprecise, and the perceived sins of dualisms of many kinds have conventionally been attributed to that fine philosopher, who cannot be made responsible for the contemporary scientific landscape, which lacks any articulated metaphysical foundation, beyond an ill-specified commitment to a vague kind of realism whose character shifts shape as one moves among the disciplines.

« 4 » It is interesting to note that Maturana himself considers his work to have entailed the construction of a new metaphysics, as revealed in his conversation with Bernhard Poerksen (Maturana & Poerksen 2004: 21). A few of his supporting observations are worth quoting in full.

« 5 » Of the prevailing metaphysical background, he says "Our present patriarchal-matriarchal culture [is] […] *the metaphysics of the transcendental reality*" (ibid: 17). "[W]hen I asked in my research on visual perception 'What is it to see?' […] I had to abandon the notion that the observer existed by itself as an ontologically independent entity" (ibid: 20). The metaphysical ground that licences epistemological and ontological assumptions is rarely acknowledged. As Maturana himself says:

> "A metaphysical attitude arises as a matter of course implicit in the cultural upbringing of a child as an unreflected background of legitimacy that is lived as the ultimate fundament that gives validity to whatever he or she may claim in that culture to be undoubtedly true as a matter of fact or rationally supported." (ibid: 19)

« 6 » Arguably neither the vague notion of "culture" nor the suggestion that scientific work has a consistent metaphysical ground will survive robust interrogation. Maturana's identification of the question of a transcendental domain of existence as a widespread founding assumption across many disciplines serves to clarify why this must be troubling to the biological and cognitive sciences. The position he adopts, in which the observer is never considered distinct from the situation of observing, is a powerful stance to take in resisting this troubling assumption.

« 7 » There are many other developed intellectual approaches to understanding our being in the world that do not unreflectively assume a simply existent transcenden-

tal reality. The many varieties of constructivism, many of which pre-date Maturana, reassure us of this. The enactive programme that has developed subsequently to the early work of Maturana and Varela is one among many active fields. Enaction is a still young field in which many received conundrums centred around the autonomy and experience of the living embodied being are re-expressed and renewed within an emerging and interlinked technical vocabulary that avoids many of the pitfalls of naïve realism (Stewart, Gapenne & Di Paolo 2010). This rather different starting point holds the potential for renewing stagnated discourses around living and value.

« 8 » The enactive project is typically considered to have begun with the 1991 book, *The Embodied Mind* (Varela, Thompson & Rosch 2017), and that seminal work has given rise to several distinct elaborations, of which the most developed is commonly referred to as "autopoietic enaction." This term is misleading, both because autopoiesis is strictly speaking a concept originating within Maturana's body of work, and referring to organization, structure and process only in the biochemical domain, and also because in the original 1991 edition of that book the term *autopoiesis* does not even occur.

« 9 » What is more relevant, though rarely elaborated upon, is the introduction of metaphysical terminology from Mahayana Buddhism, on which the book draws freely, precisely to escape the metaphysical assumptions presupposed by most orthodox approaches to cognition. This is central to the emerging view of mind and life that was further developed, e.g., in Thompson (2010) and Fuchs (2017), but in almost all cases,[1] without further development of the themes taken from the rich Mahayana tradition. A metaphysical perturbation conducive to the arising of new ways of thinking about embodiment may have occurred with the 1991 book, but the dialectic needed to ground a radically different approach to questions of life and mind is still very much in its infancy.

« 10 » The nature of consciousness, the relation between the knower and the known, and the means by which an embodied being comes to know and act in its world, these are themes that have been explored and debated, with the production of rich technical vocabularies and careful distinctions, within the sadhana traditions[2] of India, for over 2,000 years. In some sense, such themes are universal, and can be found in theology long before they arise in scientific debate, for example Proclus's *Elements of Theology* (Dodds 1995). The sadhana traditions are distinct from the scientific tradition, as their goals are primarily soteriological and ethical, but their concerns have led them to consider many of the same metaphysical topics that the cognitive and biological sciences now face. Over many centuries, the debates between the schools have been rigorous, respectful, and often fiercely empirical, in the sense that insight is viewed as something that one must have for oneself, experientially, and without regard for the authoritative statements of scripture or cleric. This is the ground from which *The Embodied Mind* drew, but it drew only from Mahayana Buddhism, and, as Thompson acknowledged in his foreword to the 2016 revised edition, from a Westernized and somewhat naïve view of the tradition.

« 11 » Maturana does not engage with such traditions. He speaks vaguely of "the oriental philosophy" from which he would like to distinguish his approach (Maturana & Poerksen: 23), but his quick summary of what he understands by that term makes it clear that he has not encountered the variety of positions that have been publicly debated over millennia. I will return to this apparent Orientalism towards the end of my commentary.

Of organisms and other beasts

« 12 » At this point, it is worth attending to the terminology employed in contemporary debates within the diverse set of approaches subsumed under the notion of "embodiment." Just as the key terms "stimulus" and "response" serve to immediately alert the reader of an article that some kind of behaviourist framework is being employed, so the uses of the several terms "person," "human," "organism," "animal" and "system" within the embodiment literature provide clues to the foundational assumptions in play as questions are developed and explored.

« 13 » The terms "person" and "human" are intended inclusively, and seek to construct accounts adequate to readers who understandably believe themselves to be well addressed with such terms. Use of these terms ensures that such work can be intertextually entwined with the vast bulk of existing psychological literature, much of which, it must be remembered, begins with soteriological motivation (caring, counselling, advising). Such an inquiry is necessarily concerned with an abstraction (person/human) who can be distinguished from the non-human, often implicitly an animal. The large body of work that looks for human characteristics in animals (teaching "language" to apes, self-recognition using the mirror test, and many more) serves to shore up an emerging picture of the non-animal human person. Such psychologies have developed in elaboration of the notion of the individual soul, as this has been developed within a social framework in which Christian ideas have been predominant.

« 14 » With the development of theories of complex systems and non-linear dynamics in the second half of the 20th century, "systems" talk became popular. A well-known example is the field of coordination dynamics (Kelso 1995), which models coordination, or non-independent evolution over time of multiple variables, allowing for accurate characterization of emerging patterns of stability and change. The variables in question may be drawn from any empirical source, and the boundaries of the system so characterized are not the boundaries of an agent. Applications abound, including coordination among individual neurons, among populations of neurons, of limbs or fingers in oscillation, of multiple bodies engaged in a collaborative task, of horse and rider, etc. Scott Kelso (1995) provides many examples. The systems view is typically treated as if it lacked metaphysical challenges, as the emerging abstract system is characterized purely mathematically. The price for this is that the system, and only the system, emerges as a result. No person, human, organism, and especially no soul, is involved.

1| For an exception, see Hart (2010).

2| I use the term "sadhana traditions" to avoid the deeply problematic East/West labels, following the careful treatment of different aspects of Indian religious and philosophical schools in Dasgupta, (2009: 77).

« 15 » Uniquely within the schools of embodied cognition, the field of ecological psychology, originating in the radical work by James J. Gibson (1979), frequently refers to the embodied being under consideration as an "animal." This field is perceived by some as having stronger physical realist commitments than other schools (Cummins 2020), and one might wonder at a field that styles itself as a form of psychology but that makes the animal (not the person, organism, or system) its quasi-object of study. There is a clear desire to avoid human exceptionalism in such a lexical choice, but what is an animal, if not a non-human among sentient beasts? Metaphysics always lurks.

« 16 » However, in the last few decades it is the "organism" that is frequently referred to in work on embodied cognition. At one level, this is clearly motivated by the desire to view ourselves through the (compound) lens of naturalism. It was Charles Darwin who informed us that we may no longer aspire to semi-divine status, but must understand our embodied being as among, and not above, the others. This tectonic shock to our self-understanding clearly still resonates, and presents us with challenges that require greatly altered assumptions about our own being and any world we might characterize as our habitat. The hat-tip to naturalism is such an obvious social signal that it is found commonly outside the embodiment literature, too, in work of a purely intellectualist character. For example, this sentence is found in Ray Jackendoff's *Semantic Structures*, a foundational work within the cognitivist generative paradigm: "The computation of inference, like for instance the computation of rhyme in phonology, is a matter internal to the organism" (Jackendoff 1990: 15). Any number of other examples could be adduced.

« 17 » Yet our best theory of the organism, stemming from Maturna's body of work, that might allow us to speak confidently of such an embodied entity, does not bridge the gap from cell to human or animal. Its central conceit, autopoiesis, allows only a single norm: self-persistence. It does not provide formal means to recognize an entity that is sensitive to impeding threats or deterioration in the conditions of viability. For that, the concept of adaptivity has been introduced as an additional "pillar" to the enactive vocabulary (Di Paolo 2005). From autopoiesis to any account of a concretely instantiated living being, additional work is required. Of late, enactive discourse has developed an explicitly dialectical character (see especially Di Paolo, Cuffari & De Jaegher 2018), more at home in the Hegelian tradition than that of Kant.

Drawing from other traditions

« 18 » The long historical path from ancient Greece to the present in which Western science slowly developed was a social context in which, for the most part, Christian ideas provided an obligatory framework. Recognizing this allows us to understand that ideas about the soul, the individual, and their place in the broader scheme of things (society, cosmos) are developed as contingent, local elaborations of underlying questions that have also been elaborated within intellectual and philosophical traditions from other parts of the globe. In 2022, a readiness to learn from and engage with other traditions seems obligatory, if parochialism is to be avoided.

« 19 » Mahayana Buddhism (in some weak form) perturbed cognitive science once. The richest development and exposition of the underlying questions have arisen, however, not within any doctrinal school, but in the dialectic among such schools, where many metaphysical assumptions are shared, e.g., as seen in contributions collected in Kuznetsova, Ganeri & Ram-Prasad (2012). Here, the challenges of many kinds of monist, dualist, and non-dual accounts of the living have been enthusiastically pursued.

« 20 » The themes from the Mahayana school find enrichment through dialectical engagement with others, most visibly in the traditions of Vedanta (Advaita and other schools, e.g., Indich 1995) and in Kashmiri Shavism (see, e.g., Todariya 2021), but much work remains to be done here in building bridges across the divides. When Maturana distinguishes his theory from "the oriental philosophy," one might be forgiven for suggesting that there might be more conceptual development within such traditions than this dismissal suggests. Such a suggestion is not entirely new (Capra 1975).

« 21 » It seems that there is a lot of work to be done yet to justify any claim that the work of Maturana has resolved outstanding dualist problems in our scientific account of the living. However, such development is necessarily slow, and must encompass changes beyond theory, extending to practices of relating to others of one's kind and to those whose alterity one likewise recognizes. There must arise the necessary "background of legitimacy" Maturana refers to in the Maturana and Poerksen quote, above. Darwin's challenge to see ourselves within, and not apart from, the order of living organisms, remains. Maturana's contribution may be perhaps best seen as another landmark in this slow progression towards an understanding that allows us to inhabit this, our, biosphere.

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A Radical Epistemological Severance

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> Abstract • Given that there are many implications of Maturana's approach that still need elaborating, I draw attention to the radical quality of his theorizing and to his endeavors to outmanoeuvre the language of realism.

« 1 » The revolutionary nature of Maturana's model is made clear when we focus on his effective dissolution of the *inside–outside metaphor*. As discussed by Fritjof Capra in §§14f and 47 of his target article, this metaphor is at the base of several other common concepts, for example, that of mind–body dualism and its current metamorphosis in brain–body approaches. The metaphor contains an ineluctable Cartesian trap of dualism, which Maturana wanted to avoid.

The inside–outside metaphor dissolved

« 2 » Alfred Korzybskis's metaphor of the map versus the territory underlines that it is not possible to see how well one's mental map is an effective mirroring of the territory: "A map is not the territory it represents." He goes on to say that "If we reflect upon our languages, we find that at best they must be considered only as maps. A word is not the object it represents" (Korzybski 1994: 157).

« 3 » Maturana, however, created a model to dissolve this metaphorical gap between the *inside* and the *outside*. While Korzybski and others warn that "the map is not the territory," Maturana claims instead that the map *is* the territory. The map is *identical* with the territory.

« 4 » For Maturana there *is* no map *inside* which tries to represent an *outside*. There is only *fit* (Glasersfeld 1984: 21ff). "Fitting" occurs due to the history of structural coupling of a system with its medium. Both the system *and* its medium *embody* the precise structural changes which have wrought a fitting between them.

« 5 » From this perspective the system and medium are not two separate entities which are interrelating across a gap. The system is not something that is set apart from the medium. Rather both form a consensual, structurally coupled domain of existence. They compose a network of reciprocal orientation and interlocked actions.

« 6 » Maturana says that given the condition of structure determinism –

> "[…] for living systems there is no inside or outside in their operation as autopoietic unities; they are in autopoiesis as closed wholes in their dynamics of states or they disintegrate." (Maturana 1988a: 14)

The radical reconstruction on communication and language

« 7 » A second way to see the radicality of Maturana's theory is through his theory of language. For Maturana (1988a: 26), the structure of our language brings forth a reality. In this sense Maturana's construct of structure determinism also applies to language that brings forth a given reality by the operations of distinction of the observer. It is not possible to have a conception of the world beyond the structure of our language system.

> "We have no way of referring to ourselves or to anything else outside of language. […] the operation of reference exists only in language and to be outside language is, for us as observers, nonsensical." (Maturana 1988b: 43)

« 8 » Outside of language there is nothing. There are no independently existing objects or components of reality outwith language waiting for us to stumble upon them and blend them into a composition – "nothing pre-exists its distinction" (Maturana 1988a: 24).

« 9 » In Maturana's view, communication ceases to be understood as efforts to transmit "information" from one person to another and instead becomes an action for orienting the other person within their own realm of sense-making:

> "Linguistic interactions orient the listener within his cognitive domain, but do not specify the course of his ensuing conduct." (Maturana & Varela 1980: 50)