Philosophical Concepts in Enactivism

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Phenomenological Teleology and Human Interactivity
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Upshot: We argue that Villalobos and Ward’s criticism misses two crucial aspects of Varelian enactivism. These are, first, that enactivist attempts to offer a rigorous scientific justification for its teleological claims, and second, that enactivism in fact pays too little attention to the nature of human phenomenology and intentionality, rather than anthropomorphically over-valuing it.

1 Mario Villalobos and Dave Ward (V&W) criticize Varelian-inspired enactivism (VE) for its apparent anthropomorphic inclinations. Allegedly, Varela and colleagues use human cognition as a model for cognition in general. V&W build their argument on several observations with which we agree, including (a) that Hans Jonas’s biological phenomenology builds on human subjectivity in a way that, by his own admission, is incompatible with the ontology behind the modern scientific method, and (b) that Francisco Varela and other enactivists fail to draw a terminological as well as phenomenal distinction between human agents’ directedness and the directedness of other types of biological agents (e.g., Di Paolo 2005; Thompson 2007; Weber & Varela 2002).

2 Despite this initial agreement, we think that V&W’s overall criticism is misguided. The reason for this is twofold: first, V&W entirely leave aside VE’s attempt to offer scientific justification for their use of teleological terms such as “intention” and “purpose,” and second, while V&W are right to criticize VE for its problematic conception of intentionality, that conception is problematic primarily because it pays insufficient attention to human experience, rather than over-generalizing it. We will show that their criticism misses its mark for these reasons, although we agree that fundamental aspects of VE are a challenge to its paradigmatic aspirations.

3 Jonas’s reasons for his anthropomorphic stance on teleology are endorsed by VE, in the passages indicated by V&W (§21), but in all cases the endorsement is either prefatory or ancillary to an argument that relates to Jonas in a different way. Rather than choosing one side of the distinction between ontologies that either explicitly relate to human experience (and so also to teleology) or those that utterly deny that phenomenology can play a role in science, VE builds on Jonas’s recognition of a difference between living and non-living systems. For Evan Thompson (2007) and Ezequiel Di Paolo (2009b), the key point in Jonas is not a phenomenological one but rather an ontological one, namely that only living systems actively regulate their own interactions with the environment. VE, following Jonas, argues that for living systems it is sensible to talk of “purposes” and “intentions” as specifiable patterns in the dynamics of the system’s operation. Non-living systems are taken to be non-teleological because they fail to display these same patterns. This means that speaking of “purposes” with respect to non-living systems is strictly metaphorical and so scientifically inadmissible.

4 This means that V&W mischaracterize the relation between VE and Jonas’s biological phenomenology. Especially with respect to teleology, it is a matter of inspiration more than endorsement. “The theory of autopoiesis can be called upon to complement this [Jonas’s] account,” writes Thompson (2007: 153), by specifying (ibid: 145f) the organizational characteristics of living systems (spelled out on ibid: 97–107) that justify speaking of them in intentional terms. Di Paolo (2005: 31) suggests that auto poiesis “provides a serious scientific account” of the “initial step” of the continual back-and-forth between science and experience that is essential to a successful investigation of cognitive phenomena. VE draws on Jonas for a perspective on the study of living systems, supported by certain useful concepts such as needful freedom. They also sometimes appear to have adopted the specific anthropomorphic aspect of Jonas’s work picked out by V&W, but they do so first and foremost because it is a logical consequence of their interpretation of autopoietic theory, and subsequent development of it in terms of immanent purposiveness.

5 It is in this specific sense that VE speaks of “purposes,” “intentions,” “norms,” and other anthropomorphically-derived concepts (Barandiaran, Di Paolo & Rohde 2009; Barandiaran & Egbert 2014). For VE, the activity of an organism is intentional because – or rather, in that – it is organized into patterns that maintain its organization over time. This is, or at least can be read as, a perfectly legitimate piece of scientific theorizing, one that can be disputed by presenting evidence that some systems fail to display precarious operational closure.

6 In light of this, V&W’s failure to mention this seems very odd, given that they approve of Humberto Maturana’s observer-dependent position (Maturana 2002), and take it to be unproblematic in its anthropomorphism, precisely because it is based in biological science:

[Maturana’s autopoietic theory’s] inference from properties of human sensory experience to properties of its nonhuman relatives is grounded by the conviction that our empirically determined grasp of the structural dynamics of the physiology of our sensory systems is our best guide to the properties of our sensory phenomenology. If this is right, then we may conclude that similarity in biological structure goes with similarity in sensory experience. [§33]
cognitive agents first and foremost reflect two kinds of intentionality: (a) "primordial stance, Martin Heidegger argues that human intentional directedness than what vE has in fact no latent commitments to anthropomorphism. This is also underlined by recent V&V research. As we see it, the problem is two-fold (see Harvey, Gahrn-Andersen & Steffensen 2016). V&V's claim) or to a transcending situation (Hodges's claim). The sense-saturated nature of human cognition (cf. Harvey, Gahrn-Andersen & Steffensen 2016) is neither bound to the agent nor the environment. Rather, it involves both of them, thus implying that normativity arises in situated agent–agent and agent–environment encounters.

The phenomenological literature, however, reveals that there is more to human intentional directedness than what is implied by mere sense-making. For instance, Martin Heidegger argues that human cognition comprises a synthesis of two kinds of intentionality: (a) "primordial intentionality" and (b) "full intentionality" (cf. Dreyfus 1988). He thus suggests that cognitive agents first and foremost reflect an immediate, non-representational directedness. While this kind of directedness does not involve linguistic meaning, the same does not hold for full intentionality. Following Daniel Hutto and Erik Myin (2013), "full intentionality" may be seen as synonymous with fully-fledged human cognition since it involves linguistic meaning. This is in line with Maturana, who argues that humans differ from other species in that our cognition emerges as a "linguistic psychological space" (§30).

To sum up, V&E has in fact no latent commitments to anthropomorphism. This is also underlined by recent V&E accounts, which either treat human cognition as a particular kind of sense-making (Froese & Di Paolo 2011) or seek to come to terms with human language (Cuffari, Di Paolo & De Jaegher 2014). V&E needs to evoke a distinction between different kinds of intentional directedness in order to be successful in these attempts, as sense-making is a necessary but not a sufficient condition for human cognition (Harvey, Gahrn-Andersen & Steffensen 2016).

**Phenomenology and teleology**

We agree with V&W that VE usually promotes a simplistic view of intentionality. However, contrary to V&W's point, VE has in fact paid special or undue attention to the phenomenological aspects of human cognition. This is evident from Hanne De Jaegher and Di Paolo's (2007) notion of "participatory sense-making," which neglects the constitutional role played by phenomenology in human social interactions (cf. the criticism by Stephen Cowley & Gahrn-Andersen 2015). In addition, similar neglect is also reflected in the fact that intentionality is generally conflated with the enactivist concept "sense-making," a concept that proponents of VE indiscriminately apply to everything from humans to animals and bacteria. Thompson offers the following definition of sense-making:

"Sense-making' is reminiscent of the phenomenological notion of intentionality, which signifies not a static representational 'aboutness,' but rather an act of intending, a purposive striving focused on finding satisfaction in further cognitive acquisitions and experience." (Thompson 2004: 389f)

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**Teleology and human cognition**

Despite these specific points of disagreement, we think that V&W are right that enactivism in the Varelian tradition has problematic implications that pose a serious challenge to the paradigmatic aspirations of VE research. As we see it, the problem is two-fold (see Harvey, Gahrn-Andersen & Steffensen 2016 for detailed exposition of both points). First, VE's core concepts (including "autonomy" and "sense-making") reflect strong assumptions about the closed organization of living systems, and thus cannot account for all types of living phenomena. It is doubtful that precarious operational closure is a necessary requirement for life. Second, when it comes to explaining interactional dynamics, VE is restricted by its simplistic notion of intentionality, which traces everything that determines agent–agent and agent–environment interactions to the immediate situation. For this reason, Varela-inspired enactivism ends up focusing predominantly on localized routines, values and actions.

With regard to human cognition, we argue that agents make sense of what is given in local situations on the basis of certain non-local factors that normatively influence the situation as well as the agents. Bert Hodges provides several examples of how non-local norms affect cognition. For instance, he mentions that values including accuracy and safety are essential for driving a car (Hodges, 2009: 631). Non-local rules and norms impact on everything from solitary thinking and problem-solving to social encounters. Normativity plays a crucial role in that it reduces contingencies. For instance, social norms prescribe behavior in relation to given contexts whereby individuals behave in accordance with the expectations of others.

However, we wish to explore a different path rather than blindly accepting Hodges' ecological account, which suffers from being overly descriptive. Because a variety of norms and values can be inferred from any given situation, and Hodges' holistic theory gives no way to choose among them, it has little explanatory value. Furthermore, it ignores the phenomenological dimension of human cognition, conceiving of values as determined by the situations in which people find themselves. On our view, the constitution of norms and values cannot be explained by exclusive reference to individual predispositions and capacities (VE's claim) or to a transcending situation (Hodges's claim). The sense-saturated nature of human cognition (cf. Harvey, Gahrn-Andersen & Steffensen 2016) is neither bound to the agent nor the environment. Rather, it involves both of them, thus implying that normativity arises in situations where agents are in the environment. Rather, it involves both of them, thus implying that normativity arises in situations where agents are in the environment.

We think that the non-localized and norm-constituting aspects of human cognition should be amongst the focal points of a more heterogeneous enactivist paradigm. The prerequisite for such a paradigm is a constructive questioning of VE's foundational commitments to strong operational closure and immediate sense-making. This is needed in order to achieve what V&W propose, namely "a new way to integrate phenomenology and cognitive science" (§38).

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Living (in) Different Enactivist Worlds: A Mathematics Education Researcher’s Point of View on Enactivism

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> Upshot • Villalobos and Ward’s distinctions between Varelian theories and Maturanian ones about anthropomorphism give rise to questions about what is or is not enactivism. This leads to recognition of an enactivist theoretical multiverse, and to embracing it as a way to advance theorizing along, and beyond, post-positivist lines.

« 1 » As my title states, I write this commentary as a mathematics education researcher. I am interested in studying the processes engaged with/when solving mathematical problems mentally, that is, without paper and pencil or any material aid. This personal focus obviously colors the meaning that I give to ideas that researchers associate with enactivism, and this is the case for those shared by Villalobos and Ward. This is reminiscent of a quote from Maturana, given in an interview for a family therapy journal:

"Systems theory first enabled us to recognize that all the different views presented by the different members of a family had some validity, but systems theory implied that there were different views of the same system. What I am saying is different. I am not saying that the different descriptions that the members of a family make are different views of the same system. I am saying that there is no one way which the system is; that there is no absolute, objective family. I am saying that for each member there is a different family, and that each of these is absolutely valid." (Maturana, in Simon 1985: 36)

« 2 » What I take from this is that I live (in) a different enactivist world. While reading Villalobos and Ward’s article, I had to keep reminding myself of this enactivist multiverse, as Humberto Maturana would have it. If I had not done so, scientific frustration would have crept up on me: there are so many assertions that simply do not fit my understanding of enactivism that this would have made their article unintelligible to me (some of these I refer to explicitly in this commentary). Thus, my intention here is mainly to account for the boundaries of what is, or is not, enactivism, and to remind ourselves of the histories that we embody as we read scientific research so that these boundaries soften. There is no single enactivist theory spread out in various versions or interpretations that is improved or that develops: there are many theories that live and develop (and die) through the work of researchers.

« 3 » Research fields have histories, and these histories are lived through their researchers. To some extent, it amounts to being his- and her-stories. The story that some of us researchers in mathematics education tell ourselves is the following. For most, if not all, mathematics education researchers, enactivism is traced back to and grew out of Tom Kieren’s University of Alberta group in the 1990s. Whereas it is probably widely recognized that Francisco Varela coined the term enactive (see, e.g., Varela’s afterword in the revised version of *The Tree of Knowledge*, Maturana & Varela 1992: 255; or in *The Embodied Mind*, Varela, Thompson & Rosch 1991), many mathematics education researchers cherish the thought that Kieren’s group coined expressions such as *enactivism* and *enactivist*, its “members” having referred explicitly to these in their writings (e.g., Davis 1996; Reid 1996). Therefore, for us, enactivism has a deep-rooted history in mathematics education research, and people have developed a common understanding of its meaning and of who is inspired by it.

« 4 » However, here lies the discomfort. At the same time as enactivism traces its path as a discourse in mathematics education research, it is also recognized that, in contrast to a number of theories and discourses, a difficulty emerges when one tries to identify which texts belong to the enactivist discourse. From one researcher who claims to be inspired by enactivism to the next, there are quite varied references to scholars, articles, books, chapters, and so forth that, for any particular author, be representative of the enactivist literature. And, Villalobos and Ward’s inclusion of Hans Jonas’s work in the enactivist literature (through Evan Thompson’s 2007) is an example of this. One might be puzzled by the clear, affirmative and direct link they established between enactivism and Jonas’s work. But again, similar claims have been made elsewhere between enactivism and George Lakoff’s work on metaphors, Erwin Schrödinger’s quantum mechanics memoirs, and even Jacques Lacan’s psychoanalysis or Jacques Derrida’s deconstructionism. So Jonas is now simply added to the list of writers that some researchers insert into their inspirations. But another issue is the main one.

« 5 » Of most importance in relation to the literature is that enactivism offers us, as mathematics education researchers, a way to develop continually a non-objectivist view of the world and a view of knowledge issues that can be used productively in mathematics education in particular. Therefore, the relationships and distinctions that can be traced from inspirng oneself from the “enactivist literature” are not to be seen as the “things-in-themselves,” as the *ding an sich*, but as issues that have been occasioned for us as researchers in relation to this literature. In this sense, and significantly, the elements and issues outlined and addressed in our research work are not necessarily explicitly outlined in those works and texts we refer to: “inspiring from” thus means that we take what we can, hence we make more of it, but also less. The main point is that those texts have made these possible, they have made possible the distinctions that we make and explore as researchers: as researchers, we are creators who are inspired by ideas, not tech-