Adaptive Behavior

Commentary

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Why do we build the wall?

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Abstract

I discuss the notion of bodies proposed by Villalobos and Razeto-Barry. I consider it a good move in a direction away from overly formal aspects of autopoietic theory, but in need of refinement. I suggest that because organismic boundaries are dialectical processes and not immanent walls, some autopoietic bodies can extend by incorporating parts of their environment as in the case of insects that use trapped air bubbles to breathe underwater.

Keywords

Autopoiesis, individuation, boundary, incorporation, dialectics

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Villalobos and Razeto-Barry (V&R-B) see a tension between claiming that autopoietic systems characterize life and suggesting that they could be realized beyond the organismic body. They resolve this tension by acknowledging that autopoietic *systems* involve loops through the environment while they remain distinct from autopoietic *bodies*, defining the latter in terms of discreteness and cohesion.

This is a move away from overly formal aspects of autopoietic theory, known for introducing sharp distinctions between abstract organization and bodily structure (DiFrisco, 2014; Di Paolo, 2018). Attention to bodies invites questions about their thermodynamic viability, their energetics and material precariousness, issues that many researchers have found lacking in autopoietic theory (Moreno & Mossio, 2015).

However, appealing to a conception of 'bodies' in terms of inner cohesion is not going to solve all the problems, particularly since the notion, as the authors recognize, admits ambiguous cases. The condition of internally sustained cohesion is reminiscent of Gilbert Simondon's (2005) concept of physical individuation, but lacks its clarity. The examples given by V&R-B, in which the unitary character of a body is a function of the object itself are too context dependent. A trapped air bubble is not a body because its spatial cohesion is sustained only by the surrounding granite. A lump of gold is? How about the lump of gold that is isolated from external melting temperatures by the granite? Individuation (of all kinds) for Simondon entails the simultaneous co-emergence of an individual body *and* its associated milieu, both as processes. There cannot be one without the other. Bodies are fundamentally relational. This is a corrective that V&R-B's notion of 'bodies' needs.

Is the original concern resolved then? If bodily discreteness is a criterion for organisms, it is hard to see the difference between the air bubbles used by some insects to breathe underwater and grown-instead-of-appropriated structures such as hairs, nails, horns, and hooves. Tiny abdominal hairs prevent air bubbles from collapsing. The integrity and discreteness of the 'insect + bubbles body' is an environmentally conditioned result of this same body. And bubbles serve the function of respiration, thus completing the loop of mutually enabling conditions. Is this not an extended body?

We must distinguish two related issues:

1. The codefinition and mutual dependence of individuation processes and their associated milieu.

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2. The dialectical character of the organismic boundary.

I agree with the authors that pointing to cases of 1 is not enough to assert that organisms extend. We need a specification of how boundaries are organisationally *and* materially constituted. We can then decide what lies on either side. Codependent processes cut across organismic boundaries without rendering them inexistent. V&R-B, however, seem to think of organismic boundaries as immanent walls insofar as they are defined by the inner cohesiveness of a living body and not by the transactions that flow through them. Unlike a wall, however, a boundary is one moment of a dialectical pair: *Boundary/Crossing the Boundary*. Crossings reaffirm boundaries, and boundaries define some flows as crossings. Boundaries are *not* walls. Try to look at walls dialectically and the result is irony instead, as in Anaïs Mitchell's prescient song:

Why do we build the wall?
We build the wall to keep us free
That's why we build the wall
We build the wall to keep us free

Real crossings (not exchanges of energy and matter in the abstract, but concrete formative processes) sustain and constitute boundaries, they don't erase them – they empower bodies and create a needful yet unironic freedom.

But more can happen because of this dialectics. The insect body *incorporates* air bubbles (*makes them body*) by going underwater (and crossing a boundary!). Organismic boundaries are processes that can shift topologically and even organizationally in concrete bodies. Multicellular organisms, in particular, show complex levels of interiority and layered boundaries that fluctuate functionally and materially not only in evolutionary but also in developmental and behavioural timescales (think of digestion, gut microbiota, pregnancy).

Is anything we add to a body immediately part of it? Are discreteness and cohesion sufficient criteria? No. Mutual enabling conditions must obtain. Caddisfly larvae build ornate protective casings from tiny stones and shells, but there is no evidence that casing cohesion is enabled by the larvae – two attached bodies rather that a case of incorporation. The situation is different if we look at the sensorimotor body; objects may be incorporated into it and remain external to the organic body; think of glasses or the blind person's cane (Di Paolo, Buhrmann, & Barandiaran, 2017). Boundaries are relative to the individuation process under consideration. Several individuation processes intersect in living bodies. We should be careful in defining them only in terms of inner cohesion.

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Ezequiel A Di Paolo is a Research Professor at Ikerbasque, the Basque Science Foundation. He has a background in physics and nuclear engineering and a DPhil in computer science and artificial intelligence from the University of Sussex (United Kingdom). His interdisciplinary work on the enactive approach to life, mind, and society integrates insights from psychology, cognitive science, phenomenology, philosophy of mind, and dynamical systems modelling. His recent research focus is on enactive theories of sensorimotor and linguistic agency.