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Can the mind be embodied, enactive, affective, *and* extended?

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Abstract In recent years, a growing number of thinkers have begun to challenge the long-held view that the mind is neurally realized. One strand of critique comes from work on extended cognition, a second comes from research on embodied cognition, and a third comes from enactivism. I argue that theorists who embrace the claim that the mind is fully embodied and enactive cannot consistently also embrace the extended mind thesis. This is because once one takes seriously the central tenets of enactivism, it becomes implausible to suppose that life, affectivity, and sense-making can extend. According to enactivism, the entities that enact a world of meaning are autonomous, embodied agents with a concerned point of view. Such agents are spatially situated, differentiated from the environment, and intentionally directed towards things that lie at a distance. While the extended mind thesis blurs the distinction between organism and environment, the central tenets of enactivism emphasize differentiations between the two. In addition, enactivism emphasizes that minded organisms are enduring subjects of action and experience, and thus it is implausible to suppose that they transform into a new form of life whenever they become intimately coupled to some new element in their environment. The proponent of enactivism and embodied cognition should acknowledge that life and affectivity are relational and environmentally embedded, but resist the further claim that these phenomena are extended.

Keywords Embodied cognition · Extended mind · Extended life · Extended affectivity · Enactivism

1 Introduction

For many years, the prevailing view among philosophers and cognitive scientists has been that mindedness is always and everywhere neurally realized. According to

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proponents of what Andy Clark (2008b) calls the 'BRAINBOUND' model, although the non-neural body does act as the sensor and effector system of the brain/CNS, consciousness and cognition are in no way *constitutively dependent* on the body or on elements of the surrounding world.

However, in the last several decades, a growing number of thinkers have begun to challenge BRAINBOUND. One strand of this critique comes from work on extended cognition, which claims that elements of the external world sometimes partially constitute cognitive processes. According to Clark's extended mind (EM) thesis "the actual local operations that realize certain forms of human cognizing include inextricable tangles of feedback, feedforward, and feed-around loops" that do not stay neatly in the brain, but instead span brain, body, and world (Clark 2008b, p. xxviii). Humans build and utilize physical structures that transform and enhance problem solving, and sometimes even pave the way for whole new forms of thought and reason (Clark 2008b, p. 63).

A second challenge to BRAINBOUND comes from theorists working in the field of embodied cognition, who argue that cognition is fully embodied and that its vehicles extend beyond the brain. According to Shapiro's (2001) "Constitution Hypothesis," the non-neural body plays a constitutive role, not merely a causal one, in cognitive processing. However, his claim is not that there is thinking "going on" in someone's lungs, or limbs, but rather that these non-neural constituents "must, like veins in a circulatory system, be integrated with other parts of a cognitive system in a way that certifies them as constituents of the system" (Shapiro 2001, p. 208). Along similar lines, Gallagher (2005) maintains that from the very beginning, consciousness is structured by embodiment, and that we engage with the world in the particular ways that we do as a result of the shape and form of our living bodies. Thus, there is "a unique, non-trivial, and cognitively limiting role for the body in the determination of mental states" (Kiverstein and Clark 2009, p. 2).

A third challenge to BRAINBOUND comes from the enactivist accounts presented by theorists such as Weber and Varela (2002) and Thompson (2007), which center on the notions of autopoiesis and autonomy.[1] In simplest terms, autopoiesis is the process whereby the constituent processes of living systems "produce the components necessary for the continuance of those same processes" (Thompson 2007, p. 98). Thompson's (2007) work explores how autopoiesis serves as the basis for the conscious minds of living organisms and describes living beings as autonomous agents that actively generate and maintain their own coherent patterns of activity. *Basic autonomy* is the capacity of a system to manage its own flow of matter and energy so that it can regulate and control both its own internal, self-constructive processes, as well as its processes of exchange with the environment (Thompson and Stapleton 2009, p. 24). Central to this enactivist view is the notion of *sense-making* and the idea that cognition is a process of ongoing, active engagement between a living organism and its surroundings. In this paper, I will focus in particular on how theorists such as Colombetti (2014) have developed another strand of enactivism that examines how sense-making is bound up thoroughly with *affectivity,* emphasizing that a living

[1] Theorists such as O'Regan and Noë (2001) have articulated an alternative theory of enactivism that centers on the way in which perception rests on knowledge of sensorimotor contingencies. However, my paper focuses primarily on what some theorists have called "autopoietic" or "autonomic" enactivism.

organism always makes sense of things from the standpoint of its own concerned perspective, in light of its *adaptive interests*.

No doubt it is important to distinguish between these challenges to BRAINBOUND and to recognize their differing theoretical commitments. Certainly one can maintain that cognition is *embodied* without also claiming that cognition is *enactive*. However, there is a natural affinity between these two approaches. Thompson (2007) has emphasized that the body that serves as a constituent in cognitive processes is a *living body*, i.e. a biological organism that dynamically engages with its environment. In his view, sense-making centrally involves three modes of bodily activity: self-regulation, sensorimotor coupling with the world, and intersubjective interaction (Thompson 2005, p. 408).

Likewise, Hanna and Maiese (2009) emphasize the connection between sense-making and the living body. Their Essential Embodiment Thesis has two logically distinct parts:

(1) the *necessary* embodiment of conscious minds in a living organism, and
(2) the *complete* neurobiological embodiment of conscious minds in all the vital systems, organs, and processes of our living bodies.

The first part emphasizes the deep continuity between mind and life (Thompson 2007), while the second part emphasizes how mindedness is shaped and structured by the fact of our embodiment. Thus, their approach can be viewed as an explicit formulation of how the embodied cognition research program might be combined with enactivism.

My central goal is not to defend the claim that the mind is fully embodied and enactive (a view I hereafter will refer to as 'EE'), since that would be too ambitious a project to take on in this paper.[2] Instead, I aim to discuss whether the proponent of EE should make the further claim that the mind is extended. While Wheeler (2010) maintains that there is deep tension between enactivism and the extended mind thesis (EM), theorists such as Di Paolo (2009), Colombetti (2015), and Thompson and Stapleton (2009) all maintain that EE is fully compatible with the non-bio-chauvinist approach of EM. What we need to do, in their view, is simply abandon a functionalist approach to mind and instead approach the questions posed by EM theorists from an enactivist perspective. This is because formulated in terms of Clark's parity principle, EM centers on the notion of multiple realizability. This principle says that "if, as we confront some task, a part of the world functions as a process which, were it to go on in the head, we would have no hesitation in accepting it as part of the cognitive process, then that part of the world is (for that time) part of the cognitive process" (Clark 2008b, p. 77). In Clark's view, the specific materiality of the substrate doesn't matter to cognition, outside of the fact that it must be able to support the required functional profile. However, as Shapiro (2004) very persuasively argues, this thesis of "body neutrality" is in tension with the notion that the mind is fully embodied. Notably, Clark (2008a) himself recognizes that that "we cannot stably reconcile functionalism and full-sensitivity to details of embodiment." And while Clark's formulation of EM begins with the question of whether cognitive processes (characterized in functionalist terms) can extend beyond the skin, the enactive approach begins with "the question of how a

[2] For a discussion of some of the key objections that have been raised against this account, see Thompson (2011).

system must be organized in order to be an autonomous system—one that generates and sustains its own identity and thereby enacts or brings forth its own cognitive domain" (Thompson and Stapleton 2009, pp. 23–4). But is there some other way to formulate EM, in non-functionalist terms, so that it is compatible with EE?

I will argue that theorists who embrace EE (e.g. Di Paolo and Colombetti) cannot consistently also embrace EM. This is because once one takes seriously the central tenets of enactivism, it becomes implausible to suppose that either life or affectivity can extend; and once one asserts that sense-making is bound up with life and affectivity, it follows that sense-making (cognition) likely cannot extend either. According to enactivism, the entities that enact a world of meaning are autonomous, embodied agents with a concerned point of view. Such agents are spatially situated, differentiated from the environment, and intentionally directed towards things that lie *at a distance*. While EM blurs the distinction between organism and environment, the central tenets of EE emphasize differentiations between the two. In addition, EE emphasizes that minded organisms are enduring subjects of action and experience, and thus it is implausible to suppose that they transform into a new form of life whenever they become intimately coupled to some element in their environment. The proponent of EE should acknowledge that sense-making is relational and environmentally embedded, but resist the further claim that it is *extended*.

2 Can life and affectivity extend?

Di Paolo (2009) maintains that moving past a functionalist account of the mind and approaching the questions posed by EM theorists from an enactivist perspective can provide us with novel tools and conceptual distinctions. However, Wheeler (2010) has argued that there is a deep tension between EM and EE that goes beyond functionalism and concerns the relationship between living systems and cognitive systems. He points to the account of Maturana and Varela (1980), who claim that autopoiesis is necessary and sufficient for life, and living simply is cognition. Wheeler points out that if we regard the living system as identical with the cognitive system, "then the boundary of the living system will coincide with the boundary of the cognitive system." An alternative way to understand the relationship between life and cognition is to suppose that cognition is a process of sense-making, and that living is just such a process. But as Wheeler points out, on an enactivist account, the meaning generated by adaptivity and sense-making needs to be connected to the self-distinguishing process of autopoiesis, whose boundary is the living system. (This is what enables meaning to be established as original to the activity of the system and not merely attributable to the system by some external observer.) According to Wheeler, because life cannot extend, and since an extended system cannot be, itself, a living system, enacted minds cannot extend.

2.1 Extended life

In response to Wheeler, Di Paolo (2009) argues that enactivism is indeed fully compatible with the non-bio-chauvinist approach of EM. According to the enactivist account, there is close connection between being alive and being cognitive: to be alive is to be capable of cognitive engagements. As Di Paolo is careful to note, though, autopoiesis on its own is not

sufficient for sense-making. In addition, the organism needs to be able to regulate its operations according to norms of viability. An *adaptive* autopoietic system is able to operate differentially, regulating its relation to the environment so as to respond to external perturbations and remain viable. What allows certain adaptive, autopoietic systems to be *agents* is their capacity to originate the regulation of structural coupling with the environment (Di Paolo 2009, p. 15). Thus, according to Di Paolo, it is clear that nothing like an internalist approach to mind is intended by enactivism. On this view, cognition is an embodied engagement that "involves the structuring of the immediate milieu with the consequent building of regularities, which feed back into the organism itself" (p. 12). Although Wheeler is justified in suspecting autopoiesis to mean that living systems are cognitive systems, and that a living system and a cognitive system are co-extensive, it is crucial to note that what matters is the *organizational boundary*, not the *physical boundary* of the organism. This is to say that autonomous systems are *operationally closed* and individuated according to boundaries established by relations of reciprocal influences among components. The constituent processes in living systems a) recursively depend on each other for their generation and realization as a network, b) constitute the system as a unity, and c) determine a possible range of interactions with the environment (Thompson 2007, p. 44). And because sense-making is *relational*, there is a sense in which it has no location. According to Di Paolo, such insights fit quite well with EM's claim that neither the organic brain nor the skin sets a boundary on the vehicles of cognition.

Within an operationally closed network, individual constituent processes depend for their continuation on the organizational network they sustain. Di Paolo points to insects like the water boatman, which are able to breathe underwater by trapping air bubble using tiny hairs in the abdomen. These bubbles "provide access to longer periods underwater thanks to a mediated regulation of environmental coupling," and this mediation "is so intimately connected with vital functions that the living system itself might be called extended" (p. 17). Di Paolo concludes that a life-mind system "may indeed involve the incorporation of relations of mediation (agential involvements that recur and self-sustain) into its own constitution" (p. 18). Here Di Paolo characterizes incorporation in processual, operational terms: the air bubbles count as part of the insect's living body because they participate in an operationally closed network of mutually sustaining precarious processes.

To support this claim, Di Paolo draws from Jonas' (1966) description of how novel forms of increasingly mediated engagements have appeared. For example, he notes how, with the advent of motility and the co-emergence of perception, action, and emotion, a new order of values (and a new form of life) is found in animality. This new form of life corresponds to a novel process of identity generation that is underdetermined by metabolism and thus cannot be directly addressed by autopoietic theory. The underwater breathing of insects, for example, signals the "authentic birth" of a new life form insofar as it involves "regulated engagements that are part of the constitution of a new identity" (Di Paolo 2009, p. 18). A structure (the air bubbles) mediates the organism's regulation of its coupling and reciprocal interactions with the environment, and this mediation is closely tied to its vital functions. After all, the air bubbles seem to be fully integrated into the adaptive autonomous organization of the aquatic insect. As the insect consumes the oxygen contained in the bubbles, a partial deficit is created, which then is compensated by dissolved oxygen that diffuses in from the water. This relation of mediation recurs and *self-sustains*, and can continue

indefinitely. Thus, the air bubbles are "intimately connected" and fully integrated into the organism's regulatory activity and vital functions.

Di Paolo notes that the new identity (the new life form) is not necessarily an extension of autopoiesis, but rather a different system. One might characterize this new 'insect-plus-air-bubbles' entity as a c*omposite autopoietic system*, one consisting of an adaptive autonomous (organic) system coupled to a non-autonomous (non-organic) system (Colombetti 2015). (Di Paolo goes so far as to say that there is a sense in which the agent I am when I'm swimming is different from the agent that I am when I'm taking a photograph.) Thus, living beings can extend insofar as they are composite systems made of organic and non-organic processes; and sense-making can extend insofar as it can be brought forth by this sort of composite system.

2.2 Extended affectivity

Building on Di Paolo's argument, Colombetti (2015) maintains that since sense-making is inherently affective and sense-making extends, affectivity can extend as well.[3] To make her case, she first points to the diving beetle: it is a sense-making system that brings forth a world of significance in virtue of its precarious adaptive autonomy. When it dives into a pond, "the air bubbles that the beetle traps on its hair are a mediating structure integrated into a new type of agent (a new form of life)" (Colombetti 2015). The world of significance of the air beetle thereby is enacted thanks to the mediation of the air bubbles, so that it makes sense of the world in a new way. While the *Umwelt* of the beetle-plus-air-bubbles has an attractive demand character, the *Umwelt* of the ant has a repelling demand character. Thus, an organism's environment can prompt or afford not only certain kinds of actions, but also affective states of attraction or repulsion. According to Colombetti, it is not that the air bubbles simply "enable" a new or altered affective state, but rather they help *constitute* one. The beetle's affective condition is extended in the sense that it is realized by the composite hybrid system "beetle-plus-air-bubbles."

Another example that Colombetti presents is that of the improvising saxophone player. In the act of playing, and through interaction with the saxophone, the musician achieves a certain mood. The musician and the saxophone then can be understood as coupled, and the musical instrument "can be seen as a mediating structure that has become part of the adaptive autonomous organization of a new, higher-order composite system constituted by the musician and his instrument" (Colombetti 2015). Colombetti maintains that the relationship between the musician and the saxophone is analogous to the relationship between the beetle and its air bubbles. There is a network of processes that determines what kind of emotional state the system is more likely to get into, and the saxophone is integrated into this network of processes (which also includes the musician's brain and body). For example, improvising on the saxophone might realize a mood of longing, and thereby make it more likely to undergo an emotion of nostalgia. Moreover, the relation of affective mediation between the musician and the saxophone is recurring and self-sustaining. On the basis of his affective state, the musician plays

[3] Some authors (e.g. Stephan et al. 2014 and Colombetti and Roberts 2015) have appealed to the parity principle to argue that affectivity can extend. In their view, some of the internal components of emotions have extrabodily functional equivalents. Although these arguments merit further consideration, here I set them aside. Because functionalism is in tension with EE, the enactivist needs to appeal to something other than the parity principle to show that affectivity extends.

certain kinds of music in a particular kind of way; this, in turn, amplifies and sustains a certain kind of affective state; and this puts the musician into a certain kind of mood, which impacts what he plays. This is especially true in cases of improvisation, where the musician's feelings "are shaped, moment by moment, by the novel musical form [he] and [his] instrument are bringing forth" (Colombetti and Roberts 2015, p. 1259).

Central to Colombetti's argument is the claim that sense-making is inherently affective. It is the *precariousness* of metabolic processes, in particular, which is crucial to the development of a concerned point of view. Similarly, in their discussion of enactivism, Weber and Varela (2002) characterize the organism as an "autonomous centre of concern" (p. 98). It is the "restless" character of the metabolic process, and the continuous efforts of the living system to get the necessary energetic and material resources, which pave the way for a point of view. In order to monitor and metabolically regulate themselves with respect to their conditions of viability, living systems must be able to discern what is suitable for their continuation (Colombetti 2014, p. 19). The ability to make sense of things involves "the capacity to be personally affected, to be 'touched' in a meaningful way by what is affecting one" (Colombetti 2015). Note that one need not be in a specific mood or emotional state to be in an affective state. Instead, there is a more basic mode of affectivity, which Colombetti (2014) calls "primordial affectivity," that is rooted at some basic level in the appropriative activity of metabolism. An entity that is *interested* in surviving, and *concerned* about getting the material resources it needs for its own continuation, projects this concern onto its surroundings. By defining itself and distinguishing between self and world, "the organism creates a perspective which changes the world from a neutral place to an *Umwelt* that always means something in relation to the organism" (Weber and Varela 2002, p. 118).

3 The tension between EE and EM

But does it truly make sense for the enactivist to suppose that life and affectivity can extend? In order to explore this question further, I introduce two new cases: a) Sally the scuba diving enthusiast, and b) Ed the improvising pianist.

First, consider Sally. Her scuba diving equipment provides "access to longer periods underwater thanks to a mediated regulation of environmental coupling" (Di Paolo 2009, p. 17), just as in the case of water boatman and the air bubbles. This mediation is intimately connected with vital functions: the equipment allows Sally to breathe while underwater. But let us further suppose that Sally makes use of highly sophisticated (not-yet-invented) equipment. As Sally consumes oxygen from the tank, a partial deficit is created, which is monitored by a sensor on the breathing apparatus. A high-tech oxygen diffusion system then takes in the appropriate amount of dissolved oxygen from the surrounding water, and converts it into breathable oxygen, so that underwater respiration can continue indefinitely. This is a precarious process in the sense that the workings of the breathing system require the rest of Sally's living body (in particular, her lungs, as well as her mouth and nose to take in oxygen from the tank) to continue. Likewise, Sally's breathing depends on the apparatus. Following Di Paolo's reasoning, her underwater breathing can be understood as an operationally closed network of precarious processes, so that the scuba diving equipment is incorporated as part of her living body.

Note that this case provides us with a putative example of not just an extended living system, but also extended affectivity. After all, Sally's *Umwelt* changes depending on

whether she is wearing her scuba diving equipment. When she is wearing the breathing apparatus, the underwater environment prompts and affords not just particular kinds of actions (e.g. swimming to get a closer look at a fish), but also affective states of attraction and repulsion, which in turn influences where she swims and what she observes underwater; and this, in turn, influences her affective condition. Sally's underwater *Umwelt* while wearing the breathing apparatus has an attractive demand character: the water seems comfortable and enticing, and is a place where there are things to be seen. The water may very well afford a different set of actions and affective states when she is not wearing the apparatus. It seems to follow, according to Colombetti's reasoning, that Sally's affective condition is extended "in the sense that its vehicles have integrated mediating structures into a new form of life" (Colombetti 2015).

Next, consider Ed the improvising pianist. In the act of playing the piano, and through interaction with his instrument, Ed achieves a certain mood. On Colombetti's account, the piano "can be seen as a mediating structure that has become part of the adaptive autonomous organization of a new, higher-order composite system constituted by the musician and his instrument." According to Colombetti, the relationship between Ed and his piano is analogous in certain respects to the relationship between the beetle and its air bubbles. Just as the air bubbles partially constitute a new form of life, the piano partially constitutes Ed's affective condition. This is because the process of playing it helps to realize a particular affective state, e.g. a melancholic mood, which in turn impacts the kind of music he plays (and thus it is analogous to the case of the improvising saxophonist which Colombetti claims is an example of extended affectivity).

Should the enactivist endorse EM in order to make sense of these two cases? One difficulty pertains to the structural features associated with affectivity and emotion. As noted previously, enactivist theorists maintain that affectivity and the capacity for possessing a concerned perspective are central to sense-making. According to EE, this concerned point of view is essentially embodied, and some of its key structural features (Thompson 2007) are rooted in this embodiment. An examination of these structural features reveals that living systems are spatially located, differentiated from their surroundings, and intentionally directed toward objects that lie at a distance. Such considerations, I will argue, make it difficult for the proponent of EE to claim that life and affectivity can extend and that initially non-organic elements can be incorporated (both operationally as well as phenomenologically) as parts of the living body or affective episodes. The second difficulty concerns Di Paolo's claim that a new form of life comes into existence in cases where an environmental structure mediates the organism's reciprocal interactions with its surroundings. I argue that this supposition is in tension with enactivism's commitment to the existence of persisting subjects of action and experience.

Taken together, these difficulties reveal an incongruity between EE and EM and indicate that enactivism is better paired with the hypothesis of embedded cognition (Rupert 2004). This hypothesis says that "cognitive processes depend very heavily, in hitherto unexpected ways, on organismically external props and devices and on the structure of the external environment in which cognition takes place" (p. 393). To suppose that both sense-making and affectivity are embedded is to regard environmental dependence as "*immediate* and *active*" (Stephan et al. 2014, p. 71), and as crucial for the continuation of those processes If this hypothesis is correct, then "we can properly understand the traditional subject's cognitive processes only by taking into account

how the agent exploits the surrounding environment to carry out her cognitive work" (Rupert 2004, p. 395). In my view, the enactivist ought to build on Rupert's hypothesis and seek to understand the ways in which life and affectivity are embedded, but resist the further claim that these phenomena are extended.

3.1 Spatiality, egocentricity, and intentional directedness

The concerned point of view posited by enactivism is spatially situated, egocentrically structured, and intentionally directed toward the surrounding world. Such considerations indicate that enactivism relies on a clear differentiation between organism and environment. However, the notion that a living organism can extend and incorporate non-organic elements of the environment blurs this distinction.

First, consider that the living body not only takes a single path through space, but also serves as the spatial point of origin for all perception and action. This spatiality is linked to autopoiesis and the self-production of a boundary between inner and outer. Autonomy and autopoietic organization are characterized by "a peculiar circular interdependency between an interconnected web of self-generating processes and the self-production of a boundary, such that the whole system persists in continuous self-production as a spatially distinct individual" (Thompson 2007, p. 101). In other words, this boundary is not simply a container for its constituent processes, but is also produced and maintained as a product of those very processes. Metabolism establishes a distinct "self" whose being is its own doing, with physical and organizational distinctions between inside and outside (Di Paolo 2005, p. 431). Insofar as this metabolic individuation establishes the system as a unity in space, the living organism does indeed have a location.

Thus, the notion that enactivism rejects the locational question (Stephan et al. 2014) is not quite accurate. It is true that cognition should not be understood simply as an event happening inside the system; instead, sense-making is a relational process that takes place between the autonomous system and its environment (Thompson and Stapleton 2009, p. 26). To describe internal neural processes as cognitive is indeed a "category mistake" given that it is whole living animals that think and feel. However, we *can* ask what does the enacting, and the answer is 'a living organism,' one which occupies a particular place that functions as the source and the "center" of sense-making processes. According to EM, this "center" can expand and the boundaries of the living organism can shift, so that a non-organic item, e.g. Sally's underwater breathing apparatus, becomes part of her living body. However, this supposition that Sally can extend out into the surrounding world is in tension with the notion that she is a bounded entity who exists apart from her environment.

This tension increases when we consider that the concerned point of view posited by enactivism has an egocentric structure and that the body serves as the "ego-pole" or "zero point" (Thompson 2007, p. 29) for perception and action. Research suggests that egocentric relations are central to spatial navigation, and that the ability to gauge an object's distance and direction in space requires knowledge of how one's sensory input will change when performing actions (O'Regan and Noë 2001). According to proponents of EE, this egocentric structure is grounded in the processes and dynamics of living organisms (Maiese 2015). Autonomy and autopoiesis entail the production and maintenance of a dynamic identity (a bodily self) in the face of material change in the

environment. By virtue of 'operational closure,' autopoiesis establishes a pole of internal identity in relation to a pole of an outside world. Because the generative activity of the living system "demarks what is to count as part of the system and what belongs to the environment" (Froese and Di Paolo 2011, p. 6), it has an essentially self-constituted identity that it affirms by *differentiating itself from its surroundings*. Autonomy, understood as "a self-defining process that establishes the uniqueness of a system as differentiated from all other surrounding processes" (Arnellos et al. 2009, p. 6), thus requires a distinction between the components that *constitute* the living system and elements that form *its environment*. While EM blurs this distinction, the notion that living systems are *embedded* allows us to preserve the important insight that autopoiesis involves both self-production (via regulated engagement with the environment) as well as self-distinction. This is to say that the living system would not survive or function in the way it does without the causal contribution of elements of the surrounding world; and yet these non-organic elements are not constitutive parts of the living system.

The notion that living systems are embedded (rather than extended) also better accommodates the intentional directedness of those systems. On the enactivist view, the concerned point of view associated with affectivity and emotion has an intentional structure, which emerges out of autopoiesis and adaptive sense-making (Thompson 2007, p. 159). It is from the point of view established by its self-affirming identity that an organism evaluates and makes sense of all that it encounters. In a basic biological sense, intentionality involves openness to the world. The autopoietic process demands matter and energy and requires that the living system regulate its boundary conditions and seek to actualize future conditions that will contribute to its regeneration and survival. Particular elements of the external world thereby are constituted as significant by the system's self-organizing activity and internal structure (Di Paolo 2005, p. 443). Enactivism emphasizes that the body is that *in and through which* the living animal is directed toward the surrounding world during both perception and action. Such intentional directedness requires that we preserve the differentiation between living body and world.

First, consider hermit crabs, which are coupled extensively to environmental resources: they adopt shells as portable protective hideouts and also make use of sea anemones for further protection. Thus, there is an important sense in which they extend their natural abilities through the appropriation of the environmental resources. However, as Dempsey and Shani (2013) note, "the relation of the crab to the sea anemone is a function of the situation in which the crab finds itself" (p. 842). In some instances, the crab uses the sea anemone as extra protection by locating it on top of its protective shell. In cases where it's deprived of the protective shell, the crab tries to crawl into the anemone and dwell in it; and when the crab is starving, it feeds on the anemone. It is clear, then, that the coupling relationship between the crab and the sea anemone changes depending on the situation, and "as a function of the situated meaning" (p. 842). But situated meaning for whom? For the living organism, of course. It is the crab's embodied mind "whose integrity remains intact despite radical changes in environmental couplings" (Dempsey and Shani 2013, p. 842). Similarly, suppose that Ed initially encounters the piano as something that affords a particular kind of action and affective stance. Later in the day, he might construe the piano differently, as a piece of furniture that he can use to block the door when burglars threaten to enter his home. But why not conclude that the boundary that distinguishes the living organism

from the environment is a shifting boundary that can sometimes be drawn in such a way that elements of the environment fall inside of this boundary? In that case, an environmental resource might sometimes be part of the living organism, while at other times the organism is intentionally directed toward that element. But this blurs the distinction between the source of intentionality and that toward which it is intentionally directed. The fact that there is a centre of sense-making which remains intact across a wide range of intentional engagements with the environment indicates that living organisms are closely coupled with, yet remain separate from, objects in their surroundings. After all, although sense-making does indeed loop out into the world, it does not stand on its own. Instead, "it requires an entity that is doing the processing" (Baker 2009, p. 646); and whatever "self-stimulating loops of interaction with worldly materials" (Colombetti and Roberts 2015, p. 1248) take place must, on the enactivist view, be driven by a living body that remains distinct from those materials. To acknowledge that "situated activity takes the form of cycles of sensorimotor coupling with the environment" (Thompson and Varela 2001, p. 424), we need not maintain that a musical instrument can become a constitutive part of Ed's living body or affective episode. Instead, given how enactivism emphasizes that an organism constitutes and affirms its identity by differentiating itself from its surroundings, the proponent of EE should investigate the ways in which sense-making is environmentally *embedded*.

3.2 Phenomenological differentiation and distance

Di Paolo and Colombetti maintain that non-organic items can be incorporated not just in an operational sense, but also in a phenomenological sense. Indeed, Colombetti's central claim is that elements of the surrounding world, e.g. the saxophone, sometimes help to constitute someone's affective condition. However, on the enactivist view, living organisms are not only spatially situated and autonomically differentiated, but also *phenomenologically differentiated* from their surroundings. This phenomenological differentiation makes it difficult for the proponent of enactivism to claim that life and affectivity can extend.

According to enactivism, "organismic processes of self-regulation aimed at sustaining and enhancing adaptive autonomy in the face of perturbing environmental events" (Thompson and Stapleton 2009, p. 27) pave the way for a sense of *inner presence* (a sense of self) that is separate from and yet dependent upon its surroundings. This is because the autonomous and adaptive organization of a living system sets up an *asymmetry* between it and the rest of the world such that it realizes a perspective or point of view from which its surroundings acquire meaning for it (Colombetti 2014 pp. 19–20). Living organisms transcend the material that realizes them, and "there is inwardness and subjectivity involved in this transcendence" (Jonas 1966, p. 84). Along these lines, Thompson (2005) describes subjectivity in terms of a phenomenal feeling of bodily selfhood linked to a correlative feeling of *otherness* (p. 419). To see the phenomenological differentiation between Sally and her scuba diving equipment, note that she does not have the same phenomenal access to the breathing apparatus that she does to her own body. This is because there is a kind of "inwardness" to her living body that gives her direct access to her own concerned perspective, and this "inwardness" simply is not present in the breathing apparatus. Similarly, Ed has phenomenal access to his own agency and felt desires in and through his fingers and vital organs, and his emotions and desires are experienced throughout his body (e.g. in and through heart

rate, blood pressure, breathing, and skin conductance); but this sort of subjective, agential transparency is not felt in the piano keys, the hammers, or the treble strings. What is more, whatever feelings of nostalgia are generated by Ed's improvisation may very well persist, and continue to influence his actions and interpretations, even once he steps away from his piano. However, it is absurd to suppose that such emotions can persist if Ed steps away from his body (and difficult to imagine what this even would entail). Such considerations indicate, once again, that the relationship between Ed and his body is fundamentally different from (and far more intimate and integral than) the relationship between Ed and his piano.

One might object, however, that some environmental resources do exhibit a high degree of phenomenal transparency. Thompson and Stapleton distinguish (following De Preester 2008) between "mere extension" and "incorporation" (p. 29). We use various tools to extend our abilities, but tools that the body "incorporates" have a phenomenologically different status. What the authors have in mind is a sort of subjective, agential transparency: tools that the body incorporates no longer are experienced as objects; rather, the world is experienced in-and-through them. They note that the classic example is Merleau-Ponty's (1962) case of the blind man with his cane: once he becomes skilled at using it, he experiences the world at the end of his cane. This sort of transparency also occurs for prosthetic limb wearers, so that the prosthetic limb is *incorporated* into the body. Thompson and Stapleton propose the following principle: "for anything external to the body's boundary to count as part of the cognitive system it must function transparently in the body's sense-making interactions with the environment" (p. 29). Both the nervous system and body are compositionally plastic in the sense that they can incorporate processes, tools, and resources that go beyond what the biological body can generate metabolically. Thus, these authors side with Di Paolo in claiming that "the enactive approach allows that the living system considered metabolically can constitutively include resources and processes beyond its body" (p. 28).

Their account raises a question about what it takes for something external to the body's boundary to "function transparently in the body's sense-making interactions with the environment." Thompson and Stapleton propose that the body and environmental resource must be tightly coupled, and also that their interaction be self-sustaining. Although biological attachment is not required for such transparency, some kind of intimate coupling with the body's autonomous dynamics is needed. Interestingly, though, Thompson and Stapleton go on to acknowledge that for this to occur, the environmental resources must be subject to active regulation by the body; and here the authors note that "the body has to be capable of leading the dance" (p. 29). Indeed, this claim that the body assumes a privileged status in agency and sense-making seems to be central to the enactivist approach. Although the piano is involved in Ed's sense-making in a crucial way, the body still assumes center stage. The experience of playing the piano that is "for the subject" (Thompson 2005, p. 420) is first and foremost a bodily experience, and according to enactivism, the connection between Ed and the piano must always be mediated by the living body. It is not clear, though, that something external to the body's boundary ever has the same kind of phenomenal and agential transparency as the living body. Note that this applies even to the prosthetic limb: even once it has been fully integrated into a subject's sensorimotor repertoire, there will remain some notable degree of phenomenological differentiation: removing the prosthetic limb is fundamentally different (in an experiential sense) from removing an organic limb.

Of course it is true that non-organic items in the surroundings world often play a crucial *causal role*, and certainly they profoundly influence the way that the world is

experienced. After all, we cannot explain the overall phenomenal character of Ed's emotional episode without pointing to the activity of the whole loop (Ed + piano). However, all this shows is that the episode is causally dependent on the piano, and thus that the piano will play a central role in causal explanations, and not that the piano is literally a constituent part the episode's phenomenal character. To suppose that we have a case of extended affectivity whenever elements of the environment play an active role in driving affective processes is to commit is to commit the so-called "coupling-constitution" fallacy (Adams and Aizawa 2009) with respect to affective states. Now, according to Colombetti, we have extended affectivity only in the event that the affective mediation between the musician and his instrument is recurring and self-sustaining, so that there is operational closure. The question is whether the use of the musical instrument involves a) affective processes causally interacting with portions of the non-affective environment, or b) affective processing throughout. And given the enactivist's commitment to the idea that there is something distinctive about the living body, namely its phenomenal transparency, it becomes difficult for the proponent of EE to argue that the felt quality of affective episodes can extend. Instead, it makes more sense for the enactivist to characterize the relationship between Ed's affective condition and his piano as one of deep and reciprocal causal dependence.

In addition, the fact that objects lie *at a distance* from the organism is central to the way that animals experience their own agency. Along these lines, Barbaras (2010) emphasizes the importance of movement and the distance between a living organism and what it needs to sustain its existence. Drawing upon the work of Jonas (1966), he suggests that although plants and animals share some minimal mode of bodily sensitivity, they have different modes of consciousness. Because plants are linked to their source of nutrition by way of direct contact, there is minimal temporal or spatial delay between need and satisfaction. For an animal, on the other hand, there is greater spatial and temporal distance separating it from the matter it requires to stay alive. Among more sophisticated animals, an internally-mediated mode of proprioception helps to establish an even greater sense of spatial distance between the living animal and its environment. There is separation from sources of food, noxious elements, alien creatures, or other environmental features; and movements *toward* or *away from* bridge this separation. Their separation from objects that are "over there" or "not yet" opens up a space for perception and movement, and also paves the way for *concern, interest,* and conscious desire. This is the beginning of valenced bodily feelings of attraction or repulsion that help to give rise to a sense of agency.[4]

Thus, it is distance (both spatial and temporal) between the animal's egocentric perspective and the surrounding world that helps to create a space for the sort of *conative affectivity* associated with a concerned point of view. An animal with this more sophisticated, internalized proprioceptive capacity has an immediate sense of moving its limbs or changing its body position on its own through intentional agency, or at least of being able to do so; or it has a sense of being moved or changed by something else. This gives the animal a sense of itself *as separate from, yet actively meshed with, its surroundings*. Its felt needs and desires are felt *here*, while the objects it wants (or wants to avoid) are located *over there*. The sense of a spatial gap between the animal and its

[4] More might be said about the how Barbaras' comments about distance relate to recent debates concerning the sense of agency and the sense of ownership. However, there is not sufficient space to explore this here.

environment calls forth goal-directed movement and efforts to bring the world in line with what the animal wants and needs. This results in interactive cycles of sensorimotor adjustment and establishes "a novel relational domain that can be traversed by means of behavior or action" (Froese and Di Paolo 2011, p. 10). One obvious example is how the feeling of hunger results in the desire for, and active pursuit of, food. All this suggests that there is a clear link between desire and agency, and that the sense of agency involves phenomenological differentiation and separation between the animal and its surroundings. Likewise, at a higher level of sophistication, there is good reason to think that an agent, as "an autonomous centre of concern" (Weber and Varela 2002 p. 98), experiences a sense of distance from her cognitive and affective props, though of course she experiences no such gap between herself and her body. Suppose that as Ed plays the piano, a saxophone sits next to him. At this point, the saxophone clearly is separate from him; it is "over there" and "not yet," but we can imagine that Ed glances at the saxophone, discerns that it *affords* (Gibson 1979) certain possibilities for action and affectivity, and is drawn toward it. What happens when Ed steps away (withdraws) from the piano and acts on his desire to improvise on the saxophone? Earlier, he experienced the saxophone as an object located at a distance, but as he begins to play it, he becomes much more intimately coupled with it, so that it modulates his sense-making and affective condition. A few moments earlier, however, it was the piano (which now lies at a distance) that modulated the shape and character of his activity. The experience of agency rests on this ability to engage with the world with the help of different instruments at different times, and "derives from the ways in which we establish, lose, and re-establish meaningful interactions between ourselves and our environment" (Buhrmann and Di Paolo 2015). Phenomenologically speaking, we do not experience our living bodies as seeping out into the environment or as having fluctuating boundaries. Instead, agents experience themselves as separate from, yet deeply embedded in the surrounding world, and as actively modulating their interactions, so that they can establish different relationships to their environment at different times. Sometimes this environmental coupling is much more intimate and vivid, while at other times we feel more detached from environmental resources. However, the living body always has a phenomenal and agential transparency that environmental resources do not.

3.3 Forms of life and enduring subject-agents

Another tension between EE and EM concerns the supposition that composite systems of the sort that Di Paolo and Colombetti describe usher in new "forms of life." Consider the diving beetle: according to Di Paolo and Colombetti, there is one "form of life" when the beetle is walking on the ground and a distinct "form of life" when the beetle dives underwater. Along similar lines, what Clark and Chalmers (1998) call "extended selves" are relatively transitory couplings of biological organisms and non-organic items of the environment. But should an enactivist maintain that a tool that is temporarily in use can allow a new "form of life" to come into being, so that the self extends?

Note some of the implications of this proposal. Given that the scuba diving equipment allows Sally to breathe underwater, and that it participates in an operationally closed network of precarious processes, this counts as an instance of an extended living organism on Di Paolo's account. However, if we suppose that these mediated

engagements with the environment "are part of the constitution of a new identity" (Di Paolo 2009, p. 18), then this seems to lead to the conclusion that Sally is one lifeform or self while scuba diving, and another lifeform or self while walking along the beach. To suppose that a new lifeform or self comes into existence when Sally puts on her scuba diving equipment is metaphysically extravagant, to be sure. Moreover, the claim that transitory hybrids composed of varying organic and non-organic elements qualify as living organisms may be in tension with basic biology and evolutionary science.

But even more importantly for the present discussion, the claim that composite systems can usher in new "forms of life" is in tension with the enactivist's supposition that there exist enduring agents and subjects of experience. This claim is in tension, for example, with the notion that there is a single point of view or locus of concern and action that persists regardless of whether Sally is scuba diving or walking on the beach, or even if she enters into some new kind of "mediated regulation of environmental coupling." Central to enactivism is the recognition that there exist enduring subjects of experience and agency, and that this capacity for subjectivity and agency is rooted in the dynamics of the living body. Whereas autopoietic closure brings forward a minimal "bodily self" at the level of cellular metabolism, sensorimotor closure produces a "sensorimotor self" at the level of perception and action (Thompson 2007 p. 48–49). Di Paolo (2005) describes an agent as "a self-constructed unity that engages the world by actively regulating its exchanges with it for adaptive purposes that are meant to serve its continued viability" (p. 443). This "concern to preserve life" is connected to the supposition that the agent persists as a living organism that is concerned about its continuation and projects this concern onto its surroundings (Di Paolo 2005, p. 443). Both activity and perspective are *asymmetrical* concepts: they point to both a self-regarding actor as well as that which is acted upon. Di Paolo goes on to suggest that there is kind of self-sustaining, self-generating dynamic form in animal behavior and in neural and bodily activity that is reflected in postural habits, perceptual invariants, and organized action (2005, p. 446). Certain behavior patterns develop and are conserved because they help the organism to maintain itself.

Along these lines, Froese and Di Paolo (2011, p. 18) maintain that sense-making involves "the adaptive preservation of a dynamical network of autonomous sensorimotor structures sustained by continuous interactions with the environment." One paradigmatic example of these autonomous structures are habits, which encompass parts of the nervous system, physiological and structural systems of the body, and patterns of behavior. Over time, these patterns of movement and behavior become more engrained and play a significant role in shaping an agent's habitual manner of engagement with the environment. Along similar lines, Colombetti (2014) describes emotional expression as a "coordinative structure" and maintains that "adult expressions can be characterized as relatively recurrent and fixed patterns whose specific shape has been carved in development as certain structures occurred more frequently" (p. 62). This includes breathing patterns, facial expressions, and characteristic gestures. Over time, different elements of the musculoskeletal system become "entrained" and exhibit particular configurations that depend on both external and internal constraints.

Building on these ideas, what Buhrmann and Di Paolo (2015) call 'sensorimotor coordinations' are particular sensorimotor patterns that an agent reliably uses to perform a task, and which depend on that agent's environment, body, and context; and what they call 'sensorimotor strategies' or 'schemes' are organizations of several of

these sensorimotor coordinations, which typically are deployed against the backdrop of some normative framework (e.g., considerations of efficiency). Among creatures that are sufficiently neurobiologically complex, these highly integrated patterns of behavior and response become quite extensive and sophisticated; and they not only constrain and modulate behavior, but also allow for new forms of coordinated activity that were not possible before. This indicates that among human animals, a new form of autonomy and agency, one which is underdetermined by biology and autopoiesis, can arise at the behavioral level. Examples of highly coordinated activity include dance, sport, driving a car, using tools and technology, social engagement, and working together with others to achieve a task. As Di Paolo (2005, p. 28) notes, "cultural interaction provides the foundation for cumulatively building on previous more or less viable ways of living," and this is because a minded animal's engagement with a culture gives rise to more developed habits. As a subject's "existing repertoire of sensorimotor schemes is modulated or transformed over time such as to address new behavioral challenges" (Buhrmann and Di Paolo 2015), she exhibits new styles and modes of agency.

In the case of Ed the improvising pianist, what we see are new forms of sense-making that are underdetermined by metabolic values. One might suppose that the identity that is at stake in this piano-playing case involves values related to Ed's project of being a good piano player, and that it is this project that is sustained over time through his activities. One might conclude that the composite system of Ed + piano exhibits autonomy and operational closure and thus yields an instance of extended sense-making.

It's true that if we want to describe Ed's experiences and psychological life, we can speak in some loose sense of his "identity as a piano player." However, Di Paolo and Colombetti do not argue simply that Ed exhibits a new style or mode of agency, since this would be insufficient to establish that there is extended sense-making. (Remember that from an enactivist perspective, metabolic values serve as the foundation and origin of sense-making, and processes of biological regeneration are what establish a distinct "self" whose being is its own doing; thus, to show that sense-making extends, we need to show that life extends.) Instead, they maintain that Ed's mediated engagements with the piano are part of the constitution of a new *form of life,* so that Ed + piano qualifies as an extended living organism. Likewise, if Ed makes use of the high tech scuba diving equipment described earlier, he qualifies as a distinct extended organism or life form. The upshot seems to be that Ed + piano is one kind of extended living organism while piano playing, and Ed + breathing apparatus is another kind of extended living organism while scuba diving. But in that case, it is unclear how to accommodate the idea that Ed, as a living human organism, endures through time regardless of whether he is playing the piano.

Of course I do not deny that the environment plays a central role in the formation of Ed's sensorimotor schemes or that habits often are thoroughly embedded in a particular socio-cultural context. This is to say that such sensorimotor schemes are deeply dependent on, and require the causal contribution of, cultural and contextual factors. What is more, agents often are involved in regulating their own coupling with the environment so as to influence the formation of particular sensorimotor schemes (for example, they may arrange their work environment so as to encourage good habits) (Buhrmann and Di Paolo 2015). Along these lines, Sterelny (2010) emphasizes how subjects often "intervene in their environment, shaping it in ways that improve the adaptive fit between the agent and the world" (p. 466). However, this is to say that

these sensorimotor schemes and habits are causally supported (scaffolded) by external resources and formed in large part via ongoing interaction with the environment. We need not make the further claim that elements of the environment are incorporated as constitutive parts of these schemes.

What is more, in order to preserve the notion that a human animal can persist as an enduring subject of experience, the proponent of EE ought to resist the more radical claims that life, sense-making, and affectivity all extend. After all, on the enactivist view, sense-making is fully embodied and fundamentally affective, and thus there is a link between being an enduring subject-and-agent and exhibiting a concerned point of view. A conscious subject, in feeling and caring about things, also inherently cares about her own well-being; and this implies that there exists a persisting subject of experience to care about. For example, Sally's concerned perspective serves as the locus for her changing perceptions, bodily sensations, feelings, and motivations, so that she persists over time throughout her various modes of engagement. However, the "shifting and transitory hybrids" (Baker 2009, p. 656) posited by EM do not allow for Sally to exist as an enduring life form with an ongoing experience of agency and subjectivity.

Note that we still can acknowledge that Sally's *Umwelt* changes depending on whether she is wearing her scuba diving equipment. However, all this shows is that the mediating structure (the underwater breathing apparatus) plays a crucial causal role insofar as it enables a new or altered affective state. Then we can say that Sally enacts one sort of *Umwelt*, from her particular point of view, while walking along the beach, and another sort of *Umwelt*, from that same concerned point of view, while scuba diving. However, some of Sally's basic concerns remain very much the same throughout: she wants to stay alive and to be free of pain and discomfort. If we were to ask about Sally's more cognitively sophisticated wants, we'd find that a wide range of her desires remain constant regardless of whether she is walking along the beach or scuba diving: for example, suppose she aspires to open her own business, travel to Australia, and marry her long-time love interest.

Di Paolo (2009, p. 18) is correct that "what an organism is and what it does should not be properties external to each other," but what seems to be so striking about the human form of life is the ability to move, fluidly and flexibly, between different sorts of enactments, in different sorts of environments, while making use of a diverse range of environmental resources. In part, it is Sally's ability to make use of different environmental resources at different times, and to thereby scaffold and augment her cognitive and affective capacities, which makes her the rational, human lifeform that she is. This is to say that Sally is capable of exhibiting different styles of agency at different moments, and that environmental resources (such the breathing apparatus) often play a crucial causal role insofar as they *enable* a new or altered style of agency. However, we should not posit distinct life forms to explain this.

4 Conclusion: Embodied, enactive, affective, and embedded

Enactivists maintain that because the particular details of an organism's embodiment lead it to become dynamically coupled with some aspects of its surroundings rather than others, the world appears to it as a value-laden environment. Thus, it is true that enactivists construe cognition as relational. However, we can hold on to the insight that

cognition is "sense-making in interaction" and resist a purely internalist account of cognition and affectivity without supposing that life is extended. Indeed, the hypotheses that life, sense-making, and affectivity are all *embedded* can accommodate these externalist insights, and deserve further investigation.

It is true that environmental resources set up, drive, and energize our affective lives (Slaby 2014), and also amplify and sustain cognition. Sally may want to put on her scuba diving equipment so that she can stay underwater and look at beautiful fish. Once she puts on the breathing apparatus, it supports and amplifies her sense-making capacities, and also alters the affective character of the underwater environment. By further examining how sense-making and affectivity are *embedded*, we still can do justice to the notion that the surrounding world is not simply part of the causal background, but rather plays a *central causal role* in the evocation and expression of various cognitive and affective states. This can allow us to acknowledge that there are "complex, cognition-sustaining interactions between organism and environment" (Rupert 2004, p. 396) while still respecting enactivism's commitment to the distinction between organism and world. It is unclear what explanatory value is gained (Rupert 2004) by making the further claim that Sally's affective condition is extended or that her identity as a life form is constituted partly by processes that extend beyond her living body. Moreover, adopting the less radical hypothesis that cognition and affectivity are embedded can allow the proponent of EE to avoid many of the objections that have been raised against the extended mind thesis (Sterelny 2010).

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