

# Introduction: Mind Embodied, Embedded, Enacted: One Church or Many?

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It is increasingly commonplace, both in philosophy and the many sub-disciplines of Cognitive Science, to encounter work said to reflect a vision of mind as ‘embodied and environmentally embedded’.<sup>1</sup> The phrase itself seems to have been coined by John Haugeland in a similarly titled paper that was circulating widely in the early 1990s<sup>2</sup> and that later appeared as Haugeland (1998). There, Haugeland writes that:

If we are to understand mind as the locus of intelligence, we cannot follow Descartes in regarding it as separable in principle from the body and the world ... Broader approaches, freed of that prejudicial commitment, can look again at perception and action, at skillful involvement with public equipment and social organization, and see not principled separation but all sorts of close coupling and functional unity ... Mind, therefore, is not incidentally but *intimately* embodied and *intimately* embedded in its world (1998, pp. 236–237).

This passage is remarkably rich in content and pregnant with possibilities. It mentions body, perception, action, skill, equipment, social organization, close coupling, and functional unity. And all of these threads are indeed represented in various approaches gathered under the sheltering umbrella of the embodied, embedded mind. Such projects include (but are by no means exhausted by):

work on ‘wide computationalism’, externalism and the nature of psychological explanation (Wilson 2004); work on ‘active externalism’ and the extended mind (Clark and Chalmers 1998; Clark 2008b); work on ‘enactivism’ and the continuity of life and mind (Varela et al. 1991; Thompson 2007); work on ‘sensorimotor accounts of perception’ (O’Regan and Noë 2001; Noë 2004); work on environment-involving accounts of perception, memory, thought and language (Rowlands 1999); work on the interdependence of conscious perception and action (Hurley 1998); work on deictic pointers and active vision (Ballard et al. 1997); and work on the complementarity between biological and technological resources (Clark 2003).

Given this large surface diversity, it seems fair to ask what, if anything, forms the deep theoretical core of the embodied, embedded approach? Equally importantly, we may ask to what extent the various projects pursued under the single umbrella are in fact harmonious? Thus Clark (2008a, b) suggests a possible tension between at least two strands of thought prominent in the recent literature. One of those strands depicts the body as intrinsically special, and the details of a creature’s embodiment as a major and

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<sup>1</sup> A very modest sampling might include Varela et al. (1991), Clark (1997), Haugeland (1998), Hurley (1998), Clark and Chalmers (1998), Rowlands (1999), Lakoff and Johnson (1999), O’Regan and Noë (2001), Shapiro (2004), Wilson (2004), Noë (2004), Gallagher (2005), Clark (2008b). For some critiques, see Adams and Aizawa (2001), Grush (2003), Rupert (2004), Adams and Aizawa (2008). It should go without saying that many if not all of the key ideas have longer and much more varied pedigrees. For a brief survey of these historical roots, see Clark (1997, chap. 8, sect. 8).

<sup>2</sup> This paper was first presented at an Academia Sinica meeting in Taipei in 1993. It appeared in a volume following that meeting (Houng and Ho 1995). The version quoted in the present text is the one found in Haugeland (1998).

abiding constraint on the nature of its mind: a kind of *cognitive body-centrism*. The other depicts the body as just one element in a kind of equal-partners dance between brain, body and world, with the nature of the mind fixed by the overall balance thus achieved: a kind of *extended functionalism* (now with an even broader canvas for multiple realizability than ever before). If this is right, then where some theorists of embodiment see a unique, non-trivial, and cognitively limiting role for the body in the determination of mental states, some theorists of embedding see only a larger functional whole with considerable slack concerning which operations are performed using which kind of resource. Other points of possible conflict concern the importance (or otherwise) of life, self-organization and ‘autopoiesis’, and the vexed question of the precise role of body and world in the construction of conscious experience.

In short, there are many straws in this otherwise quite refreshing wind. Are they merely different ways of exploring and fleshing out a common project, or does that large and sheltering slogan (mind as ‘embodied, embedded, enacted’) hide points of deep (perhaps even irreconcilable) disagreement about the nature of mind and the shape of a mature cognitive science? These are among the questions that the papers in this special issue aim to address.

## 1 The In/Compatibility of Extended Functionalism and Enactivism

The first two papers by Di Paolo and Thompson and Stapleton take up a debate between extended functionalists and enactivists initiated by Wheeler ([in press](#)), the contours of which we will briefly outline in a moment. First some words on the meaning of *enaction*, a term that has been assigned multiple meanings by different theorists.<sup>3</sup> Di Paolo and Thompson and Stapleton use the term *enaction* to refer to the process by which an organism “brings forth” meaning or significance on the basis of its autonomy. We will follow Di Paolo ([this issue](#)) in characterizing autonomy as a property of “a system composed of several processes that actively generate and sustain an identity under precarious circumstances” (Di Paolo [this issue](#)). Autonomous systems exhibit self-organising dynamics maintaining their organisation and thus establishing a boundary between themselves and the world. Enactivists claim that a system maintains its organization by regulating its interactions with its environment. Certain interactions with the world threaten the system’s organization, while other types of interaction with the environment contribute to the ongoing maintenance of the system’s organisation. An autonomous system that seeks out

only those interactions that contribute to its continuation, and avoids those interactions that threaten its survival will, it is claimed, exist in a world in which things have a meaning or value. *Enaction*, in this context, refers to the process by which meaning and value are said to be brought forth through the viable coupling of an autonomous system and its environment.

Wheeler ([in press](#)) argues that enaction so construed is incompatible with extended functionalism. Extended functionalism claims that externally located objects, such as pen and paper, can be exploited in problem solving to form proper parts of a cognitive process. Cognitive processing can sometimes include operations and capacities provided by the extraorganismic environment. Wheeler argues that enaction can be understood in two ways neither of which is compatible with cognitive extension so construed. On the first reading the enactivist is committed to the claim that life and cognition are identical. All living systems are *autopoietic* systems that produce and maintain a physical boundary that distinguishes the system as a material unity from its surrounding environment. Sense-making is required for maintaining an autopoietic system’s boundary in the face of perturbations from the system’s environment. Sense-making, according to the enactivist, just is cognition. Thus it follows that all living systems are cognitive systems. If living systems and cognitive systems are identical, both systems must have boundaries that coincide. However the boundaries of the living system are the physical boundaries of the organism. If extended functionalism is correct, the boundaries of the cognitive system can criss-cross the physical boundaries of the organism. This is precisely what the enactivist cannot allow; at least this implication will follow if we take the enactivist to be committed to the claim that life and cognition are identical.

There is however a weaker reading of enaction according to which cognitive systems are a subset of living systems. In his contribution to this volume Di Paolo claims that the relation between life and cognition is not one of equivalence but rather any system that is living is also “a system capable of cognitive engagement” (Di Paolo [this issue](#)). Autopoiesis isn’t sufficient for sense-making, since it buys only a kind of robustness or conservation of organization in the face of environmental perturbation (Di Paolo 2005, [this issue](#)). Wheeler points out however that even if we grant autopoiesis isn’t sufficient for cognition (understood as sense-making) still an enactivist must hold that being a cognitive system is sufficient for being a living system. Di Paolo must still count autopoiesis as necessary for cognition even if he denies that it is sufficient for cognition. Now we can generate the same incompatibility between enactivism and extended functionalism. If cognitive extension is possible then an extended cognitive system must also be an autopoietic system. However the boundaries of an autopoietic system are the

<sup>3</sup> For a useful overview see Torrance (2005).

boundaries of the organism. The boundaries of an extended cognitive system are not however the boundaries of the organism. Thus the autopoietic system cannot be an extended cognitive system.

In his contribution to this volume Di Paolo agrees with Wheeler that extended functionalism is incompatible with enactivism, but not for the reasons that Wheeler has given. We will look at his reasons in the next section. First we want to cast a critical eye on his attack on extended functionalism. Di Paolo begins by taking the extended functionalist to task for their failure to provide an adequate definition of a cognitive process. Di Paolo claims that the only criteria the extended functionalist proposes for determining whether a process is a cognitive process is the parity principle. However the parity principle as Di Paolo understands it is fundamentally at odds with the extended functionalist's questioning of the boundaries between cognition, body and world.

It is true that extended functionalists appeal to the parity principle to determine when externally located entities form a part of cognitive processing. They begin by finding situations in which an organism is coupled with an external entity that seems to be playing a causal role in generating its intelligent behaviour. The parity principle tells us that if this entity forms a part of a process that "were it to go on in the head, we would have no hesitation in accepting as part of a cognitive process" (Clark and Chalmers 1998, p. 8) then this entity forms a part of cognitive processing. Di Paolo reads the parity principle as claiming that a process counts as cognitive if we would call it cognitive were it to happen in the head. He suggests this must induce a kind of "schizophrenia" in the extended functionalist. On the one hand the extended functionalist is committed to saying that the skull boundary doesn't have any significance when it comes to determining whether a process is cognitive or not. On the other they propose a test of whether a process is cognitive that takes as its standard, similarity to processes that take place within the boundary of skin and skull.

Di Paolo's attack on the parity principle finds an echo in both Thompson and Stapleton's and Gallagher and Crisafi's papers. Like Di Paolo they take the parity principle to claim that processes that take place inside the head are paradigm cognitive processes, which we must use as our benchmark to decide whether an external entity forms a part of a cognitive process or not. The test we are to perform is to ask whether the external elements can do the same causal work as processes that take place inside the head.

However this is an all too common misreading of the parity principle. The parity principle doesn't invite an assessment of parity by first establishing the causal contribution of processes taking place inside the head and then determining whether processes that are located externally

can make a similar contribution (for further discussion of this point see Clark 2007). The parity principle was introduced only to engage our rough sense of what might belong to the domain of the cognitive. It was never a requirement that the external entities perform the same or similar role to processes taking place internal to the individual. Parity demands that we count external elements as forming a part of the machinery of cognition even if their causal contribution is unlike anything we find within the head. What ultimately matters is the contribution the external elements make to the functional poise of the system. It is ultimately an empirical question whether external elements can make this kind of causal contribution without behaving just like the processes that unfold inside the head.

Thompson and Stapleton argue that information processing taking place inside the head is at best only ever a "participant" in cognition. Cognitive processes are always *relational* processes of sense-making that take place between an autonomous system and the environment in which it acts. Di Paolo insists on a similar point when he writes: "As relational in the strict sense, cognition has no location" (Di Paolo [this issue](#)). The extended functionalist could accept that cognition is sometimes or even always relational in this sense. A central claim of the extended functionalist is that the rational control of behaviour is fragmented and distributed with different internal resources calling upon and interacting with different external resources. The extended functionalist denies that there is any all-seeing, all-knowing inner executive overseeing this process. The extended functionalist nevertheless insists that while cognition can in this way extend into the environment surrounding the organism, still cognition is organism-centred. Clark (2007) has dubbed this combination of claims *the hypothesis of organism-centred cognition*. The latter hypothesis strikes us as at least *prima facie* compatible with the enactivist's claim about the relational nature of cognition. This is not to say that we think there aren't tensions between extended functionalism and enactivism. Just that these tensions don't derive from the relational nature of cognition. At least some of these tensions derive from the enactivist's anti-functionalism, as we will explain in the next section.

## 2 Extended Cognition Without Functionalism

Di Paolo attacks extended functionalism for failing to recognise a distinction between causal coupling of a cogniser with external resources and the kind of normative regulation of coupling that sense-making introduces. As an example of the latter, Di Paolo discusses the water boatman's use of plastrons (trapped air bubbles) to breathe underwater. Plastrons provide "access to longer periods underwater thanks to a mediated regulation of environmental coupling ... The

mediation in cases like this is so intimately connected with vital functions that the living system itself might be called extended. The issue at play in such reliable and conserved forms of mediation is, in each case, the question of the identity of such extended systems” (Di Paolo [this issue](#)).

The water boatman’s coupling with the environment via plastrons is an example of sense-making, according to Di Paolo. The boatman uses plastrons to maintain its identity as a living system. Di Paolo claims it is also a form of extended cognition, since sense-making is cognition according to Di Paolo. The plastrons that mediate the boatman’s coupling with its environment extend the boundaries of its body. Thus the sense-making the plastrons mediate is an example of extended sense-making or cognition. Crucially however this sense-making is bound up with the boatman’s vital functions. This writes Di Paolo is “at odds with functionalism—understood generally as an attempt to provide a substrate-independent account of the operation of a system”. The substrate of extended cognition is in this case a *vital materiality* (Di Paolo [this issue](#), the expression is Wheeler’s). A consequence of distinguishing mere causal coupling from the normative regulation of coupling is that we cannot describe cognition in a way that abstracts away from the details of how cognition is materially realised. This looks to be incompatible with the functionalist’s commitment to the possibility of any given cognitive process being multiply realised in different substrates. Cognition is understood by the enactivist in terms of the contribution it makes to a system sustaining its material organisation. Sense-making occurs in order for the system to maintain its organisation.

Despite the enactivist’s rejection of functionalism, Di Paolo argues that the enactivist can and should recognise the existence of extended cognition (§ 5). In response to Wheeler’s argument, Di Paolo argues that cognition isn’t sufficient for autopoiesis. It is autonomy that is necessary for cognition, not autopoiesis, and he writes: “autonomy may occur in systems that are not themselves autopoietic” (Di Paolo [this issue](#)). Nevertheless Di Paolo allows that artefacts can make a causal contribution to intelligent problem solving. The idea seems to be that the use of artifacts and external entities in problem solving counts as a “self-sustaining process” in its own right. It is a process that is “enabled by a substrate of autopoiesis”. The construction of technologies and artefacts to augment our biological capacities is described as a “new form” that our lives have taken. Human beings have assumed a new identity, we have become different systems through our interactions with technological artefacts. This is all very much in line with arguments made in Clark (2003). So while enactivists reject functionalism they do not deny the existence of extended cognition.

Thompson and Stapleton also argue for a rejection of functionalism whilst attempting to make room for the possibility of extended cognition. They reject functionalism on the

grounds that it fails to account for autonomy. Functionalist models of the mind “characterise cognitive systems in terms of informational inputs and outputs instead of the operational closure of their constituent processes. As a result, they do not explain how certain processes actively generate and sustain an identity that also constitutes an intrinsically normative way of being in the world” (Thompson and Stapleton [this issue](#)). We have seen how, according to the enactivist, a system that can sustain its organisation must normatively regulate its couplings with the environment. Thompson and Stapleton’s worry seems to echo Di Paolo’s point that the functionalist misses the difference between causal coupling and normatively regulated coupling. It is for this reason that they offer a description of cognitive processing in terms of the computational transformation of inputs into outputs, a move which fails to recognise a cognitive system’s operational closure. There are complex questions here about the best way to understand a mental state’s functional role. Thompson and Stapleton can be read as insisting that a biological notion of function is needed if we are to adequately account for the work a cognitive process does for an organism. Moreover the notion of biological function that is required is an irreducibly normative and teleological notion. Thompson gives some arguments for these claims in his (2007, part 2) but here is not the place to enter into these large metaphysical questions. A full and adequate resolution of the debate between the extended functionalist and enactivist would however require grappling with these issues.

Whilst rejecting functionalism for the reasons just outlined, Thompson and Stapleton nevertheless attempt to accommodate the possibility of extended cognition. Following Helena De Preester they make a distinction between “extension” and what they describe as “incorporation”. Extension occurs when the cognitive system uses some external resources instrumentally to achieve its ends. Incorporation occurs when some external item comes to “function transparently in the body’s sense-making interactions with the environment” (Thompson and Stapleton [this issue](#)). The external item is no longer experienced as an object, but instead we experience the world by means of the external item. It seems to us however that what Thompson and Stapleton describe as “transparency” might be captured in terms of functional poise. It was always a part of the extended mind story that some external resource counts as a part of cognitive processing only if it poised for easy, reliable and automatic deployment. Any external resource that meets these conditions will also, we think, satisfy the Thompson and Stapleton transparency requirement.

The account of extended cognition that both Di Paolo and Thompson and Stapleton favour fits very well with what Richard Menary has described as “cognitive integration”. In his contribution to this volume, Menary describes how “extension is achieved through the body”

(Menary [this issue](#)). The cognitive integrationist lays great stress on the role that physical and bodily manipulations of the environment can play in cognition. Such manipulations require the coordination or integration of body and environment. Menary sketches how this might be achieved through the body schema, a suggestion that is also made by Thompson and Stapleton. Menary tells us towards the end of the paper that in his view extended cognition occurs when “the co-ordination of bodily processes of the organism with salient features of the environment, often created or maintained by the organism, allows it to perform cognitive tasks that it otherwise would be unable to; or allows it to perform tasks in a way that is distinctively different and is an improvement upon the way that the organism performs those tasks via bodily processes alone” (Menary [this issue](#)). This is a characterization of extended cognition that an enactivist could happily sign-up to.

Menary also rejects functionalism. Elsewhere (Menary 2007) he has explored what a non-functionalist account of extended cognition might look like. In his contribution to this volume Menary recommends that the advocates of the extended mind shift their attention from making a case for the extended mind based on functional parity to exploring the consequences of the extended mind for our thinking about intentionality. In his historically sensitive paper Menary argues for what he calls “the continuity thesis”. The continuity thesis claims that “cognitive capacities are not intrinsically different from other kinds of capacities found in the natural world” (Menary [this issue](#)). As such it ought to be a fundamental commitment of every naturalistically inclined philosopher. However Menary argues that Brentano’s influence remains strong today, even amongst naturalistic philosophers, and Brentano endorsed a *discontinuity thesis*. Brentano took intentionality to be the mark of the mental, distinguishing the domain of the psychological from the non-psychological. He construed intentionality as a peculiar kind of relation that holds between consciousness and objects that exist immanent to consciousness. According to Brentano, this directedness that is characteristic of intentionality occurs only in consciousness, relating mental states to the objects they represent. Menary contrasts this Brentanian conception of intentionality with an Aristotelian-Scholastic understanding of intentionality. The Scholastics borrowed from Aristotle the idea that in perception the soul of the perceiver takes on the perceptible form of an object without its matter. The Scholastics however, unlike Brentano, held that the form of the object existing in the soul wasn’t fundamentally different from the form of the object external to the soul. Mental content doesn’t “constitute an entirely separate ontological category from physical things” (Menary [this issue](#)). Menary argues for a return to a Scholastic idea of intentionality as directedness towards an object *for an end*. We must recognise that intentionality is bound up with the “traits,

behaviours, and environment of the organism” (Menary [this issue](#)). Such a conception of intentionality affords a powerful defence of the continuity thesis.

One implication of Menary’s teleological conception of intentionality is that it sits unhappily with a distinction between original and derived intentionality. Adams and Aizawa (2001, 2008) have deployed this distinction in arguing against the extended mind. Menary argues that standing behind the distinction between original and derived intentionality is a commitment to the discontinuity thesis. In the course of making the case for the continuity thesis he offers several arguments the upshot of which are that the distinction has to go. Aside from being a thesis that every naturalist should accept, the continuity thesis also has pay-offs for advocates of the extended mind.

Like Menary, Gallagher and Crisafi also recommend going beyond the parity principle in developing a conception of extended cognition. They argue that a theory of extended cognition must make room for external processes that form a part of cognitive processing but couldn’t possibly take place in the head of a single individual. An example of such an external process would be a court of law in which judgements are arrived at based on precedent and law. “Judgements emerge in the workings of a large institution—i.e. the legal system. The legal process is a cognitive one—it is cognition-producing, insofar as it produces judgements—and *cognition produced*, in the sense that it is the product of many (and perhaps generations of) cognizers ...” (Gallagher and Crisafi [this issue](#)). A second example they discuss is a museum as a repository of information about a rich cultural past. A museum can, they argue, function as a store of information for a culture in much the same way as Otto’s notebook can function as a store of information. The bold idea that Gallagher and Crisafi are exploring is that the extended mind hypothesis may provide us with a novel interpretation of some of the claims Hegel made about the role of social institutions in our cognitive lives. In their conclusion they write: “There is no good reason, once we start along the path of the extended mind, to stop short of considering the larger processes, such as the processes involved in social, educational, and legal institutions as cases of extended cognition” (Gallagher and Crisafi [this issue](#)).

### 3 Enacting Experience

Noë (2004, 2006) has argued that extended mind style arguments can be applied to the case of conscious experience. It is not just the vehicles of unconscious cognition that can criss-cross the boundary of brain, body and world. Noë argues that the same is true of the vehicles of conscious experience. Just as the environment can drive and partially constitute cognitive processing, so the environment can also

drive and partially constitute experience. Active externalism of this kind about consciousness has radical implications. If true, it would follow that one couldn't have experiences just like we have independent of one's active engagement with the world. It would follow that the minimal supervenience base for at least some of our experiences extends into the world.<sup>4</sup>

Noë uses the term “enactive” to refer to a view according to which perceiving is a skilful activity in which we probe the world for information. Like any skilful activity it requires know-how. Noë calls the kind of knowledge that is required for perceiving *sensorimotor knowledge*. Sensorimotor knowledge is knowledge of how our experience might be effected by movement. We know for instance that if we move towards an object the object will appear to loom in our visual field. We know that if we shift our eyes to the left objects in the centre of our visual field will move to our right and objects that were in the periphery will come to occupy the centre of our visual field.

Rowlands describes four claims that Noë's enactive theory of perception might be thought to share in common with advocates of the extended mind:

- (1) The world is an external store of information.
- (2) At least some mental processes are hybrid straddling both internal and external operations.
- (3) The external operations take the form of action: manipulation, exploitation and transformation of environmental structures.
- (4) At least some of the internal processes are ones concerned with supplying a subject with the ability to appropriately use relevant structures in the environment (Rowland [this issue](#)).

The enactive theory denies that the visual system needs to construct detailed internal representations in order for us to perceive details that are in the world. We arrive at information about the world by a temporally extended process of looking. We experience the detail that is out there in the environment by means of probing and exploratory actions. This sketch of the enactive view seems to fit nicely with the claims defended by proponents of the extended mind.

Rowlands goes on to argue however that any appearance of common ground is illusory. Sensorimotor expectations—expectations about how our experience will vary with movement—are made to do a lot of work in Noë's enactive theory. Rowlands argues that there is little reason to think of these expectations as extended. Probing and exploratory actions in which a sense modality is engaged

are assigned a central role by the enactive theory. Might the contributions of these actions to perception make perception extended? Rowlands argues that we can read the claim that such actions are required for perception in a strong and weak way. On the weak reading, what is required is the ability to probe and explore the world by means of a sense modality. There is however no reason to think that such an ability makes perception extended. On the strong reading, what is required is the exercise of such abilities. Rowlands argues that the strong reading faces a number of difficulties, not least of all over how to account for novel experiences.

Gangopadhyay and Kiverstein contrast Noë's enactive theory of perception, O'Regan and Noë's sensorimotor theory and Susan Hurley's (1998) theory of active perception. Although these theories share a good deal of common ground, there are also significant differences between them. In particular it is argued that both the sensorimotor and enactive theories are committed to a distinction between mere sensorimotor behaviour and cognition. Gangopadhyay and Kiverstein argue this distinction cannot be sustained partly by appeal to Hurley's theory of active perception and partly on the basis of empirical research on eye movements. The latter studies provide an example of a motor behaviour that makes a central contribution to visual experience. There could be no visual experience without eye movements. However eye movements are also an example of the inseparability of sensorimotor behaviour and cognition. Eye movements unfold in parallel with covert attention and they are always goal-directed and task relevant. They provide a concrete example of how sensorimotor behaviour and cognition are inseparable.

## 4 Conclusion

Taken as a whole, these papers thus begin to address the fundamental question we highlighted earlier: the question of to what extent the study of mind ‘embodied, embedded, and enacted’ is already a unified church with agreed central tenets, or remains more of a motley, with some serious disagreements hidden beneath that colourful umbrella with the three large E's emblazoned on its surface. The jury, it seems to us, is still out. But the questioning itself is a cause for celebration. For it marks, we believe, an important moment in the evolution and maturing of the study of the embodied, embedded mind. It marks that moment of critical self-awareness and questioning distinctive of an emerging paradigm. It marks, we hope, the moment at which a somewhat fuzzy collection of related (though not necessarily clear or mutually consistent) theses starts to morph into a set of sharper, increasingly distinct models for understanding mind and its place in nature.

<sup>4</sup> Clark (2008, chap. 8, submitted) argues against the existence of extended experiences.

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