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Extended Mind



Victor Loughlin

Centre for Philosophical Psychology, Department of Philosophy, University of Antwerp, Antwerp, Belgium

Abstract

Extended Mind is usually understood to be a claim about cognitive extension, that is, it is usually understood to be the claim that the boundaries of the mind can occasionally extend to include objects in the environment. This chapter will argue that understanding Extended Mind in this way helps zero in on how this claim should be defended. For example, Clark and Chalmers' (1998) Parity Principle (PP) states that if bodily external objects play roles functionally equivalent to processes inside the head, and those in-the-head processes are regarded as cognitive, then those bodily external objects should be regarded as playing cognitive roles as well. If Clark and Chalmers are correct, then PP can be used to defend Extended Mind. As this chapter will show, the pivotal role PP plays becomes apparent when we consider what happens when PP is either minimized, as is the case with second wave Extended Mind, or removed altogether, as is the case with third wave Extended Mind, since it can be doubted that either of these two readings are in fact readings of Extended Mind. Third wave, in particular, may need to

be understood in entirely different terms. This suggests that if Extended Mind is understood to be a claim about cognitive extension, then PP should be regarded as key to defending that claim.

Keywords

Extended mind · EM · Clark and Chalmers · Parity principle · Second wave · Third wave · Enactivism · Enactivist

Introduction

Take a look at the objects around you. Could those objects be part of your mind? Indeed, where exactly does your mind end and the rest of the world begin? In recent decades, philosophers of mind and cognitive scientists have begun to challenge the intuition that our minds are confined to the insides of our heads.

Consider someone's use of his or her Smartphone. This person may constantly use their phone, easily access the information stored on their phone, and sometimes even automatically endorse this information, like when such information is about the phone numbers of their friends. It might be thought that this Smartphone is just a tool like any other, employed by this person to complete a given task. However, some philosophers of mind and cognitive scientists argue that given the sorts of "glue and trust" conditions just mentioned – constant use, easy access, and

automatic endorsement – then a person’s Smartphone could be as much a part of this person’s mind as anything inside their head (Chalmers 2008). If so, then the Smartphone can, under these particular circumstances, extend the mind of this person. This, so it is claimed, is an example of what is called Extended Mind or EM for short (Clark and Chalmers 1998; Menary 2010a).

As this example illustrates, EM is usually understood to be a claim about cognitive extension, that is, it is usually understood to be the claim that the boundaries of the mind can occasionally extend to include objects in the environment. One reason to think that EM should be understood in this way is that it helps demarcate it from its close conceptual rival, the Hypothesis of Embedded Mind (HEMC) (Loughlin 2018a).

For example, proponents of HEMC, e.g., Adams and Aizawa (2001, 2008) and Rupert (2004), think that, while objects in your environment, like Smartphones, may be crucial to the completion of certain cognitive tasks, it does not follow that such objects thereby extend the boundaries of your mind. Indeed, claiming that such objects do extend the boundaries of the mind, so say proponents of HEMC, raises a host of metaphysical issues that are best avoided, such as demonstrating that objects in the environment can play a constitutive and not merely causal role in the formation of cognitive processes. If these proponents are correct, then while some objects may help one cognize, it doesn’t follow that minds also extend to include such objects. Hence, framing EM as a claim about cognitive extension matters. This is because it clarifies the ways in which EM and HEMC are in fact separate and distinct claims.

Importantly, as this chapter will show, understanding EM as a claim about cognitive extension, in the manner previously formulated, helps zero in on how this claim should be defended. This will be the central theme of this chapter, which can be illustrated in the following way.

Clark and Chalmers (1998) offer what still remains the canonical formulation of EM, according to which claims about cognitive extension are made on the basis of what is called the Parity Principle (PP). PP states that if bodily

external objects play roles functionally equivalent to processes inside the head, and those in-the-head processes are regarded as cognitive, then those bodily external objects should be regarded as playing cognitive roles as well. If Clark and Chalmers are correct, then PP can be used to defend EM.

By contrast, Sutton (2010) develops an alternative reading of EM, which he calls “second wave.” Following second wave, objects need not have parity with inner cognitive processing but rather can complement and even transform such processing. Second wave thus looks to minimize the role of PP in making the case for EM. However, this leaves it unclear that second wave actually is a reading of EM. Indeed, Sutton seems to concede as much when he acknowledges that second wave might be better understood as a methodological claim rather than a claim about cognitive extension.

On the other hand, Sutton (2010) also suggests that there could be a possible third wave reading of EM. Kirchhoff and Kiverstein (2018) develop this suggestion in detail, claiming that cognitive processes are dynamically unfolding activities realized by the practices in which agents are enculturated. Third wave thus removes any commitment to PP. Yet this raises further questions as to what exactly extends. One option then is to read third wave, not as a version of EM but rather as an enactivist proposal, although this new reading encounters a problem of its own. Another option is to employ Glaveanu’s (2018) notion of the possible. However, doing so reveals the extent to which third wave radically departs from both EM and enactivism.

These considerations highlight the pivotal role PP plays in making the case for EM. For as discussion of second wave and third wave readings demonstrate, once PP is minimized or removed altogether, then it is no longer clear that we are still talking about EM. Hence, if EM is understood to be a claim about cognitive extension, then PP should be regarded as key to defending that claim.

The layout of this chapter is as follows. Section “[Extended Mind](#)” outlines Clark and Chalmers’ original reading of EM. Section “[Second Wave Extended Mind](#)” discusses Sutton’s proposed

second wave reading of EM. Section “[Third Wave Extended Mind](#)” turns to a possible third wave reading, with some reference to Kirchoff and Kiverstein.

Extended Mind

Although EM has many precursors in the philosophical literature, e.g., Dewey (1916), it was nonetheless first explicitly outlined and defended in a seminal paper by the philosophers Andy Clark and David Chalmers (1998).

In that paper, Clark and Chalmers introduce an idea that has since come to play a defining role in the debate over EM. They state:

If, as we confront some task, a part of the world functions as a process which, were it done in the head, we would have no hesitation in recognizing as part of the cognitive process, then that part of the world *is* (so we claim) part of the cognitive process. (ibid., p. 8 emphasis in original)

For example, consider the game Tetris. As most people know, players of this game must quickly alter the shapes of falling Tetrominoes so that these objects can form a solid line at the bottom of a screen. Players can do this in a number of ways. They can, for instance, mentally calculate how these Tetrominoes should be altered before making the necessary adjustments on the screen. Or they can instead use a physical rotation device to make those adjustments.

According to Clark and Chalmers, manipulating the shape of the Tetrominoes using a rotation device is logically on a par with manipulating the shape of the Tetrominoes inside your head. This is because using such a device forms a process such that were this process done in the head we would regard it as part of a cognitive process. Given this equivalency between use of the device and in-the-head processing, then we should regard the use of this device as part of the player’s cognitive processes. Clark and Chalmers employ this example to conclude that, “[c]ognitive processes ain’t (all) in the head!” (ibid.).

In subsequent debates over EM, Clark and Chalmers’ idea has come to be called the Parity Principle (PP). PP has been challenged in

numerous ways (Menary 2010a). However, for the purposes of this chapter, it will be assumed that PP succeeds in making the case for EM. Given this assumption, two aspects of PP can be highlighted.

First, PP is meant to act as a “veil of metabolic ignorance” or an insistence on “equality of opportunity: avoiding a rush to judgment based on spatial location alone” (Clark 2008, p. 114). That is, just because something occurs in the environment need not exclude it from playing a cognitive role. For what matters is not physical location but rather the contribution something makes to an agent’s performance of a task. And where there is parity of contribution, there should be parity of status (Wheeler 2010, p. 248).

Second, if PP is to apply, then objects in the environment and in-the-head processing should be understood in terms what is called their functional role. Functionalism can be defined as the claim that “what makes something a mental state of a particular type does not depend on its internal constitution, but rather on the way it functions, or the role it plays, in the system in which it is a part” (Levin 2008). Crucially, bodily details then only matter to the extent that they fulfill the requisite functional role. So, in the Tetris example, it is not important how the player holds the rotation device or moves their body when manipulating the device. What is important is rather that the device fulfills a role equivalent to in-the-head processing. Once this functional equivalence between outer and inner is attained, then the device can be understood as part of and so extending an agent’s cognitive processing.

However, as Clark and Chalmers acknowledge (1998, p. 12), the Tetris example only applies to cognitive processes. No mention has been made so far of mental states. Clark and Chalmers remedy this via the following thought experiment.

Consider two people, Otto and Inga. Otto suffers from Alzheimer’s disease and so has difficulty remembering things. In order to offset his poor memory, he always carries with him a notebook. Any time he learns something new, he writes it down in his notebook. Inga, on the other hand, does not have any such difficulty. Her memory functions normally.

Suppose then that Inga hears about an exhibition at the Museum of Modern Art (MoMA). She thinks for a moment about where MoMA is, recalls that it is on 53rd street, and then sets off to visit the museum. Suppose that Otto also hears about the same exhibition and he decides he wants to see it. However, rather than relying on his impaired biological memory, Otto instead employs his notebook. He looks in his notebook, retrieves the address, and then sets off to visit the museum.

According to Clark and Chalmers, both Inga and Otto have an unconscious belief about the location of MoMA. The only difference is that whereas Inga's belief is located inside her head, Otto's belief is partially located outside his head in his notebook. Nonetheless, this difference is not functionally relevant, insist Clark and Chalmers, since "the notebook plays for Otto the same role that memory plays for Inga. The information in the notebook functions just like the information constituting an ordinary [unconscious] belief; it just happens that this information lies beyond the skin" (*ibid.*, p. 13).

In other words, Otto does with his notebook what Inga does with her biological memory. Indeed, Clark and Chalmers conclude that the moral of the Inga-Otto thought experiment is that, "when it comes to belief, there is nothing sacred about skull and skin. What makes some information count as a belief is the role it plays, and there is no reason why the relevant role could be played only from inside the body" (*ibid.*, p. 14). So understood, Otto's mental state, that is, his unconscious belief about the location of MoMA, extends to include the contents of his notebook. Otto is thus an example of EM.

The Inga-Otto thought experiment has generated much debate within the literature on EM (see the introduction to Menary 2010a for an overview). Nonetheless, as with the Tetris example, PP plays a pivotal role in this thought experiment. For it is the alleged functional equivalence between, on the one hand, Otto's use of his notebook and, on the other, Inga's use of her biological memory, that ensures that Otto's mental state, e.g., his unconscious belief about the location of the museum, extends to include the contents of his

notebook. Thus, if Clark and Chalmers are correct, then PP can be used to defend EM.

In what follows, the pivotal role PP plays within EM becomes more apparent when we consider what happens when PP is either minimized or removed altogether.

Second Wave Extended Mind

Second wave EM aims to minimize the role PP plays in making the case for EM. Understanding what drives this desire to minimize PP will help clarify what is second wave EM.¹

Sutton (2010), for example, regards PP as problematic for two reasons. First, he asks us to consider the "individual differences in the amount and style of reliance on external resources [that] are often glaring in the ways people plan and engage in complex activities, such as writing an academic paper, shopping for a party, or chairing a department meeting. Do I memorize the train timetable in advance, or do I just turn up at the station and see?" (*ibid.*, p. 199). This suggests, argues Sutton, that EM is more likely to be true of some people than others, since some people simply make more use of environmental objects or processes than others. But since PP only focuses on "generic features of cognitive states and processes" (*ibid.*) and so abstracts away from these

¹Section "Second Wave Extended Mind" of this chapter only focuses on Sutton's version of second wave. Another version of second wave not considered here is Menary's Cognitive Integration view (see Menary 2010a, b). This is the view that "internal and external vehicles are integrated into a whole" (Menary 2006, p. 329) and "it is bodily manipulation of the external vehicles themselves... where the cognitive work gets done" (Menary 2010b, p. 240). For Menary, cognitive processes are thus hybrid processes that constitutively involve the bodily manipulation of external vehicles. Cognition then is an ability (or abilities) of an agent to manipulate their immediate environment. In light of the discussion in this chapter (see section "Third Wave Extended Mind"), Menary's Cognitive Integration view would seem to be a Third Wave reading and so arguably incurs the problem facing other Third Wave readings, namely that it is not clear that it actually is a reading of EM.

concrete details, then it looks unable to account for these individual differences.

Second, PP “threatens to flatten out the important differences between cognitive artifacts” (ibid.). For if PP is correct, then the “particular nature of the external resources. . . does not really matter” (ibid.). Yet, according to Sutton, the differences between in-the-head processing and the roles played by bodily external objects may be crucially important. Indeed, these differences may help explain why some objects or artifacts and not others can transform the cognitive processing of agents. However, PP “fails directly to suggest study of idiosyncratic or peculiar features of particular external symbol systems, or particular ways of interacting with them” (ibid., p. 200).

These concerns lead Sutton to argue for a complementarity view of EM. Sutton makes it clear that complementarity “subsumes and takes precedence over [PP]” (ibid., p. 206). Complementarity is the view that, “different components of the overall (enduring or temporary) system can play quite different roles and have different properties while coupling in collective and complementary contributions to flexible thinking and acting” (ibid., p. 194). This is understood to “permit and encourage quite different kinds of interaction and coupling and thus different kinds and degrees of extendedness” (ibid., p. 206). Thus, second wave EM can be defined as an attempt to make the argument for cognitive extension on the basis of complementarity and not parity considerations.

As an example of this, Sutton describes Tribble’s (2005) study of Shakespearean actors at the Globe Theatre. Such actors had to learn new lines in multiple plays in very short spaces of time, often without access to the plays themselves. This raises the following question: “How did the actors cope, and how did the companies rehearse and perform so many different plays under such pressures?” (Sutton 2010, p. 202).

Building on Tribble’s study, Sutton’s answer is that, “in the Globe physical architecture, artifacts, social structure, and the characteristics of the plays themselves combine to support the collective success of the company in performance” (ibid.). This is because, says Sutton, “the Globe’s artifacts worked to get actors to the right place at

the right time for further environmental alterations (such as a particular line or event on stage)” (ibid., p. 203). That is, the Globe and its objects or artifacts were structured such that the actors simply had to remember to be at certain places at certain times, at which point lines could be quickly rehearsed and then subsequently performed on stage. Sutton claims that it was thus due to “[the actor’s] mastery of the cognitive resources of their highly structured dramatic environment” (ibid.) that they were able to memorize their lines. In which case, the physical architecture of the Globe can be understood as having complemented the actor’s internal cognitive processing. Sutton claims that this is an example of Second Wave EM.

Note that on this second wave reading, the physical architecture of the Globe, contra PP, did not play a functionally equivalent role to any cognitive processes inside the actor’s heads. Indeed, given that this architecture is alleged to have transformed what the actors could do, in the sense that these actors could do things within that environment that they could not do outside that environment, then it follows that the architecture must have had properties distinct from in-the-head processing. Second wave thus seeks to minimize the role of PP and instead emphasize how the use of environmental objects or structures can be instances of transformative cognition.

However, as Ramsey notes, this change in emphasis renders second wave EM vulnerable to the following objection:

[w]hat [second wave] authors need, but do not really provide, is an argument for treating external structures as not only important for (and integrated with) cognitive systems during various cognitive tasks. . . but for also treating them as actually mental states. (Ramsey 2010)

This seems true of Sutton’s analysis of Tribble’s study. Recall the Hypothesis of Embedded Mind (HEMC). Sutton’s analysis looks closer to HEMC than EM. For the physical architecture of the Globe may simply have provided the needed prompt for the actor’s learning to take place. Nonetheless, the learning of the lines themselves could still be entirely dependent upon the actor’s internal resources. Importantly, this would be

compatible with acknowledging the transformative role played by this architecture, namely, how outside that environment, the actors could not have learned their lines in the way that they did inside that environment. In short, while the physical architecture of the Globe may have scaffolded and in this sense complemented the actor's internal cognitive processes, it does not follow that those internal processes were also extended to include that very architecture. Ramsey also raises this criticism of Sutton.

If this is correct, then it is not obvious that second wave actually is a reading of EM. Further support for this assessment comes from Sutton himself, who claims that the advantage of second wave is primarily methodological. Second wave, insists Sutton, is "more an invitation to give detailed attention to these differences in specific contexts and case studies than a fixed new metaphysics of mind" (Sutton 2010, p. 206). Yet if second wave is only a methodological claim, that is, a claim about how and/or in what ways we should investigate cognition, then second wave is not a claim about cognitive extension, that is, it is not a claim about EM. In which case, by attempting to minimize the role of PP, it can be doubted that second wave actually is a reading of EM (Loughlin 2014).

Third Wave Extended Mind

Along with second wave, Sutton (2010) also describes a possible third wave reading of EM:

If there is to be a distinct third wave of [EM], it might be a deterritorialized cognitive science which deals with the propagation of deformed and reformatted representations, and which dissolves individuals into peculiar loci of coordination and coalescence among multiple structured media. . . [T] his third wave would analyze these [inner and outer] boundaries as hard won and fragile developmental and cultural achievements, always open to renegotiation. (2010, p. 213)

Kirchhoff (2012, pp. 291-293) picks out three key themes from the above quote from Sutton.

First, Kirchhoff understands the phrase "deterritorialized cognitive science" to mean a cognitive science whereby the boundaries

between what is internal and what is external to an agent are always porous or open-ended. Second, "deformed and reformatted representations" refer to how enculturation, that is, the process whereby human agents become immersed within a sea of cultural norms and values, can transform the human brain, which points towards the inherent plasticity of the brain's representational capacities. Third, "dissolves individuals into peculiar loci of coordination and coalescence among multiple structured media" suggests that cognition should no longer be understood to be organism centered but rather as something highly distributed, capable of being brought into existence as and when softly assembled "loci of coordination" are actualized.

These three themes, if accepted, indicate how a third wave reading removes any lingering commitment to PP. For if enculturation points towards the inherent plasticity of the brain, and cognition is no longer understood to be organism centered, then the role that objects or artifacts play in an agent's performance of a task cannot be understood in terms of their equivalence to in-the-head processing. Indeed, if agents themselves are highly distributed, softly assembled loci of coordination, then the very idea that we need to look inside the head to determine what is part of the mind is a nonstarter.

However, this removal of PP raises a key issue for a third wave reading. For what happens when you decentralize cognition in this particular fashion? Kirchhoff and Kiverstein (2018) offer a possible answer to this question.

According to Kirchhoff and Kiverstein, a third wave reading begins by rejecting any notion that the properties of what is bodily internal to the agent and/or what is bodily external to the agent are fixed and/or static. Instead, "through ongoing participation in culturally organized activities with other people" (ibid., p17), agents are transformed such that what is internal to the agent is reformed and reformatted "through a network of practices in which the individual participates" (ibid., p17). Cultural practices then are not simply background conditions in the formation of an agent's various cognitive processes. Rather, cognitive processes are themselves constituted

diachronically, for they are “dynamic and temporal trajector[ies] of activity” (ibid., p21) always forged within wider practices.

This then impacts on the agents that embody those activities. Gone is the idea of lone individuals recruiting objects or artifacts in their environments in order to complete certain tasks (think of Otto and his notebook). Instead, agents are now widely constituted “bio-cultural system[s]” (ibid., p20), realized as much by the practices in which they are enculturated as by anything happening inside their heads.

In order to illustrate this, consider the following example (which is not taken from Kirchhoff and Kiverstein). Suppose you sit down at a desk with a blank sheet of paper in front of you. You have decided to write a letter to a close friend. However, you have no clear idea about what you want to say or how you want to say it. You begin, “Hi Catherine.” You write a few words but you cross them out. You then write a few more, which you subsequently keep. In this hesitant back-and-forth between writing and editing, what you want to say slowly starts to emerge from what you write. This is how the letter is written.

Following the sort of third wave reading of EM just described, when composing the letter in this manner, your cognitive processing is decentralized, in the sense that you only loosely coordinate what is happening, hence why what you want to say can slowly emerge from what you write. But if so, then your processing cannot be sourced to any one moment. Instead, your cognitive processing is a dynamical process, that is, one that unfolds and develops over time. Moreover, this dynamical process is only possible because of your enculturation within a wider practice, namely the practice of using pen and paper to compose letters to friends. Indeed, it is your very enculturation within this practice that makes you a cognitive agent and so makes what you are now doing a cognitive activity.

Recall then the doubts previously raised as to whether or not second wave was an example of EM. There it was claimed that second wave might be better understood as a version of HEMC (see section “[Second Wave Extended Mind](#)”). The same worry, however, does not apply to third

wave. For if wider cultural practices can play constitutive roles in the formation of agents and their cognitive activities, then third wave cannot be read as a version of HEMC. Environments, according to third wave, do much more than simply embed minds.

However, another issue presents itself. Following a third wave reading, you are not a lone individual recruiting objects or artifacts in your environment in order to complete certain tasks. You are instead realized by the practices in which you are enculturated. But if so, then it no longer makes sense to think of “you” as some bounded entity. You are instead, to borrow Sutton’s words, a “loci of coordination,” softly assembled and distributed across multiple media. And what applies to you must also apply to your mind. Yet if your mind can no longer be understood as a bounded entity, then what exactly extends? Indeed, if agents and their minds are highly distributed and decentralized, as some proponents of third wave contend, then all talk of extension begins to look otiose. It is thus not clear that third wave actually is a reading of EM.²

How then should third wave be read? One option is to read third wave as an enactivist proposal.

Enactivists prioritize the role of action, and so enactivism can be understood to be a branch of action research. Most enactivists accept that mind and experience are essentially dynamical processes realized as and when agents interact with and/or have interacted with their environments. However, there is little agreement among enactivists as to how this proposal should be developed. Some root it in the autopoietic nature of autonomous systems and their sense-making activities (Thompson 2007). Others focus instead on the role of what are called “sensorimotor

²Note that this criticism of third wave does not consider many of the details of Kirchhoff and Kiverstein’s defense of Third Wave Extended Mind. For example, they appeal to predictive processing models of the mind and the role such modeling can play when considering whether or not the boundaries of the mind extend. However, determining whether or not these details can in fact resolve the criticism raised here is beyond the scope of the present chapter.

contingences” enacted during perceptual experience (O’Regan and Noë 2001; Noë 2004; Loughlin 2018b, 2019). Still others examine social and linguistic practices and how they can scaffold distinctive forms of human thought (Hutto and Myin 2013, 2017). Given that third wave views the mind in terms of dynamically unfolding activities, then it is plausible to frame such a view as akin to one or perhaps a number of these competing enactivist proposals.³

An objection to this, however, may be that most enactivists view mind and experience as first and foremost organism centered, although not of course as organism bound. Yet this looks in opposition to third wave’s insistence that cognition is not organism centered (Ryan and Schiavio 2019). If this objection is correct, then it may not be clear how third wave should be read, neither as version of EM nor as a version of enactivism.

Another option then is to frame third wave EM in terms of Glaveanu’s (2018) notion of the possible. This could be an instance of using the notion of the possible in philosophy. If so, then minds could be understood to be, in Glaveanu’s words, “creative actions. . . [that] open up, exploit and expand the possible for both self and others” (ibid., p. 12). Minds thus neither extend to include objects in the environment nor are enacted via engagement with those objects. Rather, by being enculturated within wider practices, minds are those horizons and potentialities created by those very practices. Recall the previous letter example. It is only by being enculturated within a practice of writing letters that what you think, feel, desire, etc. can emerge out of and so be softly assembled by your act of composition. However, if framed in these terms, then third wave EM is indeed radically distinct from both EM and enactivism.

³Someone who pursues this line is Gallagher (2017). Indeed, Gallagher proposes to bring EM and enactivist views into alignment via a third wave reading of EM. Gallagher also shows the interesting overlap between EM and the work of various American Pragmatists. However, following the discussion in this chapter (see section “Third Wave Extended Mind”), it could be argued that there are problems both with linking third wave with EM and with linking it to enactivist proposals.

Summary

Extended Mind (EM) is usually understood to be a claim about cognitive extension, that is, it is usually understood to be the claim that the boundaries of the mind can occasionally extend to include objects in the environment. The central theme of this chapter has been that understanding EM in the above fashion helps zero in on how this claim should be defended.

For example, Clark and Chalmers’ Parity Principle (PP) can be viewed as playing a pivotal role in defending EM. For as both second wave and third wave readings reveal, once PP is minimized, as is the case with second wave, or removed altogether, as is the case with third wave, then it is no longer clear that we are still talking about EM. Hence, if EM is understood to be a claim about cognitive extension, then PP should be regarded as key to defending that claim.

References

- Adams, F., & Aizawa, K. (2001). The bounds of cognition. *Philosophical Psychology*, 14, 43–64.
- Adams, F., & Aizawa, K. (2008). *The bounds of cognition*. Malden: Wiley-Blackwell Publishing.
- Chalmers, D. (2008). Introduction to supersizing the mind. In A. Clark (Ed.), *Supersizing the mind*. Oxford: Oxford University Press.
- Clark, A. (2008). *Supersizing the mind*. Oxford: Oxford University Press.
- Clark and Chalmers (1998). The extended mind. *Analysis*, 58, 7–19.
- Dewey, J. (1916). *Essays in experimental logic*. Chicago: The University of Chicago Press.
- Gallagher, S. (2017). *Enactivist interventions: Rethinking the mind*. Oxford: Oxford University Press.
- Glaveanu, V. P. (2018). The possible as a field of inquiry. *European Journal of Psychology*, 14, 519.
- Hutto, D., & Myin, E. (2013). *Radicalising enactivism: Basic minds without content*. Cambridge, MA: The MIT Press.
- Hutto, D., & Myin, E. (2017). *Evolving enactivism: Basic minds meet content*. Cambridge, MA: The MIT Press.
- Kirchhoff, M. (2012). Extended cognition and fixed properties: Steps to a third-wave version of extended cognition. *Phenomenology and the Cognitive Sciences*, 11, 287–308.
- Kirchhoff, M., & Kiverstein, J. (2018). *Extended consciousness and predictive processing: A third wave view*. London: Routledge.

- Levin, J. (2008). Functionalism. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy*. Downloaded March 2013 from <http://plato.stanford.edu/entries/functionalism>
- Loughlin, V. (2014). *Extended mind, extended conscious mind, enactivism*. Doctoral thesis for the University of Antwerp.
- Loughlin, V. (2018a). Going wide: Extended mind and Wittgenstein. *Adaptive Behaviour*, 26(6), 275–283.
- Loughlin, V. (2018b). Sensorimotor theory, cognitive access and the ‘absolute’ explanatory gap. *Phenomenology and the Cognitive Sciences*, 17, 611.
- Loughlin, V. (2019). Wittgenstein’s challenge to enactivism. *Synthese*, 1–14, forthcoming.
- Menary, R. (2006). Attacking the bounds of cognition. *Philosophical Psychology*, 19(3), 329–344.
- Menary, R. (Ed.). (2010a). *The extended mind*. Cambridge, MA: The MIT Press.
- Menary, R. (2010b). Cognitive integration and the extended mind. In R. Menary (Ed.), *The extended mind* (pp. 227–243). Cambridge, MA: The MIT Press.
- Noë, A. (2004). *Action in perception*. Cambridge, MA: The MIT Press.
- O’Regan, K., & Noë, A. (2001). A sensorimotor account of vision and visual consciousness. *Behavioural and Brain Sciences*, 24(5), 939–1031.
- Ramsey, W. (2010). Review of Richard Menary (Ed), *The extended mind*. *Notre Dame Philosophical Reviews*. Downloaded March 2013 from <http://ndpr.nd.edu/news/24553/?id=22110>
- Rupert, R. (2004). Challenges to the hypothesis of extended cognition. *Journal of Philosophy*, 101, 389–428.
- Ryan, K., & Schiavio, A. (2019). Extended musicking, extended mind, extended agency. Notes on the third wave. *New Ideas in Psychology*, 55, 8–17.
- Sutton, J. (2010). Exograms and interdisciplinarity: History, the extended mind, and the civilising process. In R. Menary (Ed.), *The extended mind* (pp. 189–226). Cambridge, MA: The MIT Press.
- Thompson, E. (2007). *Mind in life: Biology, phenomenology, and the sciences of the mind*. Cambridge, MA: Harvard University Press.
- Tribble, E. (2005). Distributing cognition in the globe. *Shakespeare Quarterly*, 56, 135–155.
- Wheeler, M. (2010). In defense of extended functionalism. In R. Menary (Ed.), *The extended mind* (pp. 245–270). Cambridge, MA: The MIT Press.