

Demarcating the Realm of Cognition

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Published online: 6 September 2017
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Abstract The Extended Mind Hypothesis has given rise to stimulating philosophical debates about the boundaries of the realm of the cognitive. This paper first investigates the usefulness of a “mark of the cognitive,” and then focuses on two accounts that aim to provide such a mark, put forward by Fred Adams and Rebecca Garrison on one side and Mark Rowlands on the other. The paper provides a critical assessment of these accounts and uses empirical work on emotion regulation in infants to unearth some crucial challenges that any attempt at offering a mark of the cognitive should address.

Keywords Extended cognition · Mark of the cognitive · Emotion regulation

In cognitive science, the mind is usually understood as the explanatory basis for behavior, and the established concept of mind is *psychological* and *internalist*. Mental states are conceived as properties (or processes) that have a causal role in determining behavior and lead to certain behavioral capacities (Chalmers 1996, Ch. 1). While mental states can be phenomenal states (characterized by what it is like for a subject to have them) or psychological states (characterized by its role in the explanation of behaviour), or both, cognitive scientific inquiry is predominantly interested in psychological states.¹ In cognitive scientific inquiry, this focus on a psychological concept of the mind has traditionally

¹ This methodological choice fits well with the goals of cognitive science: if the goal is to shed light on the appropriate role in the explanation of behavior, then phenomenality is of relatively little relevance. As David Chalmers notes (1996, 11), “[f]rom the point of view of cognitive science, an internal state responsible for the causation of behavior is equally mental whether it is conscious or not” (see also Clark 1997).

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been accompanied by an internalist position, according to which cognition is exclusively realized by physical substrates located in the brain.

This position is, however, increasingly being criticized, perhaps most vigorously by externalist authors who maintain that mind and world are fundamentally entangled. One of the externalist accounts that has received considerable attention is the “Extended Mind Hypothesis” (EMH), according to which human cognition sometimes constitutively depends on environmental resources. While critics of EMH (Adams and Aizawa 2001, 2010, 2008; Rupert 2004, 2009; Fodor 2009) hold that there is merely a causal relation between the cognizer and external entities, the EMH maintains that cognition can extend to include environmental resources.

The EMH has given rise to intriguing debates about the boundaries of cognition. In one of these debates, philosophers discuss whether securing progress in the debate about the “where” of cognition requires providing a “mark of the cognitive” that determines when a process counts as cognitive. In other words, the question is whether we need a criterion that reliably picks out all and exclusively cognitive processes. While many proponents of the EMH are skeptical about the need to provide such a mark (see Shapiro 2011; Clark 2008), other EMH proponents argue that a mark could prevent the debate from becoming stalled (Rowlands 2010) and would promote convergence between rival conceptions of cognition (Buckner 2015). Some go even further and argue that “without an independently motivated account of the What of cognition, quarreling about its Where is pointless” (Walter and Kästner 2012, 18).

This paper first offers some reasons for thinking that providing a mark might have a particular significance in settling the dispute about whether cognition extends. Then, the paper critically engages two accounts that offer a mark of the cognitive, one by EMH opponents Adams and Garrison (2013) and one by EMH proponent Mark Rowlands (2010). Throughout the paper, the case of infant emotion regulation will be used to assist in providing an assessment of the conditions proposed by the authors, and to lay bare some of the challenges they face.

1 Why a Mark of the Cognitive?

It is perhaps helpful to start by addressing a central concern connected to the mark of the cognitive. Some philosophers, mostly proponents of the EMH, are skeptical as to whether providing such a mark would bear on any significant practical value. Consider, for instance, biology. Although scientists might agree that the domain of biology is concerned with living organisms, there is no general agreement about the mark that makes something a living organism. So it seems that successful research in biology does not require an exact definition of what it is that makes something a biological organism. But then, why bother searching for the mark of the cognitive?

Along somewhat similar lines, some hold that “one can fruitfully discuss the pros and cons of cognitive extension in the absence of an account of cognition, so that the failure to provide a mark of the cognitive should not prevent one from worrying about whether cognitive processes are an intracranial affair only, encompass extracranial parts of the body, or even stretch out into the extrabodily environment” (Walter and Kästner 2012, 13). For instance, the original version of the EMH holds that an extracranial process may count as cognitive if it meets the functional equivalence criterion required by the “parity principle,” i.e., if it “functions as a process which, *were it done in the head*, we would have no hesitation in recognizing as part of the cognitive process” (Clark and Chalmers 1998, 8).

Elaborating on this issue, Clark (2011, 4) maintains that the question about parity is one that “we can perfectly well ask ourselves without first adopting any explicit ‘mark of the cognitive.’” This is in part because the parity principle is only designed to help establish whether there is functional equivalence.

Although this line of reasoning has appealing aspects, one might argue that it merely pushes the problem further instead of dissolving it. This is because considerations about parity involve establishing whether an internal process qualifies as “cognitive,” which itself must make recourse to a particular set of criteria. However, the EMH proponent who rejects the need for a mark of the cognitive might reply to this concern in the following way. She could maintain that there is no need for an explicit mark, because there is (tacit) agreement among cognitive scientists about the boundaries of the realm of the cognitive. As Shapiro (2011) notes, in the usual cases, when investigating problem solving, memory, or spatial reasoning, a mark of the cognitive is not necessary, because there is widespread agreement that these processes count as cognitive. We may to a certain extent agree with this view, but stress that the picture is less clear when it comes to assessing other processes. For instance, there is definitively no agreement among experts about the cognitive status of a number of processes, such as emotions, forms of instinctive reactions, comprehension, and consciousness (Walter and Kästner 2012; van Holland 2013).

But even if there was widespread agreement among cognitive scientists about which processes count as cognitive, and even if one agreed that cognitive scientists can conduct successful research without recourse to a mark of the cognitive, the EMH proponent might still be in need of a mark, because progress about the “where” of cognitive processes appears to require determining which processes qualify as cognitive to begin with. Recall that the parity principle works by comparing the functional profiles of organism-external parts or processes with internal processes that we wouldn’t hesitate acknowledging as part of a cognitive process. But saying that organism-external process X is the *same* process as intracranial process Y involves at least implicitly taking a stance on what kind of differences between the two processes we can abstract from.

For instance, some EMH supporters argue that we may abstract from fine-grained characteristics (see Clark 2008). Rejecting this view, opponents of EMH argue that the realm of the cognitive should be demarcated by investigating the fine-grained details of processes that we traditionally deem as cognitive (Adams and Aizawa 2010, 68; 2008; Adams 2010; Rupert 2004, 2009; Fodor 2009).² But, importantly for our purposes, abstracting from fine-grained characteristics involves a commitment to certain (in this case coarse-grained, functional) identity conditions that demarcate the realm of the cognitive. This commitment is often justified by maintaining that a coarse-grained level analysis is consistent with commonsense psychology and avoids conceptualizing cognition in an overly anthropocentric manner. However, to avoid an unproductive stalemate, it would be beneficial to offer independent support for the choice of a coarse-grained notion beyond the claim that it is consistent with intuitions about folk-psychology.

Insisting on her denial of the need of a mark of the cognitive, the EMH proponent might employ a different strategy. She might emphasize that the EMH does not need a mark of

² Both Rupert and Adams and Aizawa emphasize fine-grained features of human memory that EMH-systems lack (for instance the “generation effect”), while Adams and Aizawa (2008) and Fodor (2009) argue that cognitive processes are exclusively realized by particular (neuronal) lower-level processes. Resisting the coarse-grained view, Adams and Aizawa (2008, 12) and Fodor (2009) argue that cognition-realizing substrates are mechanisms that function with “non-derived representations” and do not involve non-neuronal elements. Because non-derived representations exclusively occur in brain-bound systems, cognitive processes are brain-bound (Adams and Aizawa 2010).

the cognitive, because it is not primarily a metaphysical thesis about cognition but a new methodological approach, whose practicality depends on the explanatory helpfulness of the scientific undertaking that uses it. But it is hard to see how the EMH could remain a provoking and interesting thesis if it didn't contain some kind of a factual claim about the "where" of cognition, which is separate from considerations about explanatory relevance (see Barker 2010). The EMH would risk not being able to differentiate itself from less radical accounts of embedded or situated cognition that do not necessarily oppose traditional approaches to the mind (Adams 2010; Adams and Aizawa 2010; Adams and Garrison 2013; Rowlands 2008, 2010). To see why, recall that the EMH must demonstrate that bodily and external features are more than merely causal contributors to cognitive processes. By offering a mark of the cognitive and establishing that certain uses of bodily and external features meet it, the EMH could maintain that they are genuinely cognitive parts of larger processes, without having to rely much on intuitions in distinguishing between causes and constituents. Such intuitions are often less than certain. To use Shapiro (2011) example, while preparing a meal might involve reading recipes, gathering, preparing, and mixing ingredients, setting the table, etc., it is not clear which of these events are constituents of meal preparation and which are merely events best described as precursors or results of the preparation. Intuitions on this matter will differ, and whether or not one thinks that reading a recipe is a constituent of meal preparation or an activity prior to preparing the meal will depend on what one thinks it is to prepare a meal. The lesson that Shapiro (2011, 161) draws from is that if the debate on EMH is to avoid becoming futile, one must "confront questions over the meaning of mental, or cognitive, processes. Whether the body and world may be constituents of cognition or merely causally related to cognition depends, first, on what we mean by cognition and, second, on whether the body and world fall within or outside the circle we draw around the constituents of cognition." We may add that solving this issue requires an account of what cognition is that goes well beyond the idea that cognition is what offers a causal contribution to intelligent behavior.

Subscribing to the view that the realm of the cognitive needs to be demarcated in order to make progress in the debates surrounding the EMH, Mark Rowlands (2010) and Adams and Garrison (2013) offer different accounts of the mark of the cognitive. EMH proponent Rowlands (2010) provides sufficient conditions for something to count as cognitive, while EMH opponents Adams and Garrison (2013) offer a necessary condition. In the following, I shall critically engage their accounts.

2 Adams' and Garrison's Mark of the Cognitive

Adams and Garrison (2013) argue that "reasons" form part of the mark of the cognitive. On their view, reasons form a necessary condition, and their line of argument starts out with the suggestion that creatures "that cognitively process information are capable of doing things for reasons" (Adams and Garrison 2013, 346).

Adams and Garrison first consider creatures that, in their view, do not reach the level of the cognitive. Bacteria propelled by a flagellum exhibit a particular behavior pattern, characterized by moving away from toxins and towards food, while slime mold are able to find the shortest way to food through a maze, anticipating environmental changes. Somewhat similarly, Rodney Brook's robot, Herbert, is able to move around the room and pick up empty soda cans. However, according to Adams and Garrison, in none of these cases is it warranted to speak about cognitive processing. Surely there is information

processing at stake, but it is noncognitive, because the information processors themselves do not act for reasons. Even if we stretch the concept of reasons, Herbert's "reasons" are not its own, but derive from Herbert's designers. In the same way, the bacteria and the mold do not act for "reasons" of their own, and their behavior is not based the mechanisms of beliefs, desires, and intentions. Herbert, bacteria, and mold all have non-cognitive mechanisms that explain their behavior with recourse to non-representational, biological, or computer-scientific terms.

The explanations in terms of the reasons are teleological. Cognitive systems do one thing A in order to do (achieve) another thing B. In the types of reasons explanations we are featuring, the goal of doing B and the strategy for accomplishing B by doing A are represented within the system. (Adams and Garrison 2013, 347)

This is exactly the case with animals such as cats. When a cat slowly moves towards a bird with the goal of catching it, the cat has recourse to a representation or model of the goal and the means to achieve it. Adams and Garrison maintain that the desire for food and the belief that the bird is edible are, in this case, the mechanisms that produce the relevant behavior. These reasoning mechanisms might have been selected for, but they nevertheless constitute individual reasons for the cat to catch the bird. The reasons are the cat's own, emanating from its beliefs and desires. Having reasons in this manner is a far cry from non-cognitive information processing in bacteria, mold, and robots like Herbert. In those cases, the explanation of behavior does not involve reasoning and thus fails to reach the level of the cognitive.

We maintain that to get to the level of reasoning, the internal states that represent what is happening within the termite mound must rise to the level of having meaning. The states must be about the environment in ways that beliefs, desires, or intentions can be about the environment. That is, there must be something that can be falsely tokened, that can misrepresent; that can represent non-actual states of affairs. (Adams and Garrison 2013, 350)

To summarize, Adams and Garrison set out to provide a necessary criterion for the mark of the cognitive. They maintain that for any system S, if S's behavior is not open to an explanation based on reasons, then S is a non-cognitive system. Conversely, Adams and Garrison use the example of a cat chasing a bird to explain that cognition involves reasoning. The point is that an adequate explanation of the cat's behavior demands more than citing non-cognitive processing; it requires rising to the level of reasons explanation.

3 Rowlands' Mark of the Cognitive

Rowlands (2010) starts out by providing valuable reflections on the nature of the desideratum. While cognition can both be understood narrowly (as post-perceptual processing) or broadly (as including perceptual processing), Rowlands opts for the broader understanding and develops his account accordingly. Such a project does not amount to naturalizing the mind, that is, providing a reductive definition of cognitive processes in non-cognitive terms, but merely aims at demarcating the realm of the cognitive by providing sufficient conditions. According to Rowlands (2010, 110–111) a process P is a cognitive process if:

1. P involves information processing—the manipulation and transformation of information-bearing structures.
2. This information processing has the proper function of making available either to the subject or to subsequent processing operations information that was, prior to this processing, unavailable.
3. This information is made available by way of the production, in the subject of P, of a representational state.
4. P is a process that belongs to the subject of that representation state.

Discussing the Gibsonian account of visual perception, Rowlands argues that environmental features, structures, and processes such as the optic array satisfy his four conditions. Condition (1) is easily met, as it is widely agreed upon that on available concepts of “information,” visual perception involves information processing. Regardless of whether one thinks that an entity X conveys information about Y only if the probability of X given Y is 1, or whether one thinks that X conveys information about Y only if there is at least a significant increase in conditional probability, perception involves information processing.

It is also relatively undemanding to show that condition (2) is met, i.e., that the proper function of visual information processing is to make information available for further processing. Using Millikan’s etiological concept of proper function (Millikan 1984, 1993), according to which the proper function of some Z is what Z has been designed to do, Rowlands maintains that the notion of cognition is normative, understood in terms of not what it actually does, but what it is supposed to do. Perhaps due to the nature of the examples usually used in connection with this etiological concept of proper function, some have objected that Rowlands’ criteria is too narrow and includes only biological systems (Adams and Garrison 2013, 343 and 344). However, there is nothing in Rowlands’ account that would necessitate such a limitation, which becomes clear when he discusses the deployment of knots by knivv officers (Rowlands 2010, 124–125). In that case, the knots are conceived as having a proper function, but not in a strictly biological sense.

As to condition (3), Rowlands uses the notion of representation, but emphasizes that the account doesn’t hinge on the notion, and can therefore also be used by non-representationists. On his view, while representations often have truth-values, some only have adequacy conditions, which are normative and able to accommodate that representations can be felicitous or infelicitous. While representation-involving cognitive processing can occur on personal- and subpersonal levels, the view is that the subpersonal level must be integrated into and contribute to cognitive processing on the personal level.

Conditions (1)–(3) are relatively uncontested on most accounts, and Rowlands maintains that the relevant criteria are based on the implicitly or explicitly held views of cognitive scientists about the bounds of the realm of the cognitive. He acknowledges that conditions (1)–(3) by themselves would allow too many processes to count as cognitive, and it is here that (4), the ownership condition, the most controversial of the four, comes into the picture. One problem, he recognizes, is that (4) seems to lead to circularity. He notes,

“After all, it is not any sort of subject that can own a cognitive process: the subject in question must be a cognitive subject. But a cognitive subject, it seems, is a subject of cognitive processes. Therefore, the criterion presupposes, rather than explains, an understanding of what it is for a process to be cognitive.” (Rowlands 2010, 135)

However, Rowlands argues that the condition is not circular but recursive, meaning merely that “a ‘subject’ in the sense required by condition (4) is an individual that owns processes that satisfy conditions (1)–(3).” But then, instead of having to worry about circularity, the real task is to elucidate how a subject can genuinely “own” its subpersonal and personal-level cognitive processes. Instead of offering two different accounts of ownership, Rowlands argues that subpersonal cognitive processes are to be comprehended as being properly integrated into personal-level processes, making a specific contribution to them. Because the ownership of subpersonal processes derives from the ownership of personal cognitive processes, the task is to spell out the conditions of ownership for personal-level processes. In short, a reliable indicator of a subject S’s ownership of a personal-level process P is that S has epistemic authority over P.

I am not author of, but hostage to, the processes that, for example, transform the raw primal sketch into the full primal sketch. Authority provides an epistemic criterion of ownership of cognitive processes. It clearly, then, is not the sort of criterion applicable to processes to which we lack epistemic access. Nevertheless, subpersonal processes can qualify as cognitive. And they qualify as cognitive because of the contribution they make to—the ways in which they are integrated into—personal-level cognitive processes to which the authority criterion is applicable. (Rowlands 2010, 154 and 155)

Rowlands continues by arguing that the basis for ownership of cognitive processes is provided by the idea that basic coping and higher-order cognition are both forms of disclosing activity, and that disclosure is always disclosure to a subject. In other words, cognitive processes are essentially owned because revealing activity is essentially owned. This then allows Rowlands to argue that cognitive processes can be extended because they belong to the class of revealing activities, which do not necessarily stop at the organism’s head or skin. Because the account risks stretching the notion of disclosure too thin, Rowlands points out that not all disclosing activity is cognitive. Instead, cognitive disclosure is disclosing activity that satisfies the conditions (Rowlands 2010, 212).

4 Summing Up

The previous two sections introduced two accounts that aim to offer a mark of the cognitive, both arguing that such a mark could provide useful answers as to whether cognition extends. Stopping short of trying to naturalize the mind (providing a reductive characterization of the cognitive realm in non-cognitive terms), they also agree that mere information processing does not constitute cognition. That said, they display notable differences in the manner in which they approach demarcating the realm of the cognitive. For instance, Rowlands aims at specifying sufficient conditions for a process to qualify as cognitive, while Adams and Garrison put forward a necessary condition for something to qualify as a cognitive process.

While both accounts have their strengths, it is also possible to point out some potential weaknesses. For instance, Rowlands’ (4) carries a lot of weight in his overall account, yet some argue that it is insufficiently clarified whether it is shielded against accusations of running into a vicious circle (see Adams and Garrison 2013, 345). Others argue that Adams and Garrison’s account is flawed, because they argue that the availability of a reasons-based explanation for behavior X is a necessary condition for X being cognitively

motivated by presenting evidence that systems that do not require such explanation are non-cognitive (see Elpidorou 2014, 205).

In the context of this paper, I will not provide further investigation of these potential weaknesses, but explore instead different paths. I will first discuss a particular cognitive process related to emotion regulation and show that it fails to meet the conditions proposed by Rowlands and Adams and Garrison.

5 Emotion Regulation in Infants

Undoubtedly, emotions have a significant role in our lives. They help disclose the world to us, guide our attention to vital aspects of the environment, prime patterns of behavioral response, and assist decision-making, social communication, and episodic memory. Nonetheless, their intensity, duration, and situation-appropriateness may at times have harmful effects. To avoid or minimize such effects and to achieve an equilibrium or homeostasis, we typically try to cognitively regulate our emotions, changing their trajectory and the way we experience and express them.

The regulatory activity typically increases or decreases the duration, intensity, latency, magnitude of the emotional experience, thereby exerting influencing on the behavioral response. Usually, we attempt to down-regulate (diminish duration and intensity) negative emotions, while we try to up-regulate positive emotions (Gross et al. 2006; Quoidbach et al. 2010). In addition to implicit, unconscious, and automatic regulation, the emotion regulation possibilities of adults include explicit, conscious, and controlled adjustment, which can involve the selection and modification of emotion-eliciting situations, changes in attention, cognitive reappraisal of situations, and response modulation (Gross 2014).³

While adults are able to recruit and deploy a large number of processes to regulate emotions, emotion regulation in infants, who lack access to most of these strategies, occurs in a different way. Besides the easily discernible self-oriented strategies (e.g., thumb sucking), emotion regulation also occurs in a complex interaction with the caretaker, such that the infant and the caretaker should be understood as components of a dynamically interacting dyadic system (Leclère et al. 2014; Feldman 2007; Cole et al. 2009).

What paved the way for the discovery of these subtle dyadic emotion regulation processes was the emergence of a transformed view on the social and cognitive skills of infants that highlights their interactive abilities (for a review, see Meltzoff and Brooks 2007). Some of the relevant research focuses on tight coupling and investigates the responsiveness of the infant to the caregiver's micro-level behaviors such as level of arousal, gaze direction, facial and bodily expressions, and tone of voice (Feldman 2007; Muratori and Maestro 2007). Studies discovered micro-level synchronizations between the infant's bodily movements and the speech of adults, and demonstrated that the "conversation" of vocalizations and movements between caretaker and infant is often characterized by a certain "synchrony"—an configuration of socially relevant micro-level behavior into rhythmic sequences, in which behaviors are matched and not merely copied (Brazelton et al. 1974; Condon and Sander 1974; Weinberg and Tronick 1994; Trevarthen 2002; Feldman and Eidelman 2004). Roughly, "synchrony" refers to the *completion* of each other's vocalizations and gestures, which involves matching not only behavior and emotional states, but also some biological rhythms (Feldman 2007; Feldman and Eidelman

³ This includes quite mundane strategies like watching a comforting comedy to ease sadness, hitting the wall to diminish anger, "firing oneself up" before a big game, etc.

2004). Moreover, the process involves the reciprocal adjustment of the temporal structure of behaviors (Leclère et al. 2014) and neurophysiological correlates (Dumas et al. 2010; Feldman 2012), demonstrated in changes in vagal tone, cortisol levels, and skin conductance (Moore and Calkins 2004; Gordon et al. 2010; Ham and Tronick 2009).

Important for our aims here, some of these interactive processes involving synchronizations have a key role in the infant's emotion regulation. The caretaker and the infant jointly moderate the level of arousal by complementing each other's states (Feldman 2007; Tronick 2002). Predictably, synchrony is not a constant feature of caretaker-infant interactions, and there are disruptions resulting in the mismatch of emotions or intentions. But such mismatches are typically followed by interactive "reparation", where the relevant states are matched again, resulting in the re-establishment of regulatory function (Tronick 1989). This is different when mismatch is not reliably followed by repair, for instance, in the case of mothers with post-partum depression. In such cases, mother-child dyadic interactions exhibit lower levels of synchrony and the negative affect of the infant remains unregulated and might take on depressive features. Many of these infants fail to acquire suitable regulative skills and may instead acquire maladaptive strategies (Manian and Bornstein 2009; Reck et al. 2004; Weinberg et al. 2006; in the case of extremely low gestational age children, see Sansavini et al. 2015).

The important upshot of our objectives is not merely that emotion regulation is accomplished within the framework of the dyadic interaction, but that the interaction itself serves as the vehicle of the infant's regulation of arousing experiences (Gross 2014; Manian and Bornstein 2009; Gross et al. 2011; Trevarthen 1993; Feldman 2007). While it is recognized that the infant's emotional states are dyadically regulated, some psychologists explain the process in a way that is consistent with the EMH. Tronick argues that caregiver's bodily expressions, vocalizations, and touches, are not only causal contributions. Instead of concluding that infants merely uses the social environment to ease the cognitive burden, Tronick (1998) holds that the interaction with the caretaker figures as a genuine component of the infant's emotion regulation, on par with other components. As he puts it, the components of the infant's regulatory system "are the infant's central nervous system (e.g., limbic sites) and the behaviors it organizes and controls (e.g., facial and vocal emotional displays) and the caregiver's regulatory input (e.g., facial expressions, touches, gestures)" (Tronick 1998, 296). The infant's emotion regulation is neither not brain-bound, nor organism-bound, but is realized by entities that include interaction with the external, social resources that the caretaker offers.

In particular, on more recent versions of the EMH, it appears that the dyadic emotion regulation could be considered as a case of extended cognition. It should be noted that this requires relaxing or merely adjusting some of the criteria in the original EMH to match social interactions. We should keep in mind that while Clark and Chalmers were from the beginning open to the idea of social forms of extended cognition, the original criteria, such as constancy, availability, endorsement, past-endorsement, were designed with examples in mind where human beings interact with artifacts like notebooks and computers (Varga 2016). Recall that Clark thinks of "Otto-and-the-notebook" as an integrated entity that "can be seen as a cognitive system in its own right" (Clark 2005, 7; Clark and Chalmers 1998). Along similar lines, we could argue that the "infant-and-the-caretaker" dyad serves as a system that, perhaps among other functions, at times regulates the emotional life of the infant. Keeping in mind the parity principle, emotion-regulation processes which qualify as cognitive when executed "in the head" should qualify as cognitive when executed comprising external entities and processes (Chalmers 2008). That said, it is of course true that emotion regulation can influence the emotion trajectory in a number of ways (Gross et al.

2011). In adults, emotion regulation may ensue by inhibition, reappraisal, or attentional change, while it unfolds through micro-level interaction in infants. But these differences notwithstanding, the important issue here is that there is functional equivalence between the infant-caretaker system's performance and adult emotion regulation.

The obvious objection is to maintain that the reciprocal coupling does not justify claiming that the interaction is a constitutive of the emotion regulation in the infant. Instead, it only justifies the conclusion that we are dealing with a case of distributed cognition, where the parts causally affect each other. However, we may reply by stressing two points. First, in the dyadic system, the parts are in a relation that Clark (1997) and Wheeler (2010) refer to as "continuous reciprocal causation." In such cases, an explanation that divides the dyadic system into separated causal parts is inadequate, as it fails to account for important, dynamic features of the system. Instead, it is more helpful to understand the mutually modulatory aspects in a wider perspective, beyond focusing input–output relationships between components. Second, an explanatory framework that relies on customary accounts of synchronic constitution that regard temporality as non-essential is not suitable for explaining dynamically unfolding extended cognition. Instead, we may look to recent work that uses a diachronic notion of constitution inspired by non-eliminative process ontology (Kirchhoff 2014, 2015). On such an account, "external" entities and processes can figure as constitutive parts of the system that regulates the infant's emotions (see Varga 2016).⁴

Having briefly introduced dyadic emotion regulation in infants, we may now proceed to exploring how the two accounts of the mark of the cognitive presented here could accommodate it. The hope is also to unearth some crucial challenges that any attempt at offering a mark of the cognitive should address.

6 Reasons and Dyadic Emotion Regulation

Adams and Garrison (2013) argue that reasons form a necessary condition for something to qualify as a cognitive process. But before I start exploring whether this account can accommodate the case of dyadic emotion regulation, there is a potential objection that needs to be addressed. One might object to my undertaking here, because Adams is a staunch opponent of the idea that cognition extends (Adams and Aizawa 2008), and would presumably maintain that while the infant-caretaker bodily interaction is important for the infant's emotion regulation, it merely exerts a causal influence. Further, Adams and Garrison might argue that because of the causal (and not constitutive) relation between the synchronic interaction and the emotion regulation, the former cannot count as cognitive.

To address this issue, we may grant that the dyadic emotion regulation is not a case of extended cognition in the sense that the tight bodily interaction merely exerts a causal influence that enables the intracranial emotion regulation of the infant. My point is that even if we grant this, the infant's emotion regulation would still not count as cognitive on Adams and Garrison's account. To see why, we may start by recalling the two kinds of explanations that Adams and Garrison distinguish. One type of reasons-based explanation, exemplified by the sentence "the reason plants turn their leaves toward the light is to

⁴ There are interesting parallels to researchers like Theiner et al (2010), who argue that groups can exhibit emergent cognitive capacities. It is however important to note that dyadic interaction significantly differs from typical cases of group cognition, in part because it is not the outcome of a division of labor among agents based on shared goals.

maximize photosynthesis” (Adams and Garrison 2013, 347), is an evolutionary-level explanation that does not underwrite cognitive processes, although the word “reason” is used. The explanations that characterize cognitive processing are instead teleological “system centered reasons,” in which the “the goal of doing B and the strategy for accomplishing B by doing A are represented within the system” (Adams and Garrison 2013, 347). Thus, if the infant’s emotion regulation is to be counted as a cognitive process, it has to be amenable to a “system centered” reasons-based explanation. Should it become apparent that the infant’s emotion regulation is not amenable to such an explanation, then Adams and Garrison would be forced to accept the conclusion that the infant’s emotion regulation does not count as cognitive processing.

With this in mind, let us now turn to available explanations for the behavior of the infant. Emphasizing that the infant distinctively seeks interaction and continuous engagement with the caretaker, one might be tempted to construct a reasons-based explanation along the following lines: at least in part, the reason infants engage in such tight bodily interaction is to attain regulation. However, at least without further specification, this appears to be the wrong kind of reasons-based explanation, as it neither cites the infant’s “own” reasons, nor requires that the infant represents the goal of achieving emotion regulation and the strategy for accomplishing it. In fact, this explanation would be comparable to the one formulated in the sentence “the reason plants turn their leaves toward the light is to maximize photosynthesis.”

To give a genuine “system centered” reasons-based explanation, one needs to take it a step further and invoke the infant’s concrete desires and beliefs. One obvious possibility would be to cite the infant’s desire to be near the caregiver, together with some type of belief about which “strategy” to apply in order to get the caregiver’s attention. But this strategy would fail to offer the appropriate “system centered” reasons-based explanation, because it cites task-irrelevant states, i.e., states that are not directly pertinent to the infant’s emotion regulation. Instead, on Adams and Garrison’s account, the right kind of “system centered” reasons-based explanation would need to invoke the infant’s representation of the goal (to achieve emotion regulation) together with the representation of a specific strategy (bodily interaction) to accomplish it. This, however, would require attributing a level of cognitive sophistication to the infant that it does not yet possess. Given that the infant is at a relatively early stage of cognitive development, it is difficult to conceive how the infant is supposed to be in possession of the relevant representations. While it is hard to imagine that the goal of emotion regulation is represented, it is even harder to imagine that the infant could have a representation of the right strategy to accomplish it, as this would necessitate knowledge about bodily and psychological processes that is unavailable for the infant.

To sum up, we may conclude that the infant’s emotion regulation is achieved by a process that is not amenable to an explanation that invokes the infant’s relevant states and representations. Instead, it appears that the most adequate explanation for the infant’s emotion regulation is a non-“system centered” explanation, which Adams and Garrison describe as not underwriting cognitive processes. These are explanations in which “there need be nothing in the system that represents the goal to be achieved. There need be nothing like a plan or strategy or history of memories of prior events of attempting to achieve such a goal” (Adams and Garrison 2013, 348). But whether or not Adams and Garrison’s non-“reason centered” explanation is entirely appropriate in this context, the important conclusion is that on their account, the infant’s emotion regulation process does not count as cognitive. However, if we accept the widely acknowledged view that emotion

regulation is essentially a cognitive process,⁵ then we may infer that the failure to provide reasons-based explanation constitutes an objection to Adams and Garrison's account.

7 Ownership and Dyadic Emotion Regulation

Rowlands (2010, 208) agrees with Clark and Chalmers that Otto's case qualifies as an instance of extended cognition, maintaining that it is "legitimate to regard Otto's manipulation of his book as part of his process of remembering." He explains that in the case of Otto, "the vehicles are, in part, brain processes [...]. The processes are also bodily: for example, ones that allow his arms, hands, and fingers to move in such a way that they can manipulate the book. But they are also, finally, environmental processes—processes of manipulating the book in such a way that information that was hitherto unavailable to Otto now becomes available" (Ibid., 208). On this basis, given the previously examined similarities between the dyadic emotion regulation case and Otto's case, we have reasons to assume that Rowlands would tend to agree that dyadic emotion regulation qualifies as extended cognition. Nonetheless, I want to show that his account of the mark of the cognitive would not include dyadic emotion regulation into the realm of the cognitive. To do this, let us have another look at Rowlands' conditions.

Call into mind that the case of dyadic emotion regulation we are dealing with is a tightly coupled bodily interaction that functions as the vehicle of emotion regulation. It is not hard to see that the spontaneously emerging bodily interaction fails to exhibit the kind of agency and epistemic authority that for Rowlands characterizes personal-level cognitive process. Therefore, the best way of making sense of the infant's emotion regulation within Rowlands' framework is acknowledging that the synchronic bodily interaction is not a person-level cognitive process, but maintaining instead that it nonetheless constitutes a subpersonal process that may qualify as cognitive if it is properly integrated into the person-level cognitive process of emotion regulation. This approach would require showing that (a) the infant's emotion regulation constitutes a properly owned person-level cognitive process and (b) that the bodily interaction constitutes a properly integrated subpersonal process.

Let us start with (a). While some minimal kind of ownership ("mineness") is always part of experiences for which there is something that it is like to undergo them (Zahavi and Kriegel 2015; Varga 2012), the type of ownership required here is more sophisticated. To clarify the notion of ownership and epistemic authority in person-level processes, Rowlands draws a parallel to the activity of identifying and laying bricks and argues that there are certain parts of this process that the agent has epistemic authority over. The agent is able to identify individual bricks, recognize the characteristics of good mortar, determine the optimal amount of cement to use, etc. The agent has "epistemic authority over how each brick is laid" and is "epistemically responsible-for certain parts of the process and

⁵ What counts as a cognitive process is mainly defined by the role it plays in the explanation of behavior, and thus includes including various forms of reasoning, memory, attention, problem solving, production of language. On such description, it is natural to think that emotion regulation belongs to the realm of the cognitive. This is also consistent with the manner in which the literature on emotion regulation speaks about "cognitive emotion regulation" and describes the relevant processes. For instance, cognitive reappraisal is often highlighted as the most successful general way to regulate emotions, next to situation selection, situation modification, attentional deployment, cognitive restructuring, and response modulation by expressive suppression (see McRae 2016). Thus, just as we regulate and sometimes successfully inhibit our thoughts from leading to behaviour, we regulate our emotions, for instance their intensity and duration to avoid maladaptive and behavior.

product” (Rowlands 2010, 153). But if epistemic authority constitutes a criterion for our ownership of person-level processes, then the conclusion would be that the infant’s emotion regulation does not qualify as a cognitive process. Indeed, it would be odd to claim that the infant has epistemic responsibility for the process or that he has epistemic authority over it. However, Rowlands does not maintain that the idea of epistemic authority provides a criterion of ownership, but merely that it constitutes a reasonably reliable accompaniment of properly owned personal-level processes. Instead, it is the idea of “revelation or disclosure supplies the ultimate basis for our ownership of cognitive processes” (Rowlands 2010, 163). But then, the infant’s emotion regulation may qualify as cognitive, because it may be understood as a disclosing activity, at least as long as we concur that changing the intensity or duration of an emotion alters the way the world appears to us.

Moving on to (b), the question is to what extent the bodily interaction constitutes a properly integrated subpersonal process. On Rowlands’ account, subpersonal cognitive processes like saccadic eye movements are disclosing activities that make available information, which then contributes to subsequent personal-level processes. But in the case of the infant’s emotion regulation, while the bodily interaction contributes to the personal-level process, it is very doubtful that it does so by making information available. First, it may at first be difficult to see what kind of information about the world the bodily interaction makes available for the infant. Depending on the notion of information that we use, we could perhaps say that there is some kind of a transmission of information, for instance about the caretaker’s body, emotional state, or perhaps proprioception-related information. Nonetheless, the interaction process would still not qualify as cognitive. This is because we have no reasons to hold that the presumed representational states carry the kind of *task-relevant information* that allows the infant to achieve the task of emotion regulation in virtue of this information. But if this is true, then the bodily interaction, conceived as a subpersonal process that contributes to further processing, is not the kind of disclosing activity that meets Rowland’s conditions. Ultimately, this also means that on Rowlands’ account, the infant’s emotion regulation does not count as a cognitive process.

Having reached this conclusion, we may now proceed to shedding light on the ramifications for Rowland’s mark of the cognitive. To be clear, the arguments presented in this section are in no way devastating for Rowlands’ account, because his mark of the cognitive is designed only to provide sufficient conditions for a process to count as cognitive. In other words, he offers a set of conditions that are jointly sufficient without being individually necessary, which only means that if a process X satisfies the conditions he lists, then X qualifies as belonging to the realm of the cognitive. This leaves open the possibility that there might be processes that are genuinely cognitive, but fail to satisfy his conditions. But while demonstrating that the infant’s emotion regulation fails to meet the ownership criteria does not undermine Rowlands’ account, it nevertheless highlights some of its limitations. Rowlands’ strategy might be adequate to neutralize standard objections to the idea that cognition sometimes extends, but it exhibits significant limitations when it comes to the task of providing a comprehensive account of the boundaries of the cognitive.

8 Conclusion

In the wake of the EMH, the field of philosophy of cognitive science witnessed the emergence of intense debates about the boundaries of mind and cognition. The main goal of this paper was to explore some essential issues in the debates surrounding the question about the mark of the cognitive. The paper started out by offering some reflections on the mark of the cognitive, arguing that providing such a mark would be helpful in settling the dispute about whether cognition extends into the world. Subsequently, the main part of the paper critically engaged two accounts that seek to offer a mark of the cognitive. Using case of emotion regulation in infants, the paper offered an assessment of the conditions proposed by the authors and highlighted the challenges that they face.

In regard to Adams and Garrison's account, the conclusion was that the infant's emotion regulation is achieved by a process that is not amenable to explanations invoking the infant's states. This conclusion is damaging, because Adams and Garrison aim to provide a necessary condition for a process to qualify as cognitive. In regard to Rowlands' account, the conclusion was that bodily interaction, conceived as a process that contributes to further processing, does not belong to the sort of disclosing activities that meet Rowland's conditions. This conclusion does not, however, undermine Rowlands' account, because he only sets out to provide sufficient conditions, leaving open the possibility of processes that are genuinely cognitive, yet fail to satisfy his conditions.

The jury on the subject of the mark of the cognitive is still out. But it is important to note that many of the challenges raised in this paper reflect the need to reach beyond the typical examples involving artifacts, and to take into account interactive and intersubjective forms of cognition when arguing about the mark of the cognitive or extended cognition in general. Some of these cognitive processes display radically different characteristics that all attempts at offering a mark of the cognitive need to accommodate. Although this likely makes the task even more demanding, a continued interest in attempting to offer a mark of the cognitive would be beneficial in several regards. This is not merely because a mark of the cognitive would help advance debates about whether or to what extent cognition extends. It is plausible to assume that being able to specify what constitutes cognition (and perhaps also the conditions it requires in order to occur), instead of merely providing a list of cognitive processes, would probably help secure progress in the scientific study of cognition.

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