Cognitive Processes and Asymmetrical Dependencies, or How Thinking is Like Swimming

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Abstract
Where does the cognitive system begin and end? Intracranialists (such as Rupert, Adams, and Aizawa) maintain that the cognitive system is entirely identifiable with the biological central nervous system (CNS). Transcranialists (such as Clark and Chalmers), on the other hand, suggest that the cognitive system can extend beyond the biological CNS. In the second division of Supersizing the Mind, Clark defends the transcranial account against various objections. Of interest for this paper is Clark’s response to what he calls “asymmetry arguments.” Asymmetry arguments can be summarized as follows: subtract the props and aids, and the organism may create replacements. But subtract the organism, and all cognitive activity ceases. Although I am sympathetic to Clark’s overall project, I find his response to the asymmetry arguments inadequate in light of his responses to other objections. For this reason, I maintain that Clark’s response requires revision. By adopting a process metaphysics and appealing to mereological dependencies, I believe that Clark can provide a substantive response to asymmetry arguments that is consistent with his overall theory. This paper unfolds as follows: after summarizing Clark’s response to the asymmetry objection in (§2), I will argue that his response is unsuccessful in (§3). My argument hinges on the claim that Clark does not take into account the full intent of Rupert’s asymmetry argument. In (§4) I modify Clark’s response by appealing to mereology and the asymmetrical dependencies found therein. I conclude in (§5) that this modification provides Clark with an adequate response.
to the asymmetry argument and is consistent with his overall transcranialist account. The further question of whether this account assists Clark in responding to other intracranialist objections is beyond the scope of this paper.

1. INTRODUCTION

Where does the cognitive system begin and end? Intracranialists (such as Rupert, Adams, and Aizawa) maintain that the cognitive system is entirely identifiable with the biological central nervous system (CNS). Transcranialists (such as Clark and Chalmers), on the other hand, suggest that the cognitive system can extend beyond the biological CNS.¹

In the second division of *Supersizing the Mind*, Clark defends the transcranial account against various objections. Of interest for this paper is Clark’s response to what he calls “asymmetry arguments” (Clark 2008). ² Asymmetry arguments can be summarized as follows: “subtract the props and aids, and the organism may create replacements. But subtract the organism, and all cognitive activity ceases” (Clark 2008, 162). Although I am sympathetic to Clark’s overall project, I find his response to the asymmetry arguments inadequate in light of his responses to other objections. For this reason, I maintain that Clark’s response requires revision. By adopting a process metaphysics and appealing to mereological dependencies, I believe that Clark
can provide a substantive response to asymmetry arguments that is consistent with his overall theory.

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2. CLARK’S ASYMMETRY ARGUMENT

Clark’s formulation of the asymmetry argument can be summarized as follows:

If an organism loses its external props or aids, then it is possible to sustain cognitive activity by replacing those props and aids. On the other hand, if an organism ceases to exist, then cognitive activity will not be sustained among the props that are external to the organism (Clark 2008, 162).

The asymmetry argument is taken to criticize the extended mind thesis by suggesting that there is something significant about the organism distinct from external objects that are taken to be part of the cognitive system. If it were the case that the external objects had the role in the cognitive system that extended mind theorists take those objects to have, then it seems that we would not observe such distinctions among
the cognitive system’s constituent parts. But we do observe this asymmetry. Therefore, by *modus tollens*, it is not the case that external objects have the role in the cognitive system that extended mind theorists take those objects to have. For example, as in the case of the now famous Otto (see Clark and Chalmers 1998), who suffers from Alzheimer’s and is dependent upon his notebook for remembering the location of the Museum of Modern Art, if Otto’s notebook is damaged or lost, it seems that we can repair or replace the notebook and its contents without altering the cognitive system that consists of Otto and the notebook. If the biological Otto, on the other hand, is damaged or lost, then it does not appear that the cognitive system will remain unaltered—or even continue to exist.

2.1. CLARK’S RESPONSE

Clark rejects the initial conditional of the above *modus tollens* by agreeing that we do observe asymmetrical relations between the human brain and the objects external to the organism. When we subtract “those meaty islands of wet organismic plasticity, the whole [cognitive] process grinds to a standstill” (Clark 2008, 162). Elsewhere, though, Clark makes a similar move by suggesting that other objections to the transcranialist (e.g., boundary issues) are not really objections (Clark 2008). In those other instances he shows how the objection is not an objection by fleshing out his description of the transcranialist conception of the cognitive system. Clark, however, does not provide a precise account of the “lopsidedly essential” nature of the brain in this case. Instead, he provides examples to motivate the intuition that since there are things which are essentially lopsided in an analogous fashion to the brain in its relationship to external objects, we should not reject the extended mind thesis out-of-hand. Before identifying the problems with this approach, it is helpful to first summarize
the examples he provides and the example that I believe best represents Clark’s response to the asymmetry argument.

2.1.1. INFLATING INTUITIONS

Clark first considers the relationship between a person and a marker. Similar to Otto and his notebook, we should not believe that the marker is cognitive or is the cognitive system once the person ceases to exist or use the marker. Clark then provides an analogy suggesting that the cognitive system is lopsidedly dependent on the brain in a similar way to how a finger is dependent on a person’s body. This analogy illustrates how some things are asymmetrically dependent upon one another—the organism can exist without a finger, but the finger cannot exist unaltered independently of the organism. Lastly, he evokes Chalmers’ example, “Subtract the visual cortex and I can survive and attempt to compensate in various ways. But do whatever it takes to subtract me, and the leftover visual cortex won’t try any such maneuvers” (Clark 2008, 162).

Because I do not wish to address the murky concept of me-ness, or a purely intracranial phenomenon, I will not be discussing any further Chalmers’ example. Furthermore, the example of the pen’s relationship to a person begs the question as to whether external objects can ever be proper parts of a cognitive system. I find Clark’s reference to the finger’s dependency on an organism’s body to be the most useful because it makes use of something that we can agree is asymmetrically dependent (i.e., what it is for something to be a finger is for it to be a member of a hand). For this reason, I will focus on Clark’s analogy of the finger’s dependency on an organism’s body for the remainder of this paper.
2.1.2. THE FINGER AND THE BODY

The removal of a finger will modify the organism that it is part of, but not prevent the organism from functioning as such, whereas the removal of everything but the finger will not allow the finger to function as a finger.\(^\text{v}\) In other words, the body is lopsidedly essential for the existence of the organism-finger relation. This analogy highlights the asymmetrical relationship among the members of a system. The removal of some parts of a system may simply modify a system. Some parts, though, may nullify a system altogether upon their removal—that is, some component parts may be necessary for the existence of a system.

Clark appears to treat this analogy as an adequate response to the asymmetry argument. By showing that there is at least one thing that is asymmetrically dependent, he implies that we have reasons for believing that the asymmetry argument does not pose a problem for the transcranial account. I do agree that asymmetrical dependence will play a significant role in responding to the asymmetry argument, but I believe that the asymmetrical relation of a finger and the body does not serve this function.

3. UNSUCCESSFULNESS OF CLARK’S ANALOGY

I believe that Clark’s initial response to the asymmetry argument is unsuccessful for two reasons. First, it does not provide adequate reason for dismissing the asymmetry argument. This is due to Clark’s analogy not addressing the problem expressed by the asymmetry argument. Second, Clark’s response does not give us reason for preferring the transcranial to a specific interpretation of the intracranial account. This follows from Clark’s failure to take into account the full aim of Rupert’s asymmetry argument. After discussing why his response is unsuccessful in dealing with
his initial formulation of the asymmetry argument, I will consider Clark’s response in light of a formulation of the asymmetry argument that is aligned more closely to Rupert’s original intentions.

3.1. CLARK’S FORMULATION

The main thrust of the asymmetry argument is that the transcranialist cannot account for the significance of the biological organism in the cognitive system. First, although Clark does this elsewhere (Clark 2008, 139), his analogy does not directly motivate the significance of the organism in the cognitive system. Instead, his analogy gestures to how a part of a human may be dependent upon the core organism to a greater extent than the organism is dependent on the part. This gesture, however, does not provide us with any reason for believing that objects which are external to the organism are part of the cognitive system. We have good reasons for believing that the finger is part of the organism’s body because we can directly observe how the finger is connected to the body. We cannot do the same for objects that we claim are part of the cognitive system. At the most we can observe when the causal systems underlying cognitive systems are disrupted, but this is not the same as directly observing the parts of the cognitive system itself—partly because we are unable to make observable distinctions between the cognitive system itself and behaviors that the organism exhibits that indicate that cognitive activity is occurring.

Second, the relationship between an organism and the objects of the external environment that make up an extended cognitive system is disanalogous to the relationship between a finger and the rest of the body. Transcranialists maintain that when the cognitive system is extended beyond the brain and CNS, it functions by means of an organism interacting (coupled) with objects in the
environment. But the cognitive system, itself, is not only the organism plus the objects in the environment. To identify a cognitive system as such, there must be cognitive activity occurring—that is, the component parts that make up the cognitive system must be interacting with each other in a particular way (although what this way is is a contentious matter). The finger’s membership to a body, on the other hand, does not require any activity (as in the case of a corpse) for the finger to be part of a body.

To summarize, Clark’s analogy fails for two reasons. First, the analogy fails to motivate the centrality of the organism in the cognitive system by not providing us with enough information to identify the structure of the cognitive system. Second, the relationship between a finger and the body requires a different set of conditions for their existence than the set of conditions that the cognitive system requires. It appears, then, that Clark’s analogy does not motivate the essentialness of the brain or the CNS for the existence of the cognitive system, and, therefore, is unsuccessful in refuting his own formulation of the asymmetry argument.

3.1.1. INITIAL WORRIES

At this point in the discussion, someone might object that I am simply attacking Clark’s analogy. Clark’s analogy, though, is all that he offers as a response to the asymmetry argument. In particular, Clark offers the analogy as an intuition pump to have us think that the cognitive system is lopsidedly dependent upon the brain and CNS. He writes, “The arguments from lopsidedness gain a thin veneer of persuasiveness only because we are unused to thinking of our brains as themselves not one single indivisible unity … but simply as another collection of mechanisms” (Clark 2008, 163 emphasis in original). As stated above, this is a mistaken understanding of the charge of the asymmetry
argument. I agree that many of us are unused to thinking of the cognitive system as a collection of mechanisms, but for Clark’s analogy to successfully fend off the asymmetry objection, he needs to provide an argument that highlights the nature of the cognitive system—not only modify the way that we think about it. So, although it does appear that I am only attacking Clark’s analogy, it is all that he offers us. Things appear to only get worse for the transcranialist when we consider how Clark’s formulation of the asymmetry argument does not capture the full force of Rupert’s objection, which I consider in the next section.

3.2. RUPERT’S FORMULATION

In many places, Rupert (2010, 2010a, 2009, 2009a, 2009b, 2004) expresses the worry that we should not rush to endorse the extended mind thesis because “Acceptance of the [hypothesis of extended cognition] would alter our approach to research and theorizing in cognitive science and, it would seem, significantly change our conception of persons” (Rupert 2004, 389). Before endorsing the extended mind thesis, Rupert suggests that we should check to see if there are any competing views. If it turns out that more than one theory explains the same phenomenon, we ought to endorse the more conservative theory (Rupert 2009). In the case of the extended mind debate, Rupert prefers the competing view of embedded cognition. This is the view that “typical cognitive processes depend, in surprising and complex ways, on the organism’s use of external resources, but cognition does not literally extend into the environment” (Rupert 2009, 5). Because the embedded cognition view is capable of explaining the same phenomena as the extended view “within a more conservative framework,” Rupert maintains that we do not have adequate reasons at the moment for adopting the extended view of cognition (Rupert 2004, 390). It seems, then, that the burden of proof is upon the
transcranialist to provide reasons for why we should prefer the extended account over the embedded view.

In the case of the asymmetry argument, proponents of the extended mind view can accommodate the asymmetry by providing an account of the essentialness of the organism (as Clark does (Clark 2008, 195)). The embedded mind theorist also believes that the organism is essential to the cognitive system, and is, therefore, also capable of accounting for the asymmetry relation between the organism and the objects in the external environment. The difference, though, is that the embedded cognition theorist is able to account for this asymmetry by not allowing objects in the external environment to be members of the cognitive system—thereby not needing to explain how the cognitive system expands beyond the brain and CNS. Presuming that we ought to adopt theories that maintain the fine balance of simplicity and explanatory power, Rupert believes that we have more reasons for adopting the embedded cognitive view than the extended cognitive view (Rupert 2009 and 2004).

Rather than asking the transcranialist to provide an account of how the cognitive system is lopsidedly dependent, the above formulation asks us to provide an account of why we should prefer the transcranialist picture to the intracranial one given the asymmetry of the cognitive system. I will now consider how Clark’s analogy unsuccessfully responds to this formulation.

3.2.1. ANALOGY IS UNSUCCESSFUL

To be successful in responding to Rupert’s formulation of the asymmetry argument, Clark’s analogy must provide us with adequate reasons for preferring the extended view to the embedded view in light of the existence of cognitive
lopsidedness. His analogy, however, is unsuccessful in this regard for similar reasons to why his analogy fails to rebut his own formulation of the asymmetry argument. First, the methods used for identifying the relationship between a finger and a body are inadequate for identifying the relationships of the component parts of any cognitive system. This suggests that the observational methods employed to identify biological part-whole relations underdetermine both the extended and embedded views. In other words, both theories of extended and embedded cognition are equally consistent with the data obtained by current observational methods. So, although Clark’s analogy does not succeed in providing reasons for preferring the extended view of cognition to the embedded view, the analogy illustrates that in at least one regard both extended and embedded cognition theories fall together.

Second, although Clark admits that the analogy is a non-cognitive example (Clark 2008, 162), the analogy seems to favor the embedded view. By highlighting the extent to which the biological organism is asymmetrically dependent upon its own constituent parts (e.g., fingers are dependent upon hands, but hands are not dependent upon fingers), the analogy provides us with reasons for believing that the material body is an essential part of any biological system, one of which happens to be the cognitive system, but we are left with no reason for believing that the cognitive system itself is dependent upon objects that are external to the material body.

Given such considerations, Clark’s analogy does not provide us with a reason for preferring the extended mind thesis to the embedded account, and, therefore, is not an adequate response to Rupert’s formulation of the asymmetry argument. So, although Clark does not appear to offer an adequate response to the asymmetry argument in the two
above formulations, I do not believe that Clark’s account is flawed beyond redemption. It is possible for Clark to offer a response to the asymmetry argument that highlights the structure of the cognitive system while also giving us reasons to prefer the extended mind thesis to the embedded account. The next section will suggest how this might be done.

4. MEREOLOGICAL ASYMMETRIES

There is much contention as to what kind of thing the cognitive system is. The main competing views appear to fall neatly along the intracranial and transcranial lines. I believe that clarifying the metaphysical presuppositions that underlie these opposing views will help Clark provide an adequate response to the asymmetry argument.

4.1. FROM SUBSTANCE TO PROCESS

Those who think of the cognitive system in intracranalist terms seek to identify where the cognitive system begins and ends. By identifying the parts of the cognitive system and locating the boundaries of those parts, they believe that they can identify the boundaries of the cognitive system itself (Adams and Aizawa 2010). Because cognitive science suggests that the cognitive system is bound to the organism, the intracranalist interpretation does not lend itself to the view that the cognitive system extends beyond the organism (Menary 2010). I believe that this is an outcome of the intracranialists maintaining a substance-based ontology, which suggests that substances are the only ontological primitives. By presuming that all that exists are substances, intracranialists do not allow room to for cognitive elements to extend beyond the substances upon which they are taken to depend.
A process-based ontology tells a different story of what the underlying components consist of. In this story, processes, rather than substances, play the foundational role. This is amiable to the transcranialist view of mind—the view that the cognitive system is a set of mental process. The transcranialist story suggests that the cognitive system is not simply a conglomerate of stuff, but that it is by the component parts of the cognitive system being arranged in a particular way that allows them to interact with each other. By interacting in the appropriate way, the cognitive system is sustained over time.

The outcome of understanding what is doing the interacting will determine how the cognitive system can change, thereby determining to what extent it is bound by the biological organism. On the substance-based view, if it is only substances that make up the constituent parts of the cognitive system, then it is certainly difficult to understand how the cognitive system is not strictly bound to the biological organism. The process-based ontologist, on the other hand, by viewing the constituent parts of the system as processes, has room to incorporate external objects within the cognitive system.

To understand what the constituent parts of the cognitive system are, we need to clarify what it means for something to be dependent upon something else. As in the case of many ontologically dependent objects (e.g., smiles, holes, fists, and paths), the existence of an object $A$ may depend upon the existence of an object $B$, but $B$ might not depend upon $A$—that is, the relationship may be asymmetrical. The direction of the asymmetry can be evaluated counterfactually. Given the above asymmetry, if $B$ were to cease to exist, then $A$ would also cease to exist. But if $A$ were to cease to exist, then $B$ would not cease to exist. For example, a smile is a disturbance on a face that is asymmetrically dependent upon
the face that is smiling (Simons 1987, 306-8). If it were the case that the face did not exist, then the smile would also not exist. On the other hand, if the smile ceased to exist, the face would not go out of existence by virtue of the absence of the smile.

This discussion of mereology highlights how some objects depend upon the structure of substances, and appears to be the approach that most cognitive theorists have taken to understand the cognitive system. In particular, the substances that the cognitive system depends upon are evaluated in terms of their causal role in producing cognitive effects. To produce a cognitive effect once, though, is not sufficient on the intracranialist view for something to be part of the cognitive system. The part must also regularly generate cognitive states in a predictable fashion as determined by cognitive science and psychology (Menary 2010, 18).

Cognitive science and psychology are also responsible for determining what kind of things the parts of the cognitive system must be. It is helpful to think about a smile again. A smile is not identical to the process of smiling, although the smile is the result of a face being disturbed in a specific way. Similarly, intracranialists maintain that engaging in a cognitive process such as remembering is distinct from the memory itself. So even if it is the case that a memory is offloaded to an external device (as in the case of Otto’s notebook), the act of remembering is radically different from the locating of a memory on an external device. These processes of locating a memory from an external device and the act of remembering are described by cognitive scientists and psychologists in different terms, and, as Rupert states, “the external portions of extended ‘memory’ states (processes) differ so greatly from internal memories (the process of remembering) that they should be treated as
distinct kinds” (Rupert 2004, 407 quoted in Menary 2010, 18).

Intracranialists, however, are likely to only follow guidelines offered by cognitive science and psychology to identify parts of the cognitive system. These fields only identify properties that exist within the organism as being candidate members of the cognitive system. As Menary indicates, “Mental properties are dependent on neuronal properties in an especially clear way; therefore the brain instantiates mental properties” (Menary 2010, 14). This approach is motivated by a substance-based metaphysics. What would happen, though, to the cognitive story if we shift to a process-based view?

The shift to a process-based view is not a novel maneuver. McTaggart, Russell, Whitehead, Carnap, and Quine, although in different forms and for different reasons, all endorsed process-based views at one time or another (Simons 1987, 123 n.43). Once we shift to a process-based ontology there is no obvious reason why dependency relations would disappear. Furthermore, there does not seem to be any reason why there would not be asymmetrical dependencies. But since processes would be the basic constituents, rather than substances, and most of us think in substance terms with our privileging of noun-phrases, we need to offer an account of how processes can be asymmetrically dependent upon one another.

It is important to first note that processes are four-dimensional entities. Processes require temporal parts because a process is something that occurs over time insofar as it begins and ends (Sider 2001, 211). In addition to having temporal parts, according to Seibt (2003, 31-32), a process is an activity that is a mode of occurrence that fulfills four conditions:
(1) Activities are always completed once going on. From ‘person S is doing activity A’ we can infer that ‘S has done A’. For example, a person who is swimming can be said to have swam.

(2) Activities can be suspended and resumed. From ‘S having done A’ we cannot infer that ‘S is still doing A’ or that ‘S is no longer doing A’. To say that a person has swam, though, does not allow us to infer that she is either still swimming or is no longer swimming.

(3) Can recur. From ‘S does A’ we can infer that there are many instances of S doing A. If a person swims, then we can infer that there are many instances of the person swimming.

(4) Any present going on of an activity is the outcome of its past going on. From ‘S doing A’ we can infer that ‘S has been doing A’. For a person to be currently swimming, we can infer that she has been swimming.

From the four above conditions and the idea of temporal parts, we are able to determine when a process starts and ends. We still have the difficult task of establishing the spatial boundaries of a process. For example, during the time that a person performs the act of swimming, we can use a measuring device (e.g., a watch) to determine when the activity starts and ends. But where does the swimming actually take place? We can better understand the boundaries of a process by understanding how a process is dependent upon its temporal and spatial parts.

Siebt (2003, 32) outlines two types of relations that can be obtained between a process and its parts:
Likepartedness: An entity of kind $K$ is likeparted iff some of its spatial or temporal parts are of kind $K$.

Strict likepartedness: An entity of kind $K$ is likeparted iff all of its spatial or temporal parts are of kind $K$.

Presuming that processes are entities, we can use these relations to better understand the boundaries of an activity such as swimming. Strict likepartedness implies that in the event of swimming, every part of the swimming is itself a swimming. But this seems obviously false. Water is not a swimming, a swimming cap is not a swimming, a time slice at which swimming occurs is itself not a swimming, and so on. Swimming is a process that undergoes changes. For a process to undergo change requires that the process lose and gain parts. So it is plausible to believe that not all parts of the act of swimming are all engaged in swimming at each moment that swimming occurs.

When a hand dips into the water at the same time that the feet propel the body forward, the hand, water, feet, and body are exhibiting swimming-like attributes. But the water that the person is not swimming through and the parts of the body that are not engaged in the act of swimming (if there are any), would not exhibit the same attributes. A single process of swimming, though, occurs at different locations, different times, and involves different body parts. (It would be odd to say that swimming stops each time a change occurs.) Instead, we should account for these changes by allowing the process of swimming to take on different temporal and spatial parts. The likepartedness relation captures this feature of a process by allowing some of its parts to no longer be part of the process while others begin being part of the same process.
Another benefit of adopting the likepartedness relation as the accurate description of the relationship between a process and its parts is that this adoption prevents everything from becoming part of a process. The reason becomes clear if we first consider what would happen if we adopted strict likepartedness. If all of a processes’ parts are of the same kind as the process, then an activity such as swimming would require that every part involved in swimming at anytime would be involved in the act of swimming—even when swimming was no longer occurring! This would lead to the strange outcome that all the water in a pool that had served as the medium through which the swimmer swam would still be part of the swimming process, even when the swimmer had left the pool. The likepartedness relation, on the other hand, is closer to our observations and our intuitions. We see things become part of a process and no longer belong to a process, even if the process is still occurring.

Because the likepartedness relation prevents everything from becoming part of a process, we are able to identify when the process recurs. In other words, we can recognize distinct instances of the process, which allows us to identify the process as an individual. This allows us to count recurrences as well as identify the nature of the process and its relationship to its parts. Most importantly for the purposes of this essay are our abilities to recognize the dependence relations of a process, and to understand how these dependence relations can be asymmetrical.

Many processes depend upon other processes. (I have difficulties imagining a process that does not depend upon another process.) In particular, the act of swimming depends upon an environment that allows for swimming to occur, a body that can swim, a medium through which the body
can swim, and a container for that medium. Water is itself a process that is identified in terms of an arrangement of molecules that endures over time. The human body is a collection of biological processes working collectively to allow the body to move in a particular way. The container of water is itself comprised of other atoms and molecules that are arranged in such a way as to not allow water to pass through its barrier. None of which is a static entity, as the substance ontologist would have it; all of these processes must maintain their arrangements over time for the swimming activity to be successful.

Even though swimming is dependent upon other processes, the process of swimming does not appear to be symmetrical. We can still imagine a swimming pool without any swimmers, and we can imagine the container without any water in it. So the process of swimming is an asymmetrical process: take away the swimming, and the pool will still exist, but take away the pool and no swimming can occur.

Let us take stock of what has been done so far. By shifting from a substance-based ontology to a process-based one, we can provide an account of processes as being activities that occur in a particular mode. Specifically, we have seen that some processes occur over time and that they are asymmetrically dependent. I believe that the cognitive system is a similar process to the one of swimming that I have discussed above. To highlight this similarity, I will briefly discuss how the cognitive system exhibits similar characteristics to swimming when thought of as a process rather than as a substance.
4.2. COGNITION AS PROCESS

Cognitive activity is something that occurs over time—it begins and ends. Like swimming, cognitive activity fulfills the same conditions given above for something being a process. For example, thinking is something that is always completed once it has begun; we can say that a thought has occurred once a person begins to think. Thoughts can begin and end. It is possible for us to have the same thoughts at different times, and the present occurrence of thinking is an outcome of previous thinking having occurred.

The likepartedness relationship also provides us with a way of thinking about how the cognitive system depends upon its constituent parts. Not all of the parts of the cognitive system must be engaged during cognitive activity to be counted as part of the cognitive process. When we have a thought, it is not the case that every neuron must fire at once for a thought to occur (although it may at times feel like this happens). The brain could not handle this demand of its resources. So, although, not all the parts of the brain are engaged all the time, we still have good reasons for thinking that the brain, and the inactive parts of the brain are part of the cognitive system, just not in the same way at the same time.

This likepartedness of the cognitive system further allows us to account for the change that occurs within cognitive activity. We have different memories, thoughts, desires, wishes, and dreams. We see different colors, have different tactile sensations, and hear different sounds. But none of these activities involve the brain in the same way. Instead, “The systems responsible for sensing the external world are composed of hierarchically organized, interacting neuronal groups” (Bloom et al. 2001, 140). As in the case of taste, different parts of the cortex are activated when we experience different taste sensations. Sour and bitter tastes
activate the neurons in the same region, whereas sweet objects stimulate the neurons in the opposite region of the cortex (Bloom et al. 2001, 138). Although some neurons may be engaged all the time during cognitive activity, it is not the case that all of the neurons are engaged when cognitive activity occurs. The cognitive system can be said to take on different spatial parts at different times depending upon the cognitive activity that is being performed. This is similar to how different parts of the body are activated when a person is engaged in different activities. Running is an activity that occurs in a different environment from swimming and requires a different set of joints to move in a different way than swimming requires.

We also see similar dependence relations arise between cognitive activity and swimming. The cognitive system is arguably a biological system, and a biological system is dependent upon an environment. The environment, within which the biological system is situated, is also a process. Similar to the process of swimming, we can remove a biological system from the environment without having the environment also disappear. On the other hand, if we remove the environment, the biological system will also disappear with it. By thinking more locally, we can imagine the biological body as the environment within which the cognitive system is situated. If the biological body ceases to exist (i.e., dies), then the cognitive process will also halt, but if we remove the cognitive system, the body will still be engaged in a biological process—namely, decomposition.

This appears to be an obvious example as to how the cognitive system is an asymmetrically dependent process, but to make the point more explicit it may be helpful to think even more locally. The brain and CNS are both involved in cognitive activity in some way to such an extent that if either is damaged or removed, then the cognitive system is
modified or ceases to allow cognitive activity to take place. However, if the cognitive system ceases to exist, it is still possible for the brain and CNS to exist.

It seems that what I have offered so far is an argument for intracranialism by showing how the cognitive system is asymmetrically dependent upon the brain and CNS. Remember, though, that we are working within a process framework. This means that the cognitive system is to be understood as a process. So even if the cognitive system is dependent upon the brain and CNS, it may not be the case that the cognitive system is bound by the brain and CNS. This is due to the cognitive system being dependent upon not only the internal components of the biological organism, but also the external environment. We do not want to say, because of the likepartedness relation, that the entire environment is itself part of the cognitive system, although there may be times at which a person’s cognitive activities are heavily dependent upon objects in the external environment in a way that those objects are themselves part of the person’s cognitive system.

This is not to say that a person’s entire cognitive capabilities are dependent upon external objects, although there is no clear reason why this may not be the case, but it is likely that specific cognitive activities (e.g., remembering a building’s location) are dependent upon the external object (e.g., Otto’s notebook). This point illustrates how thinking is like swimming.

The activity of swimming depends upon a medium external to the organism doing the swimming to such an extent that we are justified in believing that that medium is part of the swimming process. We, however, would not say that the medium is part of all physical activities that the person engages in (e.g., running). For similar reasons, we should not
suggest that the external object that is part of a specific cognitive activity is part of all cognitive activities that the cognitive system engages in—much in the same way that we should not suggest that the neurons involved in experiencing sweet objects are also part of the activity of tasting sour or bitter ones.

4.3. RESPONSE TO CLARK’S FORMULATION

At this point, it should be clear how this account of the cognitive system as an asymmetrically dependent process assists Clark in responding to his formulation of the asymmetry argument. Clark’s initial response was unsuccessful for two reasons. He doesn’t offer an actual description of the cognitive system that would allow for asymmetries to arise. Furthermore, he attempted to motivate the intuition that the cognitive system is asymmetrical by appealing to something of a different kind.

I believe the description of the cognitive system I offer above as an asymmetrically dependent process assists Clark in overcoming these difficulties. In the first case, by showing how the cognitive system asymmetrically depends upon its own underlying processes, it becomes clearer how objects external to the organism can become part of the cognitive system without the cognitive system halting when those objects are no longer part of the system.

Second, my account explains how some cognitive activities may be dependent upon external objects without requiring the entire cognitive system being dependent upon those external objects all the time. This is further illuminated by comparing the cognitive system (as a process) to swimming (something else that is a process). This motivates the intuition that some activities are dependent upon external objects to the extent that those objects are part of the system.
engaged in that activity, since without the external object the system would not be able to successfully engage in the activity as such. This can be accomplished, though, without requiring the external object to be part of the system all the time.

4.4. RESPONSE TO RUPERT’S FORMULATION

Clark’s objection to Rupert’s formulation of the asymmetry argument, as I had reconstructed it, was unsuccessful for similar reasons to why it was unsuccessful in responding to Clark’s own formulation of the asymmetry argument. Because the analogy Clark provides does not explain how the cognitive system is asymmetrical, his analogy is unable to avoid the underdetermination problem that both the extended and embedded views encounter. Second, because the embedded account is able to account for the cognitive system’s dependency on the biological organism without requiring an explanation of how the cognitive system extends into the environment, using Rupert’s criterion for theory selection, we have more reasons to prefer the embedded perspective to the extended one.

Although I do not believe my account definitively overcomes the first difficulty, I do believe that my account creates room for why we might prefer the extended view to the embedded account. The underdetermination problem arises because both the extended and embedded hypotheses are consistent with the current data available from cognitive science and psychology. In particular, if the removal of an external object leads to the alteration of a cognitive system, we are not able to determine if the cognitive system was altered because the external object was part of the cognitive system, or if it was altered because the cognitive system was only reliant upon the external object. I do not believe that my account can overcome this difficulty in its current form.
because even when we think of a cognitive system as an asymmetrically dependent process, there is still the possibility that the object that was removed was only interacting with the cognitive system without being a part of it.

My account of the cognitive system, however, does provide us with reasons for preferring the extended account to the embedded account. By maintaining that the cognitive system maintains likepartedness with its constituent parts, it can overcome difficulties of accounting for how the cognitive system can change as well as why some external objects are part of the cognitive system and others are not, and when external objects that were once part of the cognitive system are no longer part of it. The intracranialist, however, is not able to account for this change in cognitive activity by thinking of the cognitive system in purely substance terms. For the intracranialist, the cognitive system has its parts entirely. This would mean that the intracranialist would argue that the cognitive system maintains strict likepartedness for its dependency on its parts—that is, the parts of the cognitive system are themselves cognitive. This shifts the burden of proof to the intracranialist to explain why the cognitive system is bound by the brain and CNS all the time.

5. CONCLUSION

This essay has covered a lot of ground. After summarizing the asymmetry objection in both its formulations that Clark provides and the form that I believe is closest to Rupert’s intentions, I showed why Clark’s response unsuccessfully deals with both these formulations. I then went on to construct a formulation of the cognitive system that requires a shift from a substance-based ontology to a process-based one. This led us to understanding a cognitive system as an
asymmetrically dependent process. I then showed how this formulation of a cognitive system allows Clark to adequately respond to the asymmetry objection by overcoming the difficulties that I had originally found in his response. The downside of allowing four-dimensional entities into our ontology is that we also face difficult problems. \(ix\) I do not believe that these problems are any more difficult than the problems that face a substance-based ontology, although the reasons why require an independent discussion.

The upshot is that my account of the cognitive system appears to be consistent with the extended mind thesis that Clark argues for. Processes are understood in terms of activities that extend over time. For example, we can recognize when someone has begun and has successfully completed swimming. Similarly, we can recognize when someone successfully performs a cognitive activity. We do this by making observations over time to identify how well a person engages and completes cognitive tasks.

Furthermore, my account is consistent with the parity principle—a foundational principle for endorsing the extended mind theory. This principle suggests that:

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\text{If as we confront a task, a part of the world functions as a process which \textit{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 \textit{is} (so we claim) part of the cognitive process. (Clark and Chalmers 2010, 29; emphasis in original)}
\]

By thinking of a cognitive system as an asymmetrically dependent process, the objects of the external world can at times play a significant role in determining the cognitive activities that the cognitive system can engage in. This
dependency does not appear to be any different than the firing of a neuron that takes place within the head. For this reason, if the neuron fires outside the head, and a cognitive activity is dependent on that neuron, it seems that we ought to still count that neuron as part of the cognitive system—even if it is not within the skull.

Lastly, there may be some cognitive activities that require the cognitive system be reliably coupled with an external object for the execution of those activities. By adopting an account of likepartedness, my account allows us to better understand how external objects can be part of a cognitive system without needing to be part of the cognitive system all the time—thereby showing how “thinking and cognizing may (at times) depend directly and noninstrumentally upon the ongoing work of the body and / or the extraorganisic environment” (Clark 2008, xxviii).

NOTES

i I will be using ‘transcranialists’ and ‘extended mind theorists’ interchangeably.

ii Although both Collins and Rupert put forward the asymmetry objection (Clark 2008, 162), I will be concerned with Rupert’s account for this paper.

iii Although I believe that my account assists Clark in overcoming the asymmetry argument, I do not claim to resolve all the problems that Block (1978), Kim (1993), and Rupert (2009) address against the functionalist.

iv This example makes way for a response to Adams and Aizawa’s account of what is wrong with Clark’s extended mind account: “Question: Why did the pencil think that $2 + 2 = 4$? Clark’s answer: Because it was coupled to the mathematician” (Adamas and Aizawa 2010, 66). Clark responds to this “joke” in (Clark 2010).

v An earlier account of this kind of functionalism can be found in Aristotle (Metaphysics Z, 1034ff).
vi It’s contentious what this balance is and what is particularly special about these epistemic virtues for theory selection.
vii A substance can be understood as a material object “extended in three spatial dimensions and enduring in time without being extended in time” (Simons 1987, 117).
viii This point raises the issue as to whether the Cheshire’s smile is in fact a smile once the body disappears. It seems that the smile only remains a smile by recalling the fading of the cat’s body, or imagining that the rows of teeth are attached to a face.
ix Some of these problems are the modal problem for temporal parts, problem of identity, and puzzle of change.

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