On the Possibility of Mental Extension

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Abstract

In 1998, Andy Clark and David Chalmers presented philosophers of mind with a fresh contribution to the field’s anthology. Although *The Extended Mind* (1998) has become a seminal work in philosophy, in the two decades that have passed ithas raised eyebrows and generated some contention. In this paper, I want to claim that there is an opportunity for redemption in the extended mind thesis’ tenants. The aim of this writing is to revamp Chalmers and Clark’s (1998) thesis by demonstrating that it marries well with some of the contemporary literature found in cognitive science. The extended mind thesis is salvageable because its foundations are drawn from the folk-psychology used to describe the mental life in everyday human activity. I surmise that said phenomenon can be explained by considering the available literature on the nature of cognitive structures, their controversial evolutionary history and their relation to tool-use in early hominid life. The overarching theme of this work is that it is possible to place the extended mind thesis into a naturalized theoretical framework.

The Physical Possibility of Mental Extension

In 1998, Andy Clark and David Chalmers presented philosophers of mind with a fresh contribution to the field’s anthology. Although *The Extended Mind* (1998) has become a seminal work in philosophy, in the two decades that have passed ithas raised eyebrows and generated some contention. In this paper, I want to claim that there is an opportunity for redemption in the extended mind thesis’ tenants. The aim of this writing is to revamp Chalmers and Clark’s (1998) thesis by demonstrating that it marries well with some of the contemporary literature found in cognitive science. The extended mind thesis is salvageable because its foundations are made from the folk-psychology used to describe the phenomenon of mental life in everyday human activity. I surmise that said phenomenon can be explained by considering the available literature on the nature of cognitive structures, their controversial evolutionary history and their relation to tool-use in early hominid life. The overarching theme of this work is that it is possible to place the extended mind thesis into the theoretical framework that explains our natural world. In realizing that the properties of a mind potentially include experiences beyond the skull, not merely through caused phenomenon, cognitive science can toy with the possibility that we can explain the phenomena of mind in a way that is integrated with the environment. It welcomes a broader study of human cognition where instead theoretically limiting the features of human mental life to mere neurocognitive phenomena, it offers an interdisciplinary approach to research. To interact socially, to make things, to know your sense of space and your surroundings are all ways of describing what exactly the extended mind is and these are all things that when you consider the aspects of human development that are outside of the skull it’s easy to begin to shape a view of the mind that is embodied in a context.

**The Extended Mind**

For the sake of realizing my claim, I need to first explain to you the nature of the extended mind, as it was conceived by Andy Clark and David Chalmers (1998). Their work begins by taking apart a folk-notion about the mind. It is commonplace to assume that the boundaries of a mind are roughly located on the outskirts of the brain’s grey matter (Clark & Chalmers, 1998). The goal of the extended mind thesis was forged from the plausibly vague partition between mind and world (p. 27). This view proposes that the contributing stimuli furnishing the perceptual environment of mind is not distinctly separate from mind but is part of mind itself. Presuming this is true, if a person is sitting in front of a computer screen, solving equations in a mathematics workbook, accessing social media on a smart phone, or interfacing with any item in their perceptive field, the interaction between mind and material object insinuates a present meeting of what some perceive as two systems, the cause of mind and the cause of the sensed object (Chalmers, 2011). Chalmers and Clark (1998) borrow the term *epistemic action* to describe the process where one’s thoughts are used to alter their relative environment (Clark & Chalmers, 1998). At times a person’s thoughts are experienced extended beyond the bodily boundary. The perceptual object—the item attracting a localized cognitive event—and the neural mechanisms interacting with said object are one whole system.

The extended mind thesis emerges from an externalism about semantics and content. But this flavor of externalism is unlike the kind that fosters memorable slogans about meanings and their status of being outside of the head. The classical kind of externalism had argued for the privileged connection shared by an object in the senses and its distal sociohistorical meaning (Putnam, 1975). The meaning of an in-the-world item was not accounted for by mere propositional attitudes but by the phylogeny of the categorical item in question. *Active externalism,* unlike the former token of externalism, is about the present sensations propagated by a stimulus external to the user. The features of a sensed object activate the cognitive process. What qualifies as the internal use of a meaning of a word is any immediately available external information. In virtue of the qualifications being external to the user, the meaning of any given sensory content is live (hence, active).

Chalmers and Clark’s (1998) rendition of externalism serves as a foundation for what they dubbed a “coupled system” (Chalmers & Clark, 1998). They claim that if “all the components in the system play an active causal role”—an interaction between a person and a proximal stimulus in the percieved environment—then an external component (the stimulus), when removed, causes “the system’s behavioral competence” to “drop, just as it would if we removed part of [one’s] brain” (p. 29). Coupling is the conjoined effort of both internal and external processes used to count as a unified cognitive operation. Coupling is the bread and butter of the extended mind. If cognitive coupling is physically possible then so is this rendition of Chalmers and Clark’s (1998) thesis.

**Cognitive Architecture, Connectionism and Developmental Psychology**

In the next phase of this writing, I think it’s important to explore the possibility of realizing what coupling could be without its spooky implications. I would like to explore the features of cognitive coupling and perhaps flesh out what this can be in terms of a physical concept. To bring the extended mind to earthly interpretation, we need to look at the contemporary literature that tries to understand what cognitive systems are. Although the cognitive systems that I will describe here are limited by the boundary that is bordered by the skull, I speculate that the way these cognitive systems work together are no different than how they would work beyond the brain. Alongside these in-mind explanations come the qualities of cognition that, because of their use in socially interactive behavior, imply that cognition already experiences exchanging of systemic information with its stimulus.

From what I understand, although hotly debated, much of cognitive science has been experiencing a paradigm shift (Garson, 2015). The field has begun moving from Turing-style serial processing to connectionism and its parallel-processing explanations. Some of the major contributors to cognitive science believe that connectionism better explains learning-caused transformations in neural architecture (Prinz, 2006; D’Sousa & Smith, 2017)

Modularity’s criteria of domain-specificity only tell us a fraction of how the mind works but there’s a plethora of reasons to say why it’s not the whole story (Prinz, 2006; Fodor, 2001). In the connectionist approach to cognitive processes, parts of the system are represented by neuro-nodes that are linked together in a figurative network (Matlin, 2013). These networks and their nodes are meant to depict a nexus of neurons all of which are activated together when its associated input is presented. The activation of any of these cognitive networks happens in tandem with the brain’s neuronal firing (Matlin, 2013). In this model, neurodevelopmental changes from birth to death are understood best by the slogan “neurons wire together if they fire together” (Löwel & Singer, 1992). This rule, derived from Donald Hebb’s research (1949) simplifies the explanation for how the learning process of a behavior coincides with a neuronal event and where thereafter the neurons that fired from the initial behavioral event have the potential to fire again in the same arrangement. In another sense, it is an offspring to Humean associationism in that human learning depends on the relations of ideas fostered by causality and frequency (Hume, 1748). The more frequent a behavior is had, the more likely it is for that neural connection to remain.

For connectionist, the prospect of adopting such a model allows them to be able to explain complex behaviors. These human behaviors include but are not limited to spatial-visual assessment, decision making, explanation selection, and meaning making in language comprehension (Thagard, 2014). Complex behaviors like those listed above have been suspected to developmentally tune to the qualities of human interaction existing in a child’s environment. This compliments studies in contemporary developmental psychology, which have poised the view that the mechanisms behind an infant’s cognitive maturation rely on mostly domain-general operations (i.e.: memory, executive functions, language) (Sloutsky 2010; Samuelson & McMurray 2016; Li, Christ & Cowan 2015; Barry, Estes & Rivera, 2015; Kaufman 2012). Domain-general development means that a human being’s cognitive faculties develop as a globalized whole rather than in parts (modules).

An example of a globalized development can be found in some of the research-laden literature in developmental psychology, which has consistently found links between motor milestones and infant social behavior. It is believed that much of the quality of infant motor development relies on the exploration of environments, objects and interactions with, most importantly, people. A great example of this can be found in studies of infant motor development which reveal links between efficient motor function and infant social behavior (Campos, Kennoian, & Zumbahlen, 1992; Libertus & Needham, 2011; Karasik, Lemonda & Adolph, 2014). Those studies reveal the importance of familial social interaction with an infant, as it rewards the baby with earlier onsets for motor function capabilities. Social interaction shows to be essential to the whole system’s maturation.

Another example of domain-general development can be found in the research surrounding language acquisition. There is evidence that word learning and reading comprehension depend on the quality of language learning environments (as cited in Quenqua, 2014). Evidence for links between motor and language can be found in modern humans. Studies measuring motor milestones at 10- to 14- months and 16- to 28- month old infants reveal that the development of motor competency is not wildly separate from development of speech or language comprehension (Oudgenoeg et al., 2012; Libertus & Violi, 2016). One of these studies yielded data that suggest that the earlier attainment of infant walking predicted language performance outcomes measured from a toddler’s vocabulary (Oudgenoeg et al., 2012). It is now obvious to anyone in developmental neuropsychology that the complex features of cognition cannot blossom on their own. They take in everything in their environment.

A major contribution to social behavior may lie in specialized cells called mirror neurons. In the last few years, there has been a lot of talk about mirror neurons and about what they do. It is theorized that these specialized cells fire when a person acts and when said person observes the same action performed by another (Keysers, 2013). They are “multimodal association neurons that increase their activity during the execution of certain actions and while hearing or seeing corresponding actions being performed by others” (Keysers, 2013). These specialized cells are believed to be observed by neural imaging technologies. Using an electroencephalogram, studies on the neural correlates related to social behaviors have been promising. In some experiments, researchers have detected a decrease in the mu rhythm (electrical activity in the sensorimotor system recorded as waves). Part of the speculation behind mirror neuron activity relies on this wave decrease. It is believed to coincide with the subject’s observation of another person performing a goal-oriented motor action or an abstract motion with visible characteristics like facial expression change. This suppression of the mu is believed to be mirror neuronal activity.

Whether it be mirror neurons or any other aspect of human cognition and development, the most important take away point is that all these systems are *products of exchange*. To say this is to imply that the extended mind is not just a thesis about objects, but it is about where content can be and how content is retrieved. Whether it be through the interactions a person has with others or their interactions with the objects in their environment, these are all physical elements playing a perceptual role in the bubble-like sensation that accompanies one’s mental life. To be specific, a cognitive system is a product of exchange; that a mind is in some sense a creation of the world around it by both object, experience and persons. Products of exchange are physical exchanges.

**Tool-use, Evolution and Bodily Extension**

The story of the evolution of tool-use in humans has a lot of crucial plot points that I think can be drawn out to supplement a revision of the extended mind. Using what is known, I have an evolutionary *just-so* story that I would like to construct. Explicitly, I believe that the story of human evolution contains the reason for cognitive coupling’s adaptive role. I surmise that the thesis of the extended mind also helps to explain why in cognitive science it has been debated whether cognitive processes are either modular or connectionist. I believe that the modular aspects of a mind may in fact be older structures of the mind cohabitating with later ones. The theory of modularity might be able to provide cognitive scientist with a clearer picture of bygone architectures of the human mind and their related versions of cognitive processing capabilities. This just so-story will serve as a historical bridge between two versions of human cognitive architecture.

In the study of human nature there are few interlocutors that disagree on the momentous achievement that it was for our genus to acquire language. At some point in history, this newfound propensity separated us from all other life on earth. Research about the track of the human genome tells us that language sprung up in the short span of time between 120,000 to 200,000 years ago (as cited in Wade, 2002). This claim was confirmed by the discovery of the FOXP2 protein, a genetic marker believed to be crucial to the origins of language development in early hominids. Also, finding the FOXP2 rewarded researchers with a telling coincidence: the appearance of language has an overlap in time with a major wave of early human tool-use (like shelter construction or ritualistic behavior like body ornamentation (Hauser et al., 2014). It’s no surprise that tool-use and language both have things in common. The Broca’s area—a small region of the brain implicated in speech acts—can be divided into brodmann areas 44 and 45. Although functional brain imaging shows area 45 active during speech output, 44 is active during “nonlinguistic motor functions including complex hand movements, and sensorimotor learning and integration” (as cited in Corballis, 2010).

Controversially, discussions in cognitive science have led some to propose that our ancestors inherited language by non-gradual change; that language was not a gradual evolutionary development but rather appeared by mutation (Bolhuis, Tattersall, Chomsky & Berwick, 2014). To counter that, I suspect that what appeared to be non-gradual may in fact have been a coupled process. That its gradual change did not happen in mind, but rather happened projected through the creation of early-modern hominid societies. This evolutionary just-so story comfortably explains the existence of the low-level operations of localized serial processing systems. The mind, in unison with cognitive development was simple on the inside, growing complicated on the outside.

Tool-use, being so kindred to language in that it too is the manipulation of content, was likely the beginning of advanced cognitive computations. To regulate a mental economy coming to disarray, the proprioceptive sensations that supervene the extended mind were important to early tool use. This proto-upgrade meant that the system’s workload could adapt to being integrative; it was a pre-workout for its modern form. In this way, the system could learn to trade off with the environment by practicing parallel organization and eventually develop from mostly *local* to *global* processes. The connectionist architecture of mind may have been an adaptation sponsored to organize new aspects of hominid environments. Human behavior had to pass a stage going from manipulating real-world objects, to then manipulating the novel and complex symbol use that is modern language. So, what seems as though a strange and mysterious leap in abilities was in fact a gradual process happening external to our ancestors via tool-use and therefore happening in the environment. The extended mind fits into this picture by being the cognitive software enabling our first metacognitive events to connect with an environment at our fingertips. Complex cognition was pushed to a new level by the sensorimotor system.

The environments we are part of at any given time easily feel like they are susceptible to our interactions with it. Human tool-use is an important milestone in the evolution of human cognition because it requires a kind of complex assessment of the environment and the surroundings. It is important to this paper because the capacity for using tools implies a higher order process of knowing about the sphere of interaction around one. The use of any tool I think signifies a relationship between metacognition, executive functions and sensorimotor systems. Pscyhologist Dorothy Fragaszy’s (2016) definition of tool-use seems akin to mental extension: “a tool alters the boundary between a body and an environment by adding a new degree of freedom. An object is a tool if an individual handles the body plus the tool different than she would the body alone” (as cited in Otis, 2016). According to neuroscientist Atsuki Iriki (2016), tools “extend” and “externalize” human sensorimotor abilities (as cited in Otis, 2016). When I use my pencil to write out an outline for this paper I feel like the sphere of interaction between myself and the task designates my bodily space. When I am driving my car, I feel that without much of a glance I can conceive of the measure of space I will need to perform a task like parking. I am sure that those who read this are familiar with these kinds of anecdotes and know the feeling of how your perceptual life can be bubble-like. Putting tool use aside, there too are other forms of bodily extension and manipulation of bodily image that fool the mind. It’s not peculiar for the brain’s mapping to change or rewire for the accommodation of objects treated as extensions of the body. For example, the body transfer illusion, also known as the rubber hand illusion, is a phenomenon where coercing an individual’s bodily visual perspective fosters an indistinguishable marriage between a fake body part and the real appendage (Ehrsson, Holmes & Passingham, 2005). It creates the illusion of body ownership over the false extremity. What’s interesting about this illusion is the event of neural plasticity that coincides with this coercion. The neuroscience behind sensorimotor maps (from the cortex to your limbs) has been evolving given that we know how neural plasticity works in response to the loss of or regaining of finger or toe real-estate where studies observe connective reorganizations to these circumstances (Doidge, 2007). It is too evident that the power of mental representation seems to go beyond internal sensation. Epistemic action is a psychophysical property of our mind’s executive functions. Using a smart phone, solving equations in a math workbook, or talking to a friend are all executions of mental extension. They are the habits of mind that allow us to be submerged in a world where we must interact on a complex level. The features of the extended mind—whether one considers them a selected adaptation or a spandrel—are part of what it means to be a human being.

**Conclusion**

I can see why the extended mind thesis tends to alienate some disciples of materialism. I believe that it is not hard to picture the stirring feeling of absurdity a devoted physicalist endures when they are told that not only is consciousness separate from the brain, but to follow that it’s also a non-material amorphous existence floating beyond the skull whilst extending a phenomenal appendage to meet its needs. Luckily for them, that is not the claim that I am making.

Some of the explanations that’ve been provided to amend the mind-brain problem make the phenomena of conscious experience seem beyond natural explanations. But these kinds of contentions have always been a feature of the philosophy of mind. Since Descartes (1647), the mind-body problem has steadily chronicled the inconsistencies between the intimacy one has with their mind and any known laws of the natural world. The devoted materialist wants it to be that only physical events affect the physical world. The possible states or actions of things with matter are interactively limited and confined to the like; the system is causally closed. If there is a physical event then there is a physical cause to that event. As challenging and contentious as these discussions may be, all parties involved seem to agree on consciousness as being a something interacting with content. I think that the tenets of cognitive coupling embedded in the extended mind welcome a view of the mind that integrates what human beings do outside of their mental life. Going beyond the skull allows us to consider the possibility that we can explain the mind in a way that is integrated with the environment. It welcomes an anthropological study of human cognition where we are not cutting off the properties of human nature and reducing our studies to mere neurocognitive phenomena. Studying the artifacts of ancient civilizations is in a sense studying what the mind has done; we are studying a task it has performed. The possible insight to gain from learning more about early hominid history enables researchers to give an estimate of what the mind was like. In sum, the extended mind captures the mental life and space in every person. To interact socially, to make things, to know your sense of space and your surroundings are all ways of describing what exactly the extended mind is and these are all things that when you consider the aspects of human development that are outside of the skull it’s easy to begin to shape a view of the mind that is embodied in a context.

The human mind and its powers have proven to be a socially integrated and overly metacognitive item. The extended mind thesis is physically possible. Underneath the extended mind thesis, there is a thesis about how much of a person’s consciousness is submerged into the world. The mind as an entity in space-time is not a phenomenon divorced from the sphere of other natural occurrences. I whole heartedly believe that human beings are handcuffed to a web of caused events connected to the world beyond their mind.

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