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Semiotic Exograms: Extending the Mind Fully

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Abstract

This essay is an analysis and expanded defense of John Sutton's essay "Exograms and Interdisciplinarity: History, the Extended Mind, and the Civilizing Process." The first section of the essay surveys the extended mind literature, following the first and second waves of the Extended Mind theory. The second section explains Sutton's exograms as external representations of internal thought. This section also details his argument that exograms extend the mind because, historically, exograms play a role in the internal functioning of a mind. The third section defends Sutton's argument from objections against their place in mental processes, namely memory. The fourth section argues against the objection that the mind cannot be extended beyond the brain, by appealing to a computational view of functionalism. The conclusions drawn from the third and fourth sections are that the mind, through language, extends with culture and that, even in cognitive science, it is fruitful to study the mind extended as such.

Introduction

In his essay "Exograms and Interdisciplinarity: History, the Extended Mind, and the Civilizing Process," John Sutton briefly explains two waves of Extended Mind theory. He then provides one argument regarding the extension of memory and another regarding the extension of cognitive action based on two examples from history. He promotes interdisciplinarity in the study of the extended mind, since these examples provide insight into what cognitive extension is, showing it is not a novel idea in other areas of study. I use Sutton's concept of exograms to reply to a common objection of the extended mind. In the first section, I outline the waves of Extended Mind theory as Sutton describes them. In the second section, I illustrate Sutton's argument of extension through exograms. In the third section, I defend the concept of exograms from objections against their place in mental processes. In the fourth section, I argue against the objection that the mind cannot be extended beyond the brain, by appealing to a computational view of functionalism. The conclusions I draw from the third and fourth sections are that the mind, through language, extends with culture and that, even in cognitive science, it is fruitful to study the mind extended as such.

Waves of the Extended Mind Theory

Sutton denotes the first wave of Extended Mind theory as coming from Clark and Chalmers' essay "The Extended Mind," where they propose that external objects extend the mind when they couple with the brain in a cognitive process. The argument, following the parity principle, is that, if an object, such as an ever-present notebook, plays a functional role in a cognitive process, such as memory, then this object is a part of the mind by virtue of being a part of the cognitive process.[1] Adams and Aizawa criticize this view by asserting that Clark and Chalmers commit a coupling-constitution fallacy. Adams and Aizawa argue that just because something is coupled to the process does not mean that it is a constitutive part of the process. Pieces which aid a cognitive process are not considered cognitive, they maintain, and the mind is not constituted in that object.[2] For example, an ever present notebook used in the cognitive process does not itself make the notebook cognitive nor is it an extension of the mind. Sutton himself critiques the parity principle by stating it leaves out many cognitive tools such as exograms, a tool to be later explained.[3] Sutton positions himself in the second wave.

In the second wave, Clark clarifies Clark and Chalmers' original argument to avoid the coupling-constitution fallacy. He states that something which is coupled in a cognitive system is not itself cognitive, much in the same way that a neuron involved in the same process is not itself cognitive. Rather, the system created by the coupling is cognitive, since functional parts of the process exist outside of the brain (or skin, depending on how internal cognition is classified). Thus the mind is extended in this process.[4] Sutton places himself on the side of this broader view of Extended Mind theory, as it is more open to different types of social tools.[5] Adams and Aizawa still reject the extended mind because the brain (or its equivalent) is still the central processing piece of the cognitive system and types of "external cognition" process information in a fundamentally different way, such that they lack the "mark of the cognitive."[6] I claim later that Sutton's examples merge the brain with external objects in processing if Adams' and Aizawa's criticism is interpreted in a computationalist view.

[1]John Sutton, "Exograms and Interdisciplinarity: History, the Extended Mind, and the Civilizing Process," *The Extended Mind*, edited by Richard Menary, (Cambridge, MA: The MIT Press, 2010), 195.
[2] Fred Adams and Ken Aizawa, "Defending the Bounds of Cognition," *The Extended Mind*, edited by Richard Menary, (Cambridge, MA: The MIT Press, 2010), 68.
[3] Sutton, "Exograms," 200.
[4] Sutton, "Exograms," 206.
[5] Sutton, "Exograms," 201.
[6]Adams and Aizawa, "Defending the Bounds," 75.

Sutton's Exograms

Sutton argues that, historically, cognitive processes in regards to memory which constitute an extended mind or make an extended mind possible have existed. He proposes the concept of an exogram, taken from Merlin Donald, which is an externalized engram.[7] An engram is a cluster of neurons within the brain which stores a memory in neuronal connections. These engrams include their own triggers for enacting their memories.[8] They work such that, under a sensational prompt from outside the head or a conceptual prompt inside the head, a certain grouping of neurons, which correspond to a memory, activate and recreate that memory. Sutton argues that people export the work of an engram to physical representations in the world, creating exograms.

The first example Sutton discusses involves Elizabethan actors. Actors in this time period typically had a plethora of roles in different plays within a single month. In addition, these actors were given nothing more than their own lines for each role and a single prompting cue for each line and entrance (sometimes with no cues for exits). It seems implausible that these actors could have learned these roles in such a short amount of time by sheer force of memorization or repeated rehearsal. There is also evidence that, in an attempt to prevent plagiarism, rehearsals where a director organized the entire play at once were rare. Instead, the theaters were conducive to orchestrating these plays via a shared cue code placed in the back. With this code learned, all the actors could easily act their part in the same unison typically displayed in modern productions, where an actor has significantly fewer roles to play and practices over a long rehearsal process which includes a director.[9]

For Sutton, this is evidence that this code creates an exogram for the actors. A symbol in the theatre would be put up and it would not correspond simply to meaning. Instead, this symbol would prompt the memory of a whole line rehearsed as a distinct role. The remarkable part of this code is that it acts as the same trigger for different memories in different actors, extending the mind across multiple people.[10] In effect, the whole play is an exogram, a recreation of a scene or "memory." Under a single prompt, the players will synchronize their words and actions to create something that was unrehearsed, making the stage functionally similar to the grouping of neurons firing in synchronicity to recreate a memory.

[7] Sutton, "Exograms," 189.
[8] Sheena A. Josselyn, Stefan Köhler, and Paul W. Frankland, "Finding the Engram," *Nature Reviews Neuroscience* Volume 16, Number 9 (August, 2015): 521.
[9] Sutton, "Exograms," 202-204.
[10] Sutton, "Exograms," 202-204.

The second example is the case of the "memory palace." In Renaissance times, people created their own imagined spaces with different rooms. People could then navigate their own memory palaces by imagining walking around. In each room, this person would store a memory in the form of an imagined static painting or sculpture. According to Sutton, a memory palace, or a room in a memory palace, is an engram. That these engrams are imagined physical representations lends itself to an exogram acting in the same way. People have already used physical representations for internal cognition, so these physical representations, if actualized, can be used for external cognition.[11]

Sutton himself is careful with a distinction between the internal and external mind in the context of interdisciplinary progress. He claims that the extended mind is, rather than an ontological claim, a useful way of looking at humans anthropologically and sociologically. He does not privilege the brain as the sole mind, rather minds come in different forms.[12] He does think there should be a distinction made for the sake of cognitive science, but there is no "cognitive mark" unique to internal processes, as Adams and Aizawa might put it.[13] By stating there we should consider different scales of the mind dependent on the disciplinary context, Sutton also avoids an objection of overextension of the mind, as it is only as extended as necessary for the explanation.

In Defense of Exograms

In this section, I defend exograms as a method of extending the mind in the style of much of the present Extended Mind literature. I argue here that exograms extend the mind by functioning similarly to large-scale mental processes. In the next section, I outline how exograms function similarly to small-scale brain processes to defend against the objection that exograms are not cognitive in the sense that they do not act similarly to what we currently regard as cognitive: the brain. Here, I respond to Peter Carruthers' objection that external memories do not originate in conceptual terms as internal memories do. I defend exograms by first showing that the order in which memory arises does not matter. I then go further by showing that conceptual terms themselves originate externally through culture.

Carruthers explores memory in both the sense of *working memory*, that is memory which provides a space for working out arithmetic, and *episodic memory*, which is the memory of past events. He denies the Extended Mind theory in *working memory*, claiming a "mark of the cognitive" style privilege for internal workings, that is *working memory* arises through physically unique processes. His explanation of *working memory*, however, meshes well with Sutton's example of the memory palace in that it

[11] Sutton, "Exograms," 208-211.
[12] Sutton, "Exograms," 214.
[13] "Defending the Bounds of Cognition," 77.

is always conscious and sensory.[14] So, *working memory* appears as something external even if its contents are internal to the brain. Carruthers' objection has also been treated extensively elsewhere, shifting the focus from parity to the complementary use of external objects.[15] Sutton advocates for complementarity by suggesting that exograms do not pair with a brain. Rather they are used as cognitive tools in ways that can be used internally, with memory palaces being the prime example. Internal perceptions in the style of external perceptions are used, so the internal nature of these perceptions are superficial.[16]

Carruthers also details *episodic memory* in a more specific way than Sutton or Sutton's interpretation of Merlin Donald does. Concepts are the first thing drawn in *episodic memory,* that is remembering who "Mary" is begins not with her facial features or other sensory details, but with the emotions or concepts associated with the name. According to Carruthers, these sorts of things cannot be "experienced" elsewhere and are necessarily internal.[17] However, exograms are not in contention with this. By Donald's account, even concepts and emotions are coded externally by language, that is the experiences are linguistic or heavily influenced by language.[18] Nor does the order of *episodic memory* preclude using a photo of Mary to spur on this memory in a supposedly backwards way, that is recognizing the face and then thinking of her short temper. It is even possible to use an exogramatic code to hasten this by making a painting of Mary with heavy usage of the color red.

Moreover, certain views of emotions, like that of the intentionalist, deny that emotions are not defined by an internal experience. Rather, emotions are representations of the environment. For example, fear is a representation of danger in one's environment. If a bear emerges from the bushes with a thundering roar, the expression of fear is just a representation of the danger the bear poses. An intentionalist view supports the expression of emotion in external objects, like works of art, without needing to appeal to phenomenological experience of emotion.[19] Considering that exograms are coded representations, they do not have to be restricted to coded memory. Exograms can also

[14] Peter Carruthers, *The Centered Mind: What the Science of Working Memory Shows Us about the Nature of Human Thought*, (Oxford: Oxford University Press, 2015), 197-202.
[15] Andy Clark, "Coupling, Constitution, and the Cognitive Kind: A Reply to Adams and Aizawa," *The Extended Mind,* edited by Richard Menary, (Cambridge, MA: The MIT Press, 2010): 81-99.
[16] Sutton, "Exograms," 209.
[17] Carruthers, *The Centered Mind*, 75-80.
[18] Merlin Donald, *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*, (Cambridge, MA: Harvard University Press, 1991), 309-319.
[19] Rebecca Copenhaver and Jay Odenbaugh, "Experiencing Emotions: Aesthetics, Representationalism, and Expression," available on Academia.edu: http://www.academia.edu/13335567/Experiencing_Emotions_Aesthetics_Representationalism_and_Expression

store the emotion of a person and can be reflected in others, much like the emotion is reflected in its appearance on the face of the person.

Sutton, in a later paper, even shows that concepts are built contextually in a culturally coded way in what is called "scaffolding memory." Per scaffolding memory, a baby learns everything in a cultural context. From the way parents present certain objects, to the objects available to them in their environment, all the way down to the milieu of basic language in which all these concepts are learned.[20] Since a baby learns in a cultural context, all concepts must be framed in that context, even the concepts of the baby's culture.

The upshot is that exograms should pave the way to explaining the extended mind of entire cultures. Merlin Donald situates exograms in the context of cultural evolution. Humans have adapted to making codes, creating representations of ideas using these codes, and extracting meaning from these representations. This allows for the storage of information for the use of an entire cultural group. This way memory can be stored across generations in the form of history.[21] History has even been modeled to show similarities between it and memory traces, the content of engrams.[22] This is essentially an evolutionary explanation of semiotics (sign-making), but the use of semiotics as 'memory' in exograms is a useful explanation of the role of semiotics in extended cognition.

Sutton's essay makes a concession to cognitive science by keeping a distinction between the internal and the external so we can use different models of mind for different disciplines. This distinction is not needed with updated approaches to thinking about the brain, a view to which Sutton may be sympathetic. Richard Menary mentions that the brain is encultured through using cognitive artifacts, that is the use of cognitive tools survives culturally rather than genetically.[23] This, in conjunction with the fact that codes for exograms are also developed culturally, indicates that any extension of the mind is culturally propagated. The brain has evolved to not only make use of social tools, but to depend on them. Even Carruthers concedes that language is integral to internal thought.[24] However, language is culturally determined and interactions within a social framework shape how this code is embedded within the brain. Language is not simply learned, it shapes thought.

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[20] John Sutton, "Scaffolding Memory: Themes, Taxonomies, Puzzles," for forthcoming book *Contextualizing Human Memory* edited by Lucas Bietti and Charlie B. Stone, (Psychology Press, September 2014 version).
[21] Donald, *Origins*, 309-319.
[22] John Heil, "Traces of Things Past," *Philosophy of Science,* Volume 45, Number 1 (March, 1978): 60-72.
[23] Richard Menary, "Cognitive Practices and Cognitive Character," *Philosophical Explorations* Volume 15, Number 2 (June, 2012): 147.
[24] Carruthers, *The Centered Mind,* 75.

Using Exograms to Refute the Mark of the Cognitive Privilege

Some objectors to the extended mind theory try to concede that if something is functionally equivalent to a brain, then it thinks, and is therefore a mind, while keeping some sort of privilege for the internal brain, stating that if something is external to the brain, it has no functional equivalence with processes inside the brain. However, we can take a computationalist approach to show that some things external to the brain are on a fundamental level equivalent to things inside the brain when considering cognitive processes.[25] We can see the enactment of this concept in exograms. The argument against these objections follows simply. (1) If parts of a cognitive process external to the brain are functionally equivalent to the parts of a cognitive process inside the brain, and those external parts function in conjunction with the internal parts in performing a cognitive process, then the mind is extended in performing this cognitive process. (2) Parts of a cognitive process external to the brain are functionally equivalent to the parts of a cognitive process inside the brain via the use of language, symbols, etc. under computationalism. (3) External parts function in conjunction with internal parts in performing a cognitive process via exograms. (4) Therefore, the mind is extended in exograms.

First, a description of computationalism from Gualtiero Piccinini: "computational functionalism says that the mind is the software of the brain (or any functionally equivalent system; I will omit this qualification from now on). Taken at face value, this slogan draws an analogy between the mind and the software of ordinary, program-controlled computers. But the same slogan is often understood to suggest, more modestly, that the mind is the computational organization of the brain—or that mental states are computational states—without the implication that such a computational organization is that of a program-controlled computer."[26] This view is in the same spirit of microfunctionalism, that is something is functionally equivalent to a mind if and only if the individual processes for thought are functionally equivalent.[27] In other words, a mind is like a computer in that it performs cognitive functions. It does so, at a fine-grained level, much like a computer in that it accomplishes this algorithmically. So, a brain computes by a series of algorithms, individually composed of if-then statements, each of which feeds into another, which eventually leads to the correct solution or desired effect. The path between algorithms is called a *credit assignment*

[25] For a similar argument before Clark and Chalmers proposed the Extended Mind Thesis, see Robert A. Wilson, "Wide Computationalism," *Mind*, Volume 103, Number 411 (July 1994): 351-372.
[26] Gualtiero Piccinini, "The Mind as Neural Software? Understanding Functionalism, Computationalism, and Computational Functionalism,"*Philosophy and Phenomenological Research* Volume 81, Number 2 (September, 2010): 271.
[27] Michael Wheeler, "In Defense of Extended Functionalism,"*The Extended Mind*, edited by Richard Menary, (Cambridge, MA: The MIT Press, 2010): 259.

path as it tracks which algorithm is assigned by the end of previous algorithm.[28] I will call the act of feeding an output of an algorithm to another algorithm as an input "assigning." This is a functional view of the mind which takes the function of the brain to a smaller level. It does not only think, but it thinks in a computational way. It views functionalism as true on a "micro" level. The main appeal to this idea is there are similarities between the brain and the computer such that artificial intelligence is a real possibility.

If we take the internal brain, we can see that an engram is a series of assignments. One grouping of neurons makes up the storage of a concept which, if activated, then activates another group of neurons in an engram which physiologically, and to a lesser extent phenomenologically, recreates a memory which in turn activates some emotional grouping of neurons. These firings are not all of one material type, either. The neurons in the emotional center activate using a different neurotransmitter than those in an engram area.[29] In the end, all these cognitive parts in the brain are just assignments, assigning from one neuron or neuronal area to another.

If we view language semiotically, assigning is also essentially all language does. There exists syntax, which is much like the sequence of neurons. There exist meanings and concepts embedded in people or other written works, to which the individual words assign. If we do the same with paintings, they assign to historical context and other symbolic meaning.

By viewing the mind internal to the brain, we get a series of assignments. Exograms external to the brain/body is also a part of that assignment path (just using photons as a neurotransmitter). If we write something sensical on paper, it will assign to places within the brain which activate that concept and so on. Writing it captures the concept just like an engram, and the cultural change that works on languages also works within the brain, shaping it differently. Individual brains store parts of these within cultures, but meanings in language are independent of any single brain. In the greater context of language within culture, brains act like the neurons within the brain.

If we view language as something not semiotic, we still get something nonderivatively cognitive, like the theory proposed by Stephen J. Cowley where language is distributed among society and does nothing more than give the feeling of thought.[30] Such a move does not let the cognitive mark objector off the hook, as cognition just is language and

[28] Derek Sleeman, Pat Langley, and Tom M. Mitchell, "Learning from Solution Paths: An Approach to the Credit Assignment Problem," AI Magazine, Volume 3, Number 2 (1982): 49.
[29] Josselyn et al., "Finding the Engram," 522-531.
[30] Stephen J. Cowley, "Distributed Language and Dynamics," *Pragmatics and Cognition,* Volume 17, Number 3 (December, 2009), 495-508.

language is extended. However, such a view moves away from anything computational about cognition.

I understand the appeal to not claim that the mind is always extended in this way for the sake of cognitive science, but cognitive science does not need this view. There are already different studies in different kinds within the brain, like the difference between the functioning of the frontal cortex and the amygdala. Cognitive science does not need a restricted view of the mind to carry on. In fact, there have been suggestions within the cognitive science community to look at cognition as socially extended.[31]

In conclusion, John Sutton's interdisciplinary approach to the extended mind promotes a complementary view of cognition, showing that historically we already have used external memory stores internal to the brain. Exograms hold to a closer examination of the way memory works in the mind. Moreover, when taking this approach, we see that on a smaller level language functions like neuronal structures and produces cognitive function through exograms. This means that, even if we use a more fine-grained approach in determining whether the mind is extended, there is nothing unique to the internal brain which should preclude it from being extended. And, since language influences the brain heavily, this extension is useful even in the study of cognitive science.

References

Adams, Fred, and Ken Aizawa, "Defending the Bounds of Cognition," *The Extended Mind*, edited by Richard Menary, (Cambridge, MA: The MIT Press, 2010): 67-80. https://doi.org/10.7551/mitpress/9780262014038.003.0004

Carruthers, Peter, *The Centered Mind: What the Science of Working Memory Shows Us about the Nature of Human Thought*, (Oxford: Oxford University Press, 2015). https://doi.org/10.1093/acprof:oso/9780198738824.001.0001

Clark, Andy, "Coupling, Constitution, and the Cognitive Kind: A Reply to Adams and Aizawa," *The Extended Mind,* edited by Richard Menary, (Cambridge, MA: The MIT Press, 2010): 81-99. https://doi.org/10.7551/mitpress/9780262014038.003.0005

[31] Jan Slaby and Shaun Gallagher, "Critical Neuroscience and Socially Extended Minds," *Theory, Culture & Society,* Volume 32, Number 1 (November, 2014), 33-59.

Copenhaver, Rebecca and Jay Odenbaugh, "Experiencing Emotions: Aesthetics, Representationalism, and Expression," available on Academia.edu: http://www.academia.edu/13335567/Experiencing_Emotions_Aesthetics_Representationalism_and_Expression

Cowley, Stephen J., "Distributed Language and Dynamics," *Pragmatics and Cognition,* Volume 17, Number 3 (December, 2009): 495-508. https://doi.org/10.1075/pc.17.3.01cow

Donald, Merlin, *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*, (Cambridge, MA: Harvard University Press, 1991).

Heil, John, "Traces of Things Past," *Philosophy of Science,* Volume 45, Number 1 (March, 1978): 60-72. https://doi.org/10.1086/288779

Josselyn, Sheena A., Stefan Köhler, and Paul W. Frankland, "Finding the Engram," *Nature Reviews Neuroscience* Volume 16, Number 9 (August, 2015): 521-34. https://doi.org/10.1038/nrn4000

Menary, Richard, "Cognitive Practices and Cognitive Character," *Philosophical Explorations* Volume 15, Number 2 (June, 2012): 147-64. https://doi.org/10.1080/13869795.2012.677851

Piccinini, Gualtiero, "The Mind as Neural Software? Understanding Functionalism, Computationalism, and Computational Functionalism,"*Philosophy and Phenomenological Research* Volume 81, Number 2 (September, 2010): 269-311. https://doi.org/10.1111/j.1933-1592.2010.00356.x

Slaby, Jan and Shaun Gallagher, "Critical Neuroscience and Socially Extended Minds," *Theory, Culture & Society,* Volume 32, Number 1 (November, 2014): 33-59. https://doi.org/10.1177/0263276414551996

Sleeman, Derek, Pat Langley, and Tom M. Mitchell, "Learning from Solution Paths: An Approach to the Credit Assignment Problem," AI Magazine, Volume 3, Number 2 (1982): 48-52.

Sutton, John, "Exograms and Interdisciplinarity: History, the Extended Mind, and the Civilizing Process," *The Extended Mind*, edited by Richard Menary, (Cambridge, MA: The MIT Press, 2010): 189-225. https://doi.org/10.7551/mitpress/9780262014038.003.0009

Sutton, John, "Scaffolding Memory: Themes, Taxonomies, Puzzles," for forthcoming book *Contextualizing Human Memory* edited by Lucas Bietti and Charlie B. Stone, (Psychology Press, September 2014 version).

Wheeler, Michael, "In Defense of Extended Functionalism,"*The Extended Mind*, edited by Richard Menary, (Cambridge, MA: The MIT Press, 2010): 245-270.

Wilson, Robert A., "Wide Computationalism," *Mind*, Volume 103, Number 411 (July 1994): 351-372. https://doi.org/10.1093/mind/103.411.351