

Superfunctionalizing the Mind

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**Extended critical notice of Andy Clark, *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*. Oxford University Press, USA, 2008, 320 pages
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With *Supersizing the Mind*, Andy Clark makes the ultimate step away from dualism and the idea that the mental is a mysterious stuff happening inside the head. The general idea underlying his proposal is that what makes something mental is neither the stuff it is made of, nor some non-natural activities (somehow different from the physical activities we observe happening everyday around us). Mental activities are just physical activities, as special as any other physical process. What makes them special, different from digestion or the rolling of a ball, is what they *do*. In this sense, being made of meat or metal, or taking place inside the head or outside of it, is not critical anymore. The boundaries of skin and skull are not, according to his proposal, the boundaries of the mental. Mental activities can happen, and in fact are actually happening in many occasions, outside the head. After the defeat of dualism, the mind is not a magical stuff anymore. After Clark's book, the brain is not the (exclusive) seat of the mental anymore.

A monotheist who is becoming an animist would reconsider, amongst other things, the prestigious position monotheism gives to human beings in comparison with the rest of living organisms and nature. In his approach to cognition and mind in general, Andy Clark plays here the role of the enthusiastic animist in his case against the privileged position in which sciences, humanities and common sense have placed a particular part of human beings: the brain (and the nervous system in general). “[T]he physical mechanisms of mind (...) are not all in the head” [ibid, p. 82]. His thesis is not that the brain is not important for cognition. It is important, but it is not the only party. The animist(s) would say that non-human living organisms are as important as human beings. Here Clark proposes that, when considering cognition and mind in general, the body and the environment surrounding us are as important as the (sacred) brain is.

Broadly speaking, classical orthodoxy in cognitive sciences could be displayed as obeying two main dividing lines that Clark proposes to break. The first one separates the mind from the environment. The second one is the division, inside the organism, between the central control and the vehicle. These two divisions are clearly reflected in our common sense notion of mind. The first division says that the mind is something separated, somehow isolated, from the environment. Whatever mind is, it is something that happens inside the organism, an assembly of internal processes that makes the organism able to cope with the (external) environment, from which it gets (some) information through the senses. The second division operates inside the organism, and dissects it into mind (the controller) and body (the passive executor of mind's orders). Within the materialistic framework, our notion of mind is that of something tightly linked to our brain. Different theories posit different relations between mind and brain.

Whatever the details of this relation are, mind and brain are tightly linked. Brain (and the nervous system) and its mechanisms are responsible for our mental activity. We can cash out then the second dividing line as separating brain from the rest of the body. Brain is that part of our body that we better keep safe. A broken arm or a blocked lung do not threaten our mental capacities or our personality (it does affect our mood, though!). A trauma in our brain does threaten our mind.

In Clark's book, we find a straightforward rupture of these two dividing lines that have dominated not only humanities and sciences, but also our common sense notion of mind.

He overcomes these two separations claiming, in line with recent research in the embodied/embedded cognition framework, that the world is not just the passive scenario where our brains-inside-our-bodies perform their processes. The mind could not be as it is if the environment in which it happens were not there. The world is an active participant in mental processes. Clark confronts the second dividing line by endorsing the increasingly accepted idea that body is not a submissive wrapper of the brain. The rest of the body is as important a party in mental activity as the brain is. Once these two dividing lines have been broken, traffic and (free) trade between mind, on the one hand, and body and world, on the other, begins.

In the first part of the book, "From Embodiment to Cognitive Extension", Clark introduces this general idea, elaborating on material he already introduced in earlier works [Clark, 1997; and recent papers]. He starts by reviewing research in different fields supporting the idea that in order to study cognition and build intelligent autonomous agents, we need to include the body and the dynamics between agent and environment in the equation. Clark offers here examples of the cognitive potential of the body and the environment, and explains the notions of scaffolding and profound embodiment. The notion of scaffolding refers to the natural capacity of cognitive agents to enhance their cognitive abilities by exploiting and manipulating their environment. Biological organisms in general exploit the world in different ways to augment their problem-solving skills. Let me recall an episode from high school to illustrate this notion. It was the time when the game Tetris became famous and its command was a *carte blanche* for social success. Amongst popular girls, there were two in particular whose command of the game was astonishing. They could be playing for hours with just one coin of 25 pesetas (the currency at that time). I remember watching them playing, together with the rest of the audience, and there was one thing that would attract my attention: they were constantly pushing, sometimes violently, the button that rotates the upcoming zoid. For a long time, I had the thought that this was a mannerism proper of virtuosos. That constant noisy action, I have to say, would add some mystery to the scene. Why rotate the zoid so many times, apparently for no purpose? You just have to (mentally) decide the best position for it, and then rotate it according to your decision. However, once I tried playing Tetris (as part of an unsuccessful attempt to become popular) I found myself pushing the rotation button over and over again. I discovered that those continuous rotations improved my performance. Now I know that these extra rotations increase the player's mental capacity. They are epistemic actions, "ways an agent has of modifying the external environment to provide crucial bits of information just when they are needed most" [Kirsh & Maglio, 1994, p. 38], physical actions that make mental processing easier and/or faster. As demonstrated in some

experiments [Maglio, Wenger & Copeland, 2003], the continuous rotations help to identify the shape of the zoid, as a kind of preview. By means of these rotations, then, it becomes easier (and faster) to place the zoid in a good spot. Not only do they facilitate the mental decision, they are part of the process by means of which we arrive to a good solution. In sum, these rotations lighten the internal processing, increasing the overall performance. In Clark's words, "The cost (temporal and/or energetic) of adding nonpragmatic actions to the problem-solving mix are outweighed by the benefits conferred" (p. 72).

Niche constructions (like nests and burrows and the manipulation of existing social structures), physiological extensions (like termite mounds, coral reefs and -human- prostheses), and technological aids (like cell phones, calculators and computers) are other examples of the way in which biological organisms rely on external resources. Cognitive niche construction, for example, is defined as "the process by which animals build physical structures that transform problem spaces in ways that aid (or sometimes impede) thinking and reasoning about some target domain or domains" (p. 62). Think of a spider's web or a beaver's dam. These structures transform the environment as to improve organisms' performance. Educational practices and artifacts also constitute ways to alter the environment in a way that allows a relatively light cognitive strategy to obtain a great result. Clark mentions here the example of the expert bartender and the way she arranges differently shaped glasses in a spatial sequence corresponding to the temporal sequences of drinks orders. Different drinks are served in different kinds of glasses, so now the task of remembering which drink to prepare next turns into the task of perceiving the shapes of the glasses and associating each shape with a kind of drink. The bartender creates this spatial structure and exploits its potential, making the most of the basic mode of visually cued action and recall, therefore minimizing the cognitive burden.

What Clark labels *profound embodiment* refers to the particular capacity of organisms to integrate external structures, like prostheses. Clark talks of two ways in which the organism relates to these external structures. The organism can *use* or *incorporate* them. The latter is the interesting case for Clark's purposes. When the organism incorporates an external structure, it becomes integrated and forms, together with the agent, a whole new system. For example, if we are to use a stick as a walking aid, when we fluently do so, "we feel as if we are touching the world at the end of the stick, not (once we are indeed fluent in our use) as if we are touching the stick with our hand" (p. 31). Who has not, while walking with a stick, felt the properties of a just found unidentified object through the stick? The organism, in this sense, is extended into the environment, as it includes, for a specific goal-directed activity, that external resource. These profoundly embodied agents, "are able constantly to negotiate and renegotiate the agent-world boundary itself" (p. 34).

It is not difficult to concede that organisms exploit environment and that is an important part of our cognitive performance. But we can still remain skeptical with regard to Clark's interpretation of the capacity to integrate external structures. It seems more reasonable to claim that we *use* the external tools, as we use a corkscrew to open a bottle. So the mind, on the one hand, and the body and environment, on the other, are still separate things with clear boundaries. The skeptic can explain the cases Clark mentions by saying that the mind is flexible enough to adjust to variation in the body's

morphology. And that is undoubtedly interesting, but does not provide a reason to claim that the confines of the mind are plastic. Research presented by Clark in this first part of the book is promising, but it does not seem to be enough to persuade the skeptic to extend mental boundaries.

The second part of the book, “Boundary Disputes”, is perhaps addressed to those skeptics. Here Clark tries to provide a more elaborated defense of his claim, addressing some of the criticisms that the extended mind account has received from different authors. Adams and Aizawa, in a series of recent papers and in their book *The Bounds of Cognition* (2008), elaborate a deep criticism of Clark’s view. An example where the dispute gets bloody is the case of Otto and his notebook, the now famous extended individual who Clark and Chalmers introduced to us in their first exposition of the extended mind account [Clark & Chalmers, 1998]. Let’s recall Otto and why his notebook is said to be part of his beliefs. Otto suffers from a disease that makes him forget many things. To compensate this deficiency, Otto always carries a notebook where he writes down important information, and consults it to recall this information. Clark & Chalmers compare Otto with Inga, a person who is not victim of this disease, in the following scenario: they both hear of an interesting exposition at MOMA, and they both decide to go. Inga recalls the museum’s address and sets off. Otto consults his notebook and sets off. According to the extended mind view, the entries in Otto’s notebook play the same role as dispositional beliefs in Inga’s mind. Therefore, they can be said to be part of Otto’s dispositional beliefs. Otto’s mind, they argue, is then extended outside his brain.

Adams & Aizawa (2008), and also Rupert (2004), emphasize the important differences between biological memory processes and processes involving Otto’s notebook. Primary effect and negative transfer, characteristic of our biological memory, are not features of the way Otto uses his notebook. These differences prevent biological memory from being equitable to the mechanisms involved in consulting a notebook. Here, the debate seems to turn into a discussion about defining the adequate level of description. Clark’s defense is that the extended mind account does not need the similarities between Inga’s and Otto’s processes to be similarities in the actual physical mechanisms involved. There is a coarse-grained similarity. And similarity at that level is enough. The fact that there is a level of description at which their respective recalling processes are different, Clark argues, does not imply that there are no other systemic descriptions in which they are similar. Adams & Aizawa critique the disparity of phenomena involved in an extended mental process, claiming that “transcranial [extended] processes are not likely to give rise to interesting scientific regularities” [Adams & Aizawa, 2008, p. 61]. Clark’s defense now is that we have no reason to assume that an integrated scientific treatment of the underlying processes is not possible. As a promising example of disparate things put together in a systematic description, he names complexity theory, where we can find laws that explain some aspects of the behaviour of systems as different as an ant colony and the World Wide Web.

We might agree with Clark that there are coarse-grained similarities between Inga’s and Otto’s memory processes, and we can accept his claim that the extended mind account does not need a fine-grained similarity. The question at issue here is, how scientifically interesting is a description at that level? Or we might even go further and call into question the fact that there really exists a rough similarity between those

processes. Otto's remembering, for example, involves perception while Inga's does not. By equating these processes in a coarse-grained description, isn't Clark breaking a well-established difference? We may say he needs a justification to do that, other than the mere assertion of the similarity. Or is it the skeptic who needs to justify her reluctance to accept this comprehensive description? Let's examine this controversy regarding who has the burden of proof in more detail.

Adams & Aizawa (2008) denounce what they call the *causal-constitution fallacy*, consisting of moving from the causal coupling of an object to a cognitive agent, to the conclusion that the object is part of the cognitive agent. Let's consider bodily gestures as an example of external element (non-mental under the standard reading), and how they relate to thought and reason. We gesture when talking on the phone, when nobody can see us and even when we talk to ourselves. And importantly, gesturing increases with task difficulty (e.g. when reasoning about a problem rather than merely describing the problem or a known solution). Are gestures the expression of fully formed thoughts, or might gesture work as part of the very process of thinking? Are gestures merely impacting cognitive processes, or constituting them? Elaborating on Goldin-Meadow's work (2003), Clark asserts that "The act of gesturing (...) is not simply a motor act expressive of some fully neurally realized process of thought. Instead, the act of gesturing is part and parcel of a coupled neural-bodily unfolding that is itself usefully seen as an organismically extended process of thought" (p. 126). The *causal-constitution fallacy* criticism demands an explanation of how a causal contribution becomes constitution. Gestures, under the skeptic's reading, are a complement to the real cognitive processes, not a constitutive part of them. The burden of proof seems to be on Clark's side. A justification is needed of why an external aid to cognitive processes is said to be a constitutive part. Clark encourages us, however, to realize that this discourse is the result of our tendency (or current scientific predisposition) to locate the machinery of cognition in the head. That is, in demanding a justification here, the skeptic is assuming a separation between the agent and something external that might be incorporated or not (constitutive or not). She is assuming, in short, that mind is not extended. It can be said, then, that Adam & Aizawa's *causal-constitution fallacy*'s criticism begs the question against the extended mind proposal [Menary, 2007].

Where Clark does not seem to have an answer, however, is when Adam & Aizawa demand a mark of the mental. In his responses to critics, Clark is opting for arguing that extended processes (e.g. Otto's notebook) fulfill the criteria his critics impose on a process for it to be cognitive (e.g. to have original, non-derived content). His responses, nevertheless, do not seem to satisfy the critics' concerns. An alternative strategy, and maybe the best way to defend his proposal, would be to provide a different account of the mark of the mental, a customized one suitable for the extended mind. So far, Clark is not offering an alternative definition of what it means for a process to be mental.

In part three, "The Limits of Embodiment", Clark urges caution in interpreting the embodied perspective, denouncing those who have wrongly exaggerated it and its consequences. This part digs into the debate, within the embodied view, between a computationalist and a non-computationalist approach. There is a tension, as Clark dubs it, at the heart of the embodied cognition program. According to some researchers,

embodied cognition departs from the traditional view in cognitive science in its unwillingness to think of cognition as computational. This radical reading rejects the view that cognition is a matter of computations that are independent of the physical medium where those computations are occurring. A different team, where Clark is included, argues for a less radical reading of the embodied cognition agenda, recognizing that cognition is (still) a matter of computations that are independent of the physical medium in the sense that, if, with a different physical structure, you get the right set of abstract organizational features in place, then the cognitive properties are guaranteed. We can present this debate as a debate between a reductionist and a functionalist interpretation of the notion of embodiment. What does it mean to be embodied? How fine-grained is the contribution of body (and environment)? At which level does the body shape the mind? A functionalist reading, such as the one Clark defends in this book and in some recent papers [Clark, 2006, 2007], claims that implementational details of the body are not a constraint on mental processes. The body can play a computational role in cognition, it can be part of the physical platform implementing the pertinent functions, but its computational potential is not in virtue of its particular morphological details, but in virtue of “the suite of abstract opportunities (encodings, operations) that it makes available” (p. 201). A reductionist interpretation, labeled by Clark as body-determinism or body-chauvinism, defends, however, that physical details of the body matter. Shapiro’s *The Mind Incarnate* (2004) endorses this reductionist reading, and so it is one of the objects of Clark’s criticisms in this part of the book.

Under the functionalist lens, body-sameness is not a requisite for mental sameness. Since Putnam introduced the claim that minds are multiply realizable [Putnam, 1975], this idea has become widely accepted among philosophers (though it has been recently called into question, see for example Polger 2002, 2004). Putnam stated that the same mental state (e.g. pain) can be instantiated by creatures with different anatomical, physiological and biochemical structures. According to this, bodily differences are not, then, a constraint for mental sameness. According to Shapiro’s view, however, differences in embodiment make a difference in mental states. Evidence for this claim is found in examples of cognitive processes that depend (partly) on the specific kind of body that the organism has. Research of Lakoff & Johnson (1999) provides an example that illustrates the body-determinist position. According to their research, many of our basic concepts (e.g. the spatial concepts of *front* and *back*) are the way they are, because our body is the way it is (i.e. we have eyes in one side of the head). In line with these findings, and against the body neutrality characteristic of functionalism, Shapiro claims that the mind cannot be described independently of the brain and body that happen to realize it. Differently embodied organisms, then, are likely going to display mental differences.

Clark’s reading of the embodied paradigm, however, claims that what matters for an organism’s mental properties is something that goes beyond fine-grained implementational details. In the same line as a classical functionalist, Clark describes bodily actions as (just) one of the means by which certain operations (computational and representational) are implemented. The body is defined as a (contingent) implementation of certain computational profiles, as the brain is under the classical functionalist lens. The only difference between the old classical functionalism and this new extended version is that the functional profile with which cognitive processes are identified belongs not only to the neural system and its inputs and outputs alone, but to the whole embodied system embedded in the world. Two organisms with different bodies might have the same mental states as long as they implement the same –now

extended- computational process.

Alva Noë's *Action in Perception* (2004) and his collaborations with O'Regan [O'Regan & Noë, 2001] constitute another example of what, according to Clark, embodied cognition should not lead to. According to Noë, the specific fine-grained details of an organism's body and the characteristic ways in which it interacts with objects and properties, are said to be a constraint on its perceptual experiences. At the basis of this view there is a particular theory of perception, the sensorimotor account of perception, according to which what explains the content and character of our perceptual experiences is the implicit knowledge we have of the relations between movement and change, on the one hand, and sensory stimulation, on the other (what is called sensorimotor dependencies). That is, what we perceive is the way it is in virtue of our knowledge of how our senses are affected by the world, and how our actions on the world change the way our senses are affected. It follows from this that perceptual experiences of differently embodied organisms, engaging in different sensorimotor loops with the world, cannot be identical, perhaps not even similar. According to Clark, however, perceptual experience ultimately depends on representations and computational processes that are insensitive to details of implementation. Thus, differently embodied organisms could in principle have the same perceptual experience, as long as they have access to the same gross information and then can form the same internal representations.

For Clark, "The primary lessons of embodiment are thus lessons in economy, efficiency and spreading the load" (p. 166), that is, they are lessons on how computational processes responsible for cognition are articulated and carried out. For a radical defender of the embodied view, nonetheless, the lessons to be extracted have to do with the nature of cognitive processes: they are not multiply realizable computational processes. The reasons to endorse the embodied perspective are, the radical argues, reasons to reject functionalism. In response to this radical interpretation of the embodied perspective, Clark keeps, as we see, his functionalist conviction. The radical defender might wonder what the benefits and novelty of Clark's proposal are. After all, mental processes are (still) said to be computational processes, and computational processes, we all know, are platform-free, predisposed to be implemented in whatever meets the pertinent functional description. The functionalist mind allows disparate implementations, so there is nothing really new in including outside-the-head elements. The extended mind proposal might seem just another functionalist thought experiment (in the same line of Ned Block's example of a nation realizing a mind). In that case, Clark does not need to go through the embodied perspective in order to argue for an extended mind. He is only making a step further in the functionalist dramatization.

Sympathetic or not with functionalism, the reader will find in *Supersizing the Mind* a thought-provoking and enlightening reading. Importantly, Clark's last book is a brilliant example of philosophy affecting our scientific as well as our everyday assumptions, and an excellent illustration of integration between science and philosophy. When philosophy is to be demanded to justify its usefulness, *Supersizing the Mind* is a fine response.

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