

Two ways of grounding the discussion on extended cognition

Nils Dahlbäck (nils.dahlback@liu.se)

Department of Computer and Information Science, Linköping University
SE-581 83 Linköping, Sweden

Fredrik Stjernberg (fredrik.stjernberg@liu.se)

Department of Culture and Communication, Linköping University
SE-581 83 Linköping, Sweden

Mattias Kristiansson (matkr657@student.liu.se)

Department of Computer and Information Science, Linköping University
SE-581 83 Linköping, Sweden

Kenny Skagerlund (kensk904@student.liu.se)

Department of Computer and Information Science, Linköping University
SE-581 83 Linköping, Sweden

Abstract

We question two of the basic foundations of the Extended Mind hypothesis originally formulated by Clark and Chalmers, i.e. that all cognition is organism centered and that the important theoretical issues that the debate surrounding the Extended Mind hypothesis can fruitfully be resolved by to a large extent rely on invented examples of cognitive activities as the empirical foundation. We suggest that one way to proceed is to frame the hypothesis within the larger theoretical framework of activity theory, and another is to conduct extensive field studies of extended cognitive processes. We illustrate our position with examples of how these can be used to reformulate some of the aspects of the Extended Mind hypothesis.

Keywords: Extended mind; Activity Theory; Cognitive Ethnography.

Is the mind also in the world?

“Where does the mind stop and the rest of the world begin?” That is the opening question in Clark & Chalmers (1998) seminal article “*The Extended Mind*”. The central thesis that they put forward is that human cognitive processing literally extends into portions of our environment, thereby moving the traditional boundaries of cognitive processing from neural tissue to encompass non-neural components of the human environment as well. They do not only argue for an extension of cognitive processing into the environment, but take the argument one step further by claiming that beliefs can be constituted partly by features of the environment, and that hence, it can be argued that in fact mind extends into the world.

As an illustration, they describe two fictitious characters, Inga and Otto, who are both interested in art and live in New York City. In fact, they are in all interesting aspects similar except for one thing. While Inga has a normal functioning brain, Otto suffers from Alzheimer’s disease. So when they both (in different places and on different occasions,

presumably) hear about an interesting exhibition at the Museum of Modern Art, and decides that they want to go there to see it, they act a little bit differently. Inga recalls that the museum is on 53rd street, and walks there to the exhibition.

Otto, however, suffers like other Alzheimer patients from problems of retrieving facts such as the address of a museum, and is forced to rely on external aids. So we are told that Otto carries a notebook around with him everywhere he goes. When he learns new information he makes a note of it in the notebook. And when he needs any of this information, he looks it up in it. So Clark and Chalmers claim that “his notebook plays the role usually played by a biological memory”. So, in this case, when he hears about the exhibition, we are told that “[he] consults the notebook, which says that the museum is on 53rd street, so he walks to 53rd street and goes into the museum”.

The central thesis of the Clark and Chalmers paper has since its publication sparked a discussion almost as intense as the one that followed upon Searle’s well known “Chinese room” thought experiment (Searle, 1980), and in our opinion this for a good reason. Just like Searle 30 years ago, the Clark and Chalmers paper cuts right into a central theoretical issue in cognitive science, and illustrates the central thesis with a vivid concrete illustration which at the same time is easy to grasp the basic features of, while at the same time open up for a vast range of theoretical interpretations and arguments for and against them.

It is, however, our impression, that while the discussion on the extended mind (EM) hypothesis has helped clarify the positions of those engaged in it, it is perhaps not all too unfair to say that there has been limited theoretical progress towards an accepted resolution of the issues brought out by the original paper. It is our belief that this, at least to a large part, can be accounted for by the fact that most of the discussion has accepted two basic assumptions of the original Clark and Chalmers’ paper. First the definition, or

lack thereof, of the central theoretical terms, second the empirical foundation for the argument. The aim of the present paper is to first substantiate this claim, and second to sketch alternatives to both of these.

The rest of the paper is structured as follows. First we review the theoretical discussion on extended mind, and conclude that that in order to defend Extended Mind hypothesis, we need to further develop a definition of what cognitive processes are and how to analyze cognitive systems in a more fruitful manner. Furthermore, we offer an alternative perspective on cognition, namely Activity Theory (AT), and illustrate how that framework, in our opinion, can be fruitfully used to put the various positions put forth into a larger framework. Second, we question the correctness, and hence usefulness, of the Inga and Otto example, by comparing the fictitious data of Clark and Chalmers with observations from a field study of the use of environmental memory support in elderly people. In the final section we summarize our arguments for why we believe that to move the discussion on extended mind forward, we need to put our arguments into a larger theoretical cognitive framework, and also need to place our theoretical discussion on a firmer empirical ground.

An outline of the Extended Mind debate

In the original article Clark and Chalmers wrote "If, as we confront some task, a part of the world functions as a process which, 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 is (so we claim) part of the cognitive process." (Clark & Chalmers, 1998, p. 3). This was later referred to as the Parity Principle (PP), which has been heavily debated by both proponents and critics of EM.

The PP is explicitly illustrated in Clark and Chalmers (1998) original paper where one is encouraged to ponder upon three different scenarios. In the first scenario, one is told to imagine a problem solving situation where an individual is sitting in front of a computer screen and doing mental rotation on a figure represented on the screen to see whether it fits into a hole also presented on the monitor. The second scenario is almost identical, but with one crucial element that differs. In this second scenario, the individual can manually rotate the represented figure by pushing a button thereby making it possible to visually see whether the figure matches the hole, much as in Kirsh and Maglio's (1994) experiment. The third scenario is somewhat more controversial, where one is asked to imagine a distant future where a human has implanted an artificial neural component that allows the human to rotate a visual figure in an inner screen as in the second scenario. In this scenario, the human can choose to consult this high-tech feature or simply do traditional mental rotation as in the first case.

Clark and Chalmers are confident that cognitive processes are present in all three aforementioned cases, and that they are functionally the same. The difference is simply that they contain different couplings between agent and artifact. If one accepts that scenario 1 and 3 are functionally

equivalent, then it is dogmatic to insist that scenario 2 is not equivalent as well. Hence, the authors purport that all three scenarios are manifestations of genuine cognition (Clark & Chalmers, 1998).

Criticism of EM has arisen most prominently from, on the one hand, Adams and Aizawa, who published a seminal paper in 2001 (Adams and Aizawa, 2001); and on the other, Robert Rupert, who published a similarly influential article in 2004 (Rupert, 2004). Nevertheless, Adams, Aizawa and Rupert actually all claim sympathy for the Parity Principle. "To us, [the Parity Principle] means that the skull does not constitute a theoretically significant boundary for cognitive science. More specifically, it means that being inside the brain cannot be the mark of the cognitive. This seems to us true and obvious" (Adams and Aizawa, 2001, p. 46). In addition, Rupert writes "I sympathize with the motivation behind the Parity Principle. After all, why should it matter where a process takes place? If that process instantiates cognitive or mental properties when it is over here, why should things change simply because it is now over there?" (Rupert, 2009, p. 30).

An argument that was formed by Adams and Aizawa (2001) that illuminated the fact that there might be a crucial difference between a genuine extended cognitive process – where some external artifact in the world is part of a genuine cognitive process – and process that enables some process. Consider pencil and paper. By using them while conducting arithmetic one is partaking in a cognitive process – the process of deduction. Now, imagine that the current arithmetic is quite complex and you would not be able to calculate the problem using only your head and that you need to offload some information onto the paper. Adams and Aizawa (2001) claim that the pen and paper only enabled some cognitive process that otherwise would be impossible. You still conduct the actual cognitive process in your head, while simply offloading some information onto the paper and hence simplifying the problem and offloading your working memory

Rupert (2004) has coined the terms HEC (Hypothesis of extended cognition) and HEMC (Hypothesis of embedded cognition), which are two different takes on cognitive systems and their composition and their role in cognitive processing; HEC would roughly correspond to the perspective adopted by Clark (2008) where cognitive processes literally extends into the environment, whereas the more conservative HEMC still insists that cognition is organism bound. According to the HEMC the cognitive processes depend on - rather than being constituted by - external components and devices in which cognition takes place without the external components being a literal part of the cognitive process. Rupert also believes, contra Clark (2008) that HEMC has more empirical support and explanatory value than HEC. Rupert argues that the debate over extended cognition largely boils down to the question of how to pin down when something is cognitive and how to properly individuate cognitive systems (Rupert 2010).

The controversy regarding cognitive systems and the nature of their constituents and properties is questioned by Wilson (2010) and he suggests that we should focus on cognitive specifications of certain activities: “The shift is one from a focus on “things”, such as representations, to a concern with “activities”, such as the act of representing. Such activities are often bodily, and are often world-involving in their nature. A version of the problem of intentionality formulated so as to apply to them - “In virtue of what is activity A the representation of C?” – seems hardly pressing at all. Rather, what cries out for discussion is the question of just what forms these activities take, and just how they bring about the effects they do.” (Wilson, 2010, p.183) Wilson’s statement deemphasizes the pertinence of non-derived content and coupling-constitution as discussed at great length by Adams & Aizawa (2008) and rather emphasize that it is the activities and practices that are of importance in cognitive science (Wilson, 2010).

It seems as though the heavy body of literature and debates are predicated on discrepancies of conceptual definition, and that discussions regarding cognition vis-à-vis mind and vis-à-vis cognitive processes all fall back to individual intuition and subjective conception of these terms. We are not going to take a stand in these issues, but we suggest an alternative approach to understand cognition.

Activity theory

It seems to us, that while the positions taken by the work reviewed here, and also by other workers in the field, vary on many dimensions, they with one or a few exceptions share a common assumption, i.e. that cognition is primarily biological and organism centered. The most clearly articulated alternative to this is Hutchins, who claimed already in Hutchins (1995) that cognition is a social and cultural process.

One problem here is that it seems that different ideas or conceptions of what is an is not cognitive in part can explain the different positions taken, and another is that it is primarily intuitive judgments that are used to decide what is and is not cognitive, something which is also noted by Rupert who writes, “After all, it’s not up to our intuitive judgments to decide what cognition is; the property of being cognitive is a scientific construct, validated only by the causal-explanatory work it does” (Rupert, 2010, p. 20).

We would like to suggest here, that by placing the Extended Mind hypothesis in the wider theoretical framework of Activity Theory, it becomes possible to reconcile these two positions, and it also makes it possible to go beyond intuitions in deciding what is cognitive.

Activity theory (AT) was developed primarily by Leontjev (1978) and is based on Vygotsky and his cultural-historical psychology (e.g. Vygotsky 1978). It is beyond the scope of the present paper to present a complete picture of the theory, instead we will confine ourselves to some parts which we believe are relevant for the Extended Mind debate (for an excellent short introduction to Activity Theory, see chapter three in Kaptelinin and Nardi (2006)).

One key idea in Activity Theory is that the human mind is intrinsically related to the interaction between the human being and the world. Moreover, the human mind is an emergent product that is developed in order to make successful interaction with the world. Culture, in this view, is not something wholly external that is influencing the human mind but, rather, is a generative force that is part of the very production of mind.

Vygotsky makes an important distinction between “higher” and “lower” or “natural” psychological functions. The latter are defined by Kaptelinin and Nardi as “mental abilities such as memory or perception with which every animal is born” (ibid, p 41). This is in contrast with the higher psychological functions, which “emerge as a result of a restructuring of natural psychological functions in a cultural environment” (ibid, p 41-42). The natural functions are obviously organism centered, and fit well within the basic perspective on cognition of Clark, Chalmers and most of the participants in the Extended Mind debate. And at first appearances, this perhaps looks so also for the higher functions. But the position of Vygotsky and Activity Theory is very different from this, and in many respects.

In this theory, the human mind is social in nature. This both in that the individual (the subject) is social; we are shaped by culture, by the languages we use etc., and also in the sense that the world we live in is social. It does not consist of only individual biological agents in a physical world; we live also in a social and socially construed world. A consequence of this is that in Activity Theory, the individual is not the fundamental unit of analysis; that instead is the activity, which is the purposeful interaction of the subject with the world (Leontiev, 1978, cited in Kaptelinin and Nardi, p. 31). Central to these activities are mediators, i.e. tools that are used and that shape the activity. These tools can be both physical, like a hammer, and psychological, like an algebraic notation.

Thus, in essence, higher mental functions are mediated mental processes. A key notion of AT and Vygotskian psychology is the phenomenon of *internalization*. Internalization is the process whereby an individual does not need to rely on mediated, external artifacts, which was hitherto necessary in order to carry out the current activity. Previous external processes can now take place internally in the head of the individual and the activity and process is from here on out mediated by internal resources rather than by external ditto. In this way, AT highlights how mental processes are restructured as a result of the development in a cultural environment.

The relation between mind and environment is intrinsically related and the relation is symmetrical, which means that the restructuring works both ways in the interaction between mind and world. The internalization does not necessarily involve physical tools that together with the individual constitute a traditional cognitive system, but might also involve social others and internalization through participation in joint social activities such as communication in general and learning in particular.

Framing the Extended mind debate in a AT Framework

This condensed and incomplete description of Activity Theory is probably rather difficult to understand for readers not previously familiar with it, while at the same time we fear that readers that are familiar with it will shake their heads in despair over our rough and simple exposition of an elaborate theoretical framework. But our ambition is not to present the theory in its entirety, but only to use it as an illustration of the benefits that we suggest can be gained by placing different positions regarding the Extended Mind hypothesis in a unifying framework.

A first observation is that by distinguishing between a set of basic or “normal” psychological functions and a set of “higher” psychological functions, we can place different examples used in the debate in different categories. We can also within the same framework find some cognitive functions that indeed are primarily biological and organism centered, as was assumed in the original Clark and Chalmers paper. But a problem encountered by Clark and Chalmers when assuming that all cognition has these characteristics, was how to avoid reaching the counter intuitive conclusion that e.g. “my cognitive state is somehow spread over the Internet” (Clark and Chalmers, 1998). Their solution was to develop a set of criteria for stopping the mind from encapsulating the entire universe, a solution which few have found convincing.

The solution suggested by the Activity Theory framework is very different. Here higher cognitive or psychological processes are from the beginning outside the isolated individual. He or she is born into a world which has developed and accumulated a wealth of cognitive mediators, both physical and psychological. These are then during the developmental process gradually appropriated and internalized. So the answer to the question, “how are (the higher) cognitive functions extended into the world” is that they are not. On the contrary, they exist first and foremost in the world, and are to a larger or lesser extent internalized and perhaps one even could say organism centered.

We are of course by no means suggesting that Activity Theory is a panacea which solves every issue touched upon in the Extended Mind debate. We see many unsolved problems here, as well as parts of the theory’s formulation that can be questioned. To take one example of the latter, the characterization of the “natural” psychological functions as those that we share with other animals as if these were unaffected by the knowledge we have acquired, does not seem to fit well with an abundance of data showing how also basic perceptual processes can be influenced by such knowledge. But we do believe in the fruitfulness of using a wider theoretical framework to contextualize theoretical positions taken in discussions such as the Extended Mind debate.

Using a wider theoretical framework is one way we suggest can be used to clear up some of the issues in the Extended Mind debate. Another way, we suggest, is to

provide a firmer empirical base than what has hitherto been used. It is to this we turn in the next section.

Extended mind in the wild

In the introduction we compared the Extended mind paper of Clark and Chalmers with the Chinese Room paper of Searle, claiming that both these papers, not the least by using a vivid imagined example, have sparked a theoretical discussion. But in our view, there is an important difference between the ways the imagined example is used in the two papers. Searle use his thought experiment to illustrate the theoretical consequences, in his view absurd ones, of the theoretical position he argues against. There is never any claim that the depicted situation is a realistic one that could ever occur. Clark and Chalmers, on the other hand, use an imagined example as the empirical foundation of their theoretical position. In some way one might even claim that they base their theoretical analysis on fictitious data, as if Otto’s behavior is something that actually has, or at least could, occur, and which is in need of an explanation.

We have no arguments against thought experiments in general – on the contrary we believe that they are important tools for science when they are used to illustrate the consequences of a theoretical position. But then the argument goes from a theoretical position to an imagined and often unrealistic empirical illustration which not is taken to actually exist in the real world, as in Searle’s (1980) Chinese Room or in Putnam’s (1975) Twin Earth, to mention two examples from Cognitive Science. But in the case of the Clark and Chalmers paper, the argument goes in the other direction; from an imagined empirical observation, which the reader is supposed to be taken as something that might actually exist, to a theoretical conclusion. We claim that we need some evidence that the situation depicted actually could occur. If not, we risk building our theories on a too unstable empirical foundation.

What is important to observe here is that *the only* difference between Otto and Inga is how they retrieve where the Museum of Modern Art is located. (c.f. the quotation in the introduction). In all other respects they behave and act in identical manner. The reason that we consider this important is that this is a central and necessary feature of the Clark and Chalmers’ argument; if this does not hold, then the so called Parity Principle cannot be used. Remember that a central part of the argument for the Parity Principle is an identity between the two tasks; the only difference is that in one case part of it is done in the external world instead of in the head. And, so the argument goes, since these are identical in all respects but this little one, we cannot escape the conclusion that they must be functionally and cognitively equivalent. But what if it never is the case that if afflicted by Alzheimer’s disease, the only difference is that memory retrieval is performed differently? Can we still claim that Inga and Otto are functionally and cognitively equivalent? And if we can’t, where is the ground for claiming that mind is extended into the world?

We believe that before proceeding further, we need to learn more about how the external world is used as memory support in people which are diagnosed with memory problems, i.e. whose memory in the head has reduced capacity.

A field study of external memory in elderly

To find out how external memory support is actually used, we conducted a field study to explore how elderly act in order to remember in their everyday life. The field work was done by one of the authors (M.K.) in the home healthcare service of a small Swedish town during the summer 2010. The study lasted for five weeks, with approximately 25 participating health care receivers.

Both participatory observations and interviews were conducted. We will below present some illustrative examples of external support for their memory from four of the participants, aged from 72 to 91, all with mild memory impairments. Two of these (A and B below) were diagnosed with Alzheimer's disease or some other form of dementia, whereas the rest only showed loss of cognitive functions normal for an elderly population.

During one of the visits it is noticed that one elder woman keeps the disposed plastic envelope for the medicine ("ApoDos"¹) even after its contents has been used. On every envelope there is information about the patient and the medicine: date, time it should be taken, what tablets it contains, social security number and name of patient. The woman has memory problems; therefore she receives help with assuring that she takes the medicine three times daily. On a kitchen table she keeps all the used plastic envelopes in a clip. She says that the envelope is a way of helping her to assure herself of that the home healthcare been there, because she will not remember.

Clark and Chalmers argue that the cognitive functions are extended in the world through active externalism, i.e. through for instance making a note in a notebook for later use. In this case, however, how the plastic envelope becomes a part of her memory system is through an active *internal* process. So, instead of creating a material artefact to enhance a deficient internal function, in this case an already existing material artefact is put to a new and creative use to enhance her memory.

B has a note on the inside of her door in order to remind herself that she shouldn't open the door for strangers. The note has been put there and signed by her daughter. If the doorbell rings, and she stands by the door, reading the note, it can be argued that this note is an "extension", with the same function as Otto's notebook. But the note works here only because it is pinned to the door – it would probably

have been useless if it had been somewhere in her notebook, where she was supposed to look every time the doorbell rings. We believe that Clark probably would argue that this is not an example of extended mind, since B does not carry the note with her all the times, which is a criterion Clark and Chalmers use to delimit the degree to which mind can be extended into the world. We would, however, suggest that this example can be used to question the criterion that Clark and Chalmers use, since to us this example is in many respects a prime example of extending memory into the world. And it even shares an important feature with memory "in the head", that remembering is facilitated by contextual priming.

C uses a shopping list when going shopping. This person has other medical problems in addition to her memory problems, and it is important for her that she finds paracetamol, and the importance of attaining this goal makes her drop the other goals for a while. When she has found out that paracetamol is to be found after the check-out, she gets calmer, but she wants her follower to remind her, even though paracetamol is on the list. After the check-out she had indeed forgotten that she were to buy paracetamol after the check out. This is an illustration of something emphasized in Activity Theory and in general in the sociocultural approach to cognition, i.e. that the cognitive processes are not only include the physical environment but also the social environment (Vygotsky, 1978, Sutton et al 2010). We suggest that this is an interesting and important potential extension of the extended cognition approach as formulated by Clark and Chalmers.

This example can also be contrasted with the Otto example. Once Otto has from his notebook retrieved the location of the Museum of Modern Art, he is able to proceed there just like Inga with no further problems. For C, on the other hand, it is not enough to have a note with the required important information. Even if she has it in her hand all the time, she forgets what she should use the information on it for. With this example in mind, it is not clear to us to which extent there are cases where two processes are functionally and cognitively identical, with the only difference being that a part of it in one case depends on an external artifact.

F has an appointment at the podiatrist. She had a note with the appointment, which she had posted on her fridge. But she had turned the note around and written the date again, though bigger this time. For some unknown reason, the dates had gotten mixed up, and the wrong date had been transferred to her calendar.

An external memory support is in this case as much a question of how information finds its way into the external memory support as it functions as a memory support. It is not as simple as Clark & Chalmers' picture, where Otto simply notes every new piece of information in his notebook. Memory problems do not present an isolated cognitive problem. The picture of Otto's way to execute the action – to note new information in the book, read the

¹ "ApoDos is the name of the multi-dose system which has been used in Sweden for 30 years. It is used for delivering medicines to persons requiring regular medication. ApoDos is a method for ensuring quality-assured medication supply both today and in the future."

http://www.apoteket.se/privatpersoner/om/sidor/OmApoteketContents_Internationellt_ApoDos_ApoDos.aspx (retrieved 2010-12-13)

information, and then walk to the museum – is a much too simple description of something complex.

Discussion of the field study

The examples here are a small subset of observations just from one study. To draw any far reaching conclusions regarding how the Extended Mind hypothesis should be reformulated from this would obviously be premature. But it is our belief that already these short examples illustrate an important point, namely that by looking at real existing cases of extending cognitive processes into the material world, many details in the Extended Mind hypothesis can be questioned, and other obviously are in need of reformulation.

Already in this small empirical study we on the one hand found reasons to question the validity of the Inga and Otto example, and on the other hand found examples of real existing use of extended cognition which as far as we can tell not have been addressed in the discussion following the publication of the Clark and Chalmers paper.

We want to stress that we are not against the hypothesis of extended cognition. We only want to claim that to build a theoretical framework for extended cognition we need to base it on a foundation of observations of real existing situations.

Summing up

We have suggested that one problem with the important theoretical debate initiated by Clark and Chalmers introduction of the Extended Mind hypothesis, is that these cognitive phenomena have been discussed in isolation, i.e. without being framed within a wider theoretical framework encompassing all kinds of cognition. We have also suggested that the empirical base for the debate has not only been narrow by being confined to only a few examples, but has also been of questionable quality by relying too much on construed examples.

For both of these, we have outlined potential solutions. In the case of a theoretical framework we have suggested that Activity Theory potentially can be used to clarify some of the issues brought up in the debate. And as an alternative to invented examples, we have suggested that field studies of extended cognitive processes should be used instead. We also tried to show with a few examples how such real cases makes it necessary to reformulate some of the positions taken. We want to stress that this does not imply abandoning the Extended Mind hypothesis in its most general form. But we are convinced that it will require reformulations, both of the specific questions asked, and the answers given to them.

In the beginning of the paper we argued that we need to further develop the central theoretical terms used here. We have presented one example of this; to use Activity Theory's distinction between two kinds of cognition to differentiate between different cases in need of different kinds of theoretical explanations. Another theoretical or conceptual issue that we believe is in need of further

development is the relation between 'cognition' and 'mind'. We have been careful in this paper to only talk about extended cognition and not extended mind, except when reviewing the work of others. It seems to us that for most, if not all, working on issues of extended cognition has taken for granted that if there are good reasons for seeing cognition as something existing outside the skull of the individual agent, then this is also good reasons for concluding that mind extends into the world. We are not convinced of this. There is of course another possible solution, namely that cognitive processes are not seen only as processes in the mind. Then the answer to the question stated in the beginning of this paper "Is the mind also in the world" would be, "no, but cognition is".

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