The Extended Mind, Internet, and Augmented Reality

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Abstract

In this paper I will take a look at the extended mind thesis. Particularly I will discuss why I believe that augmented reality is the best way to implement the thesis. Before arguing for this hypothesis, I will clarify my position on some common issues found with EM. Firstly, I will provide a description of Clark and Chalmers original outline of the thesis and all of the updates they have given over the years, particularly touching on Clark's paper '*The Extended Mind: Extended',* and Chalmers's brief discussion of the thesis in his book *'Reality+'.* After establishing the base argument of EM I will discuss the argument Paul Smart provides for the Web-Extended Mind hypothesis provide my objections using points raised Duncan Prichard and K. Brad Wray. I will then go on to discuss current and potential augmented reality technologies and how I believe they best implement the EM thesis.

Introduction

Andy Clark and David Chalmers came up with the extended mind thesis in their 1998 paper of the same name. Although the idea was not widely accepted at first, it has since grown in popularity and plausibility largely due the advancements in technology. Clark and Chalmers originally use a notebook as an example of an object that can extend the mind, today however, our devices such as our smartphones seem much more fitting examples. The advancement of technology also brings in a new set of considerations that must be made. One area of debate comes especially when talking about the role of the internet in extending our minds. If we grant that the use of the internet in a certain way can extend our minds, are we saying that all of the information on the internet can count as our knowledge? In this paper I will argue why I believe that the internet should not and cannot be used to extend the mind as the information found on the internet cannot count as a person's knowledge. I also will discuss why I believe that sight is an exciting are of human functionality that has great effects on our cognition, and therefore should be a focus for technological extension. Specifically, I will discuss how current augmented reality technologies are being used to enhance our visual fields. I will argue why I don't believe that these current implementations can meet the requirements of extending the mind because of their use of the internet as a source of information. I will finally describe how I believe augmented reality technologies should be implemented to properly extend the mind

The Extended Mind Thesis

The extended mind thesis is a thesis put forward by Andy Clark and David Chalmers in 1998 that states that objects we use in our daily lives can become a part of our minds. A common thought experiment used to explain the thesis is that of Otto and Inga. Imagine two people Otto and Inga, are both trying to go visit the Museum of Modern Art. To reach the museum Inga consults her memory for directions, follows these directions and reaches the museum. Otto, however, has Alzheimer's disease, meaning that he cannot properly store memories as Inga does. Otto instead keeps a notebook with him at all times in which he writes down things he may need to remember such as the directions to the museum. Clark and Chalmers state that if we are to look at how both Otto and Inga go to the museum, they are both the same process. The only difference being that the memory is stored in different locations. From this experiment, Clark and Chalmers come to the conclusion that Otto's notebook extends his mind and serves as his memory. Clark and Chalmers state that 'If, as we confront some tasks, 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. 6). This idea is known as the parity principle and Clark and Chalmers argue that it applies towards Otto's notebook. Fred Adams and Ken Aizawa offer their objections to the extended mind thesis in their 2010 paper *The Bounds of Cognition*. Adams and Aizawa reject Clark and Chalmers's use of their Otto and Inga thought experiment and the use of the parity principle by explaining why they believe that the cognitive processes carried out by Otto and Inga are actually not comparable enough to invoke the parity principle. Adams and Aizawa point out multiple key differences in the two processes. For example, the actual content of Otto and Inga are not the same kind of content, Otto's written memories in his notebook consist of derived symbols while Inga's memories in her mind are made of non-derived symbols. The process of retrieving these memories is also quite different as there are extra steps such as cognitive-motor and visual processing that needs to take place in order for Otto to recall his memories (Adams & Aizawa 2001, p 55).

These concerns raised by Adams and Aizawa are addressed by Andy Clark in 2004. The most important of which, I believe to be intrinsic content. Adams and Aizawa state the parity principle does not work in the case of Otto and Inga as their 'memories' are made up of different content. Inga's memories are made up of intrinsic content while Otto's written memories are derived content. Clark argues that even if this distinction is granted, it is not clear that human mental processing must solely use intrinsic content. Clark provides the example of imagining a set of Venn diagrams. Clark argues that the meaning behind the overlap within the diagram is derived content and still is a part of our mental process. From this example it seems that derived content can be part of our mental processes and therefore backs up the example of Otto's notebook extending his mind. Clark also clarifies some key requirements an object must meet in order to be classified as an extension of our minds. For the purposes of this paper, I am going to take meeting these three requirements as sufficient for being able to extend the mind.

1. That the resource be reliably available and typically invoked
2. That any information thus retrieved be more-or-less automatically endorsed. It should not usually be subject to critical scrutiny. It should be deemed about as trustworthy as something retrieved clearly from biological memory.
3. That information contained in the resource should be easily accessible as and when required. (Clark, 2010, p 7)

Since the introduction of the extended mind, it has only grown in popularity. A key factor of this is that our own technology has tremendously improved in the last two decades, making the ideas presented by Clark and Chalmer's much more plausible. In Chalmers's 2022 book *Reality +*, Chalmers explains that when originally published, the thesis was deemed too radical to take seriously but has become more acceptable since the invention of the smart phone and increased availability of the internet. Chalmers says that devices have been extending our minds for centuries with tool such as the abacus, it is now with the current state of technology and computers that the idea of extending the mind has been 'supercharged'. In *Reality +*, Chalmer's provides an updated version of the Otto and Inga thought experiment to account for our technological advancements. Chalmers describes the case of Omar and Ishi, who are both trying to find their way to the Sydney Opera House. Ishi is not technologically advanced and uses her memory to find her way to the Opera House. Omar, however, heavily relies on a par of augmented reality glasses that show him information on any topic. Omar asks the glasses to show him the way to the Opera House, and Chalmers states that Omar's external memory is genuine knowledge because of the parity principle (Chalmers, 2022, p 302). Chalmers's formal argument goes as follows.

1. Ishi's internal memory is genuine knowledge.
2. Omar's external memory plays the same role as Ishi's internal memory.
3. If the internal and the external memory play the same role, they both count equally as knowledge.
4. So: Omar's external memory is genuine knowledge (Chalmers, 2022, p 302).

Chalmers also considers some objections to this modified thought experiment, the first being on conscious thought. Some may say that Ishi's internal memory may not be genuine knowledge until she is consciously thinking about it. Clark responds to this by saying that it is not viable to say that genuine knowledge only consists of what is conscious as this would discount much of what makes up our minds. Chalmers also makes it clear that the implications of the extended mind are not that the objects that extend our minds are part of our consciousness, but rather become unconscious parts of our mind much like our internal memory. The second objection Clark considers is once again an objection to the use of the parity principle in the given thought experiment, with there being potential objections to the similarity between the Omar and Ishi's process of memory. This objection is handled in the same way it was when raised on the original hypothesis. Here however, I do not believe the response is valid.

Internet Extended Mind

I believe that Clark and Chalmers's use of the parity principle is valid in the case of Otto and Inga but not in the case of Omar and Ishi. The difference being the source of information that provided Otto and Omar with their respective knowledge.

In his article titled "How far can Extended Knowledge be Extended?", K. Brad Wray discusses the idea of extended knowledge introduced by Duncan Pritchard and why he believes problems would arise when cognition is extended by the knowledge gained from the source of a secondary agent, rather than an object such as Otto's notebook. Pritchard describes knowledge as the product of cognitive ability and that true beliefs do not count as our knowledge if they are not produced by cognitive ability. Pritchard provides the thought experiment an agent who is a brain in a vat that is being fed beliefs about her environment by supercomputers. Even though the information may be true and verifiable, Pritchard states that contemporary epistemologists would deny that the information can be accounted as the brain's knowledge (Pritchard, 2010, p2). Pritchard introduces two accounts of cognitive ability, a weak and strong account.

1. COGA Weak: If S knows that *p*, then S's true belief that *p* is the product of a reliable belief-forming process which is appropriately integrated within S's cognitive character such that her cognitive success is to a significant degree creditable to her cognitive agency
2. COGA Strong: S knows that *p* iff S's true belief that *p* is the product of a reliable belief-forming process which is appropriately integrated within S's cognitive character such that her cognitive success is primarily creditable to her cognitive agency. (Pritchard, 2010, p6)

Pritchard argues that the strong view of cognitive ability puts more emphasis on the credibility, allowing the agent to be credible for their own beliefs. Pritchard provides two conditions that must be met in order for formed beliefs to be credible to the agent. First the belief must come about because of cognitive ability of the agent. Secondly, the agent must take cognitive responsibility for his cognitive success. If these two conditions are met, we can say that the beliefs of an agent can constitute as their knowledge and can be credited to their cognitive ability. Wray applies the requirements of credibility for knowledge to the knowledge gained from scientific study, specifically studies conducted by groups of scientists. Wray asks the question of whether a scientist can be deemed credible for the knowledge they may have gained by work done by another scientist within their group. Given Prichard's extended knowledge, Wray argues that the scientist cannot be deemed to have extended knowledge if a discovery was made by someone else within the group as the two criteria for credibility would not be reached. Wray uses this conclusion to discuss collaborative research, however, I believe it can be used as an objection to what is known as the Web-Extended Mind. An idea proposed by Paul Smart that states that in certain cases, knowledge gained from the internet can be used to extend the mind.

In his 2017 paper “Extended Cognition and the Internet”, Paul Smart discusses a wide range of issues that are to do with Internet-extended cognition and the Web-Extended Mind hypothesis. Smart believes that the internet is too broad of an entity to be able to extend our minds and therefore narrows down to the world wide web. Smart defines a Web-Extended Mind as a “extended cognitive system whose processes supervene on a set of constituent material elements that includes one or more Web resources” (Smart, 2017, p6). This description can be likened to Clark and Chalmers’s original definition of the extended mind but with the catch that the object that extends the mind is replaced with resources found on the Web. Given the definition of a Web-Extended Mind, Smart goes on to consider how this kind of system would address the three conditions laid out by Andy Clark that must be met in order to extend the mind. Clark labels these conditions as the availability, trust, and accessibility criterion. When discussing the availability criterion, it initially seems that the Web meets the condition and as advancements continue, will only become more and more available. Smart does discuss the potential issue of how information on the Web is organized and how after a deeper look, the Web in its current state may not be as accessible as initially thought. Although it may seem that the internet is everywhere, the availability of the information found on the Web is dependent on having access to the internet and this may not always be the case. We can be cut off from the internet for many reasons that may even be outside of our control. Smart also admits that the trust condition could prove to be a challenging issue to Web-Extended Minds. In this section of the article Smart points out that the trust condition is one that would be difficult to meet for a Web-Extended Mind as it is as it is not clear how to replicate the level of endorsement and trust we put on our memories with non-biological systems. As for the accessibility criterion Smart brings up the potential issue of the organization of information. Information on the internet is easy to find only if you know where to look and there is no consistent way to always find the information you are looking for. Smart recognizes these issues as legitimate concerns for the accessibility of information on the Web (Smart, 2017, p7-12).

It is important to note that Smart is not raising these concerns to reject the Web-Extended Mind but rather is raising them to point out what areas need to be looked at and addressed by future technologies. The concerns raised by Smart can be addressed by advances in technology and how information from the internet is presented to us. This is where I believe the points made on extended knowledge by Pritchard and Wray can serve as an outright objection to the Web-Extended Mind. The key concerns in Smart’s paper are all of the form of how the information is delivered to the agent and how the agent accepts the information, by applying Wray’s objection to knowledge gained from groups, I can object to knowledge gained from the information itself that is found on the internet. If we accept that credibility is required to generate knowledge, it becomes clear that even if information from the Web meets the availability, trust, and accessibility conditions, it cannot be counted as our knowledge as we are not credible for it. Given credibility is a requirement for acquiring knowledge, we must be careful in granting a cognitive system as extended. This issue is already occurring with newly emerging technologies such as augmented reality.

Augmented Reality and The Extended Mind

When discussing possible implementations of the Extended Mind Thesis, it is clear that the level of technology is a key factor in meeting the three conditions for extending the mind. One subject of discussion, however, could be about which part of the mind is most worth extending? I believe that enhancing sight could be a greatly worthwhile way to implement the extended mind. To argue for this, I will go over two studies that investigate how vision is linked to cognition. The first study was conducted to see if there was a relation between vision and cognitive development within an elderly population. Researchers conducting the study hypothesized that the correlation between vision and cognition is based on the impact of vision on mentally stimulating activities. Loss of vision can hinder the performance of mentally stimulating tasks such as reading or socializing and could therefore lead to a decline in cognitive ability. To test this hypothesis an experiment was designed in which seniors over the age of 75 were tested in their near visual acuity (VA) and their cognitive ability through a version of the mini-mental state examination for the visually impaired (MMSE-blind) (Spierer et al., 2016, p1). A high VA score indicates good vision, and a high MMSE-blind score indicates good cognitive ability. After collecting data on these test statistics for the participants, a correlation was found between VA and MMSE-blind, meaning that good vision was correlated with a good level of cognitive ability. It also seen by the study that the use of glasses by those that have impaired vision was correlated with an improvement in cognitive ability (Spierer et al., 2016, p2). The paper titled "Visual Cognition: In sight, in mind" written by Mariam Aly discusses a study that looked at how the brain links perception and concepts. The study was designed specifically to look at how the brain handles objects that are conceptually related, such as a tennis ball and tennis racket, against objects that are visually related, such as a tennis ball and a lemon. To start the study, researchers tested two equally sized groups of people. Participants in the group were shown pairs of objects, one group was told to rate how much each pair looked alike, and the other was told to describe the conceptual features of the objects. From this a number that indicated perceptual similarity and a number that indicated conceptual similarity were able to be found (Aly, 2018, p1). fMRI was used to observe brain stimulation while members from each group performed their tasks. The results of the fMRI showed that an area of the brain called the perirhinal cortex was stimulated in both cases of perceptional and conceptual probing, allowing the conclusion that perception is linked with conceptual meaning to be drawn (Aly, 2018, p2). These two studies support the claim that vision is an important part of cognition and therefore it would be worthwhile to tackle extending the mind through vision. Through current trends in technology, it seems that the best way to enhance vision is through augmented reality.

Augmented reality (AR) technologies aim to seamlessly overlay computer-generated content into the real world. Up until know this technology has mostly been implemented within camera fitted devices such as our smartphones. Implementations of AR allow smartphone users to add in virtual objects into their environment and view them through their cameras, the most popular of implementations being the hit game Pokémon GO, which overlays Pokémon characters into the real world. This implementation does not utilize the full potential of AR as the overlayed objects can only be seen through the screen of the user's device. Newly emerging

implementations are taking the form of AR glasses. These glasses allow the virtual objects to always be in the user's field of view. They also allow the virtual objects to be input directly into the environment and not on a recording of the environment, enhancing the experience of the user. One version of AR glasses, the HoloLens, has been created by Microsoft. In his paper "Shedding Light on the Extended Mind: HoloLens, Holograms, and Internet-Extended Knowledge", Paul Smart takes a look at how an application of HoloLens fits into the discussion of the extended mind and the internet. The application Smart focuses on is called HoloArt. The app uses augmented reality and cloud-based computing to display information about art pieces to the user within their visual field. When the user is looking at an art piece, they can prompt the app to run a search on the web for information about that specific piece. The art piece is captured by a camera in the HoloLens headset, the picture is sent to Google's image-based search engine and information on the piece is gathered from various sources around the web. The app then takes this information and organizes it into a card that is overlaid into the user's environment by the HoloLens headset. When discussing whether or not the information from the HoloArt app can be counted as knowledge, Smart concludes that the information would count as the user's knowledge according to a classical account of knowledge. An account which goes as follows, S knows p if, and only if, (i) S believes p, (ii) S's belief that p is true, and (iii) S's belief that p is justified. Smart argues that all of these conditions are met by the HoloArt system. One condition of knowledge that could cause problems for HoloArt is the second condition that states that the belief must be true in order for it to be counted as knowledge. This could cause issues as HoloArt is not always accurate and may provide information for the wrong art piece. Smart states that this issue is avoided because of the layer of justification from the user that the information must go through before becoming a belief of the user. HoloArt always shows a picture of the art piece that it is providing information on, if HoloArt failed to correctly recognize the art piece, the image it provides next to the information would not match what the user is looking at in real life. Smart argues that the user would be able to catch the misinformation by recognizing that the picture provided by HoloArt does not match the art piece in front of them. Smart also does go on to address whether or not information from HoloArt could count as knowledge under Pritchard's sense of knowledge that puts emphasis on credibility. Smart argues that the process of the user verifying the knowledge by comparing the image to the art piece they see makes the user credible for the information and therefore makes the information the user's knowledge (Smart, 2021, p8). I disagree with this statement as I believe that the idea of credibility is much deeper than being able to justify information. Credibility, in Pritchard's sense, is only present when the information itself comes from the agent. Where HoloArt lacks in credibility is through its source of information. Unlick Otto and his notebook, the information that HoloArt provides comes from the web, which cannot be credited to HoloArt's user. If information from HoloArt cannot be credited to the user, it cannot be counted as knowledge and therefore cannot extend the mind.

Although I believe that technology such as the HoloLens cannot extend the mind due to a lack of credibility, I still believe that AR can be used effectively to extend the mind. I believe that AR implementations should limit information it uses to that provided by the user. It should also play to the strengths of visions effects on cognition. For example, in the case of visually impaired seniors, AR could allow the elderly to see clearly by enlarging objects or texts within their visual field.

Conclusion

Although the extended mind thesis was not immediately accepted, it has become less controversial due to how integrated technological devices have become with our lives within the last two decades. The incorporation of technology may seem to be more likely to meet the conditions laid out to extend one's mind, however, I feel that the inclusion of the internet causes a major issue for extending the mind as information taken from the internet cannot be credible to the user and therefore cannot be counted as the user's knowledge. If the information cannot be counted as the user's knowledge, it cannot extend the user's mind.

I believe that a worthwhile way to implement the extended mind with technology is through enhancing our vision through augmented reality. Vision has been shown to be a key factor in maintaining a good level of cognitive ability in elders and the brain's processes of understanding visual similarity and conceptual meaning are closely linked. This shows that vision is an important part of cognition and I believe that augmented reality is one of the best ways to enhance the power of our vision. We must be careful, however, to not break the conditions of extending the mind by utilizing information from the internet. Instead, the design of augmented reality technology should take into account how it can strengthen cognition by playing to the strengths of the role of vision in our cognition.

Bibliography

Clark, Andy & Chalmers, David J. (1998). The extended mind. Analysis 58 (1):7-19.

Clark, Andy (2010). Memento's revenge: The extended mind, extended. In Richard Menary (ed.), The Extended Mind. MIT Press. pp. 43--66.

Adams, Frederick & Aizawa, Kenneth (2001). The Bounds of Cognition. Philosophical Psychology, 14, 43-46.

Chalmers, David John (2022). Reality+: Virtual Worlds and the Problems of Philosophy. New York: W. W. Norton.

Pritchard, Duncan (2010). Cognitive ability and the extended cognition thesis. Synthese 175 (1):133 - 151.

Wray, K. Brad (2018). How far can Extended Knowledge be Extended? Socially Extended Epistemology.

Smart, Paul (2017). Extended Cognition and the Internet: A Review of Current Issues and Controversies. Philosophy and Technology 30 (3):357-390.

Smart, Paul (2021). Shedding Light on the Extended Mind: HoloLens, Holograms, and Internet-Extended Knowledge. Frontiers in Psychology 12 (Article 675184):1–16.

Spierer O, Fischer N, Barak A, Belkin M. Correlation Between Vision and Cognitive Function in the Elderly: A Cross-Sectional Study. Medicine (Baltimore).

Aly M. In sight, in mind. Elife. 2018 Mar 1;7:e35663. doi: 10.7554/eLife.35663. PMID: 29493506; PMCID: PMC5832411.