


RESEARCH ARTICLE

Cognitive Enhancement as Transformative Experience: The Challenge of Wrapping One's Mind Around Enhanced Cognition via Neurostimulation

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Abstract

In this paper, the authors explore the question of whether cognitive enhancement via direct neurostimulation, such as through deep brain stimulation, could be reasonably characterized as a form of transformative experience. This question is inspired by a qualitative study being conducted with people at risk of developing dementia and in intimate relationships with people living with dementia (PLWD). They apply L.A. Paul's work on transformative experience to the question of cognitive enhancement and explore potential limitations on the kind of claims that can legitimately be made about individual well-being and flourishing, as well as limit the kind of empirical work—including the authors' own—that can hope to enlighten ethical discourse. In this paper, the authors advance the following theses: (1) it is sometimes reasonable to characterize cognitive enhancement as a transformative experience; (2) the testimonies of people intimately acquainted with dementia may still be relevant to evaluating cognitive enhancement even though cognitive enhancement may be a transformative experience; and (3) qualitative studies may still be useful in the ethical analysis of cognitive enhancement, but special attention may need to be given to how these are conducted and what kind of insights can be drawn from them.

Keywords: cognitive enhancement; deep brain stimulation (DBS); dementia; transformative experience

Introduction

Neurostimulation—a type of neurotechnology that applies electrical stimulation to parts of the brain to induce certain neural patterns and activities that are considered beneficial—is a powerful alluring technology not only because of what it might be able to do for people struggling with conditions involving motor, psychological, and cognitive impairments but also for conventionally healthy people who might be able to amplify their cognitive abilities to unprecedented degrees or be given greater control over their mental lives, what some have called cosmetic neurology.¹ The prospect of achieving cognitive enhancement through neurostimulation has inspired a DIY movement of lay people to create their own neurostimulation tools for cognitive enhancement purposes.² For example, citizen-scientists are devising noninvasive³ neurostimulation devices, such as transcranial magnetic stimulation and transcranial direct current simulation, to produce the desired effects of enhancement. The interest in using neurostimulation to enhance cognition has expanded to include consideration of surgically implanted devices.⁴ Direct neurostimulation, in which electrodes are in proximate contact with the brain, offer the potential for a more powerful, precise, and effective technique to enhance cognition. Potential effects on cognition have been noted in the use of direct brain stimulation (DBS) for a range of neurological and psychiatric conditions, including Parkinson's disease and epilepsy, and research that

specifically targets cognitive and mood disorders, like Alzheimer's disease, major depressive disorder, and obsessive-compulsive disorder.⁵

Yet direct forms of cognitive enhancement are understandably controversial, generating a robust discourse, not only about their possibility but whether their development and use are ethical. Although a world where neurostimulation devices, like DBS,⁶ are available to broader publics for cognitive enhancement is a distant possibility, it is still important to carefully grapple with the ethics of pursuing brain-altering enhancement technologies and be thoughtful about the kind of world we should bring in, especially when many think that DBS is destined to be used for enhancement purposes.⁷ Heeding a recent call that more empirical work is needed to inform ethical analysis on the use of neurotechnology to affect cognition,⁸ we are conducting a qualitative study exploring perspectives on the potential use of DBS for cognitive enhancement.⁹ Interviews are being conducted with individuals perceived to be at risk of developing future dementia, e.g., from Alzheimer's disease, due to family history of dementia or genetic testing. All interviewees will have had at least one first-degree relative who is a person living with dementia (PLWD) and many thus will have had intimate access to what living with dementia is like. In the study, we are presenting in short video form various hypothetical neural devices that might give rise to different kinds of cognitive effects, including enhancements like improved memory or language (e.g., word-finding) abilities.

Yet the study of ethical views of using DBS for enhanced cognition has revealed to us how complicated it is to make sense of cognitive enhancement. One of the early findings that has emerged from this project has been the difficulty of getting some participants to imagine *themselves* possessing cognitive enhancements. Although participants are typically able to give their opinions on ethical issues related to cognitive enhancement in general, it has proved more difficult to get participants to draw explicitly on their own visions of how they personally would experience cognitive enhancements. Although at first we considered this finding as evidence of a possible methodological limitation of our approach, we are beginning to think about this differently as involving a potential conceptual limitation for cognitive enhancement research more generally.

As a way to grapple with this potential limitation, in this paper, we consider the idea of characterizing cognitive enhancement through neurotechnological means as a kind of transformative experience.¹⁰ By transformative experience, we appeal to L.A. Paul's work, where transformative experiences are the kinds of experiences that are novel, inaccessible to understand without having the relevant lived experience, and can radically alter the perceptions and preferences of those who undergo them. For Paul, transformative experiences pose an epistemic problem in that we cannot properly know or judge these experiences without experiencing them first and yet going through the experience may involve dramatically changing who we are, including the core values from which we make judgments. Thus, if neurostimulation-induced cognitive enhancement can be a kind of transformative experience, then this complicates any ethical analysis on the effects of cognitive enhancement that relies on individuals robustly envisioning themselves as cognitively enhanced.

In this paper, we seek to address three questions: (1) Is it reasonable to characterize some forms of cognitive enhancement via neurostimulation as a transformative experience? (2) If so, how does this affect how we interpret the perspectives of individuals as they imagine different forms of cognitive enhancement, including the testimonies of people intimately acquainted with changes in cognitive disorders, like dementia? (3) How should researchers approach qualitative studies on cognitive enhancement if it can indeed be a transformative experience?

We advance the following theses: (1) it is sometimes reasonable to characterize cognitive enhancement as a transformative experience, (2) the testimonies of people intimately acquainted with dementia may still be relevant in evaluating the ethics of cognitive enhancement even though cognitive enhancement may be a transformative experience, and (3) qualitative studies may still be useful in the ethical analysis of cognitive enhancement, but special attention may need to be given to how these are conducted and what kind of insights can be drawn from them.

The paper proceeds as follows: In Section "Cognitive enhancement debates: from conceptual to empirical explorations," we briefly present the various approaches to exploring the ethics of cognitive enhancement through direct interventions of the brain, from conceptual to empirical approaches. In

Section “Cognitive enhancement and transformative experience,” we briefly present Paul’s account of transformative experience and her characterization of it as raising an epistemic problem. We then propose the possibility that cognitive enhancement can be a kind of transformative experience and any ethical analysis on cognitive enhancement should be sensitive to this prospect. Then, in Section “Exploring the ethics of cognitive enhancement through hypothetical devices,” we highlight some of the testimonies from people at risk of dementia or in relationships with PLWD drawn from our current study that describe the difficulties of imagining what it would be like to be cognitively enhanced, which we call the “hard to imagine” problem. We call attention to some of the different strategies or conceptual tools that individuals call upon to make sense of devices about which they are asked to opine. In Section “The “hard to imagine” problem: information deficit or transformative experience?” we advance the idea that the “hard to imagine” problem could be plausibly explained as the result of cognitive enhancement being a transformative experience. In Section “The place and value of testimony in the cognitive enhancement debate,” we defend the relevance of listening to the testimonies of people intimately familiar with breakdowns in cognition, such as family members of PLWD, as an important resource in the ethical analysis of cognitive enhancement, despite holding to a view that cognitive enhancement can be reasonably understood as a transformative experience. We conclude by taking stock of the discussion in this paper and suggest ways to improve qualitative studies on cognitive enhancement when characterized as a transformative experience.

Cognitive enhancement debates: from conceptual to empirical explorations

Neurostimulation is the latest iteration of the human enhancement debate. It follows a lineage of emerging biotechnologies that have inspired speculations and interest in employing them to enhance the cognitive functioning of human beings. Previous and ongoing discussions on cognitive enhancement revolve mainly around the use of drugs or gene modification. Like neurotechnology, these discussions respond to the potential of these biotechnological interventions to manipulate people’s physiological characteristics in ways that could improve their cognitive performances “beyond the species-typical level or statistically normal range of functioning.”¹¹ Since the ethics of cognitive enhancement has been discussed in the context of specific biotechnologies, some advantages or worries may not apply generally to all types of biotechnologies. Here, we will focus on points relevant to DBS-enabled cognitive enhancements.

The main argument for developing and using biotechnologies to enhance cognitive performance is that enhanced cognition will likely improve people’s well-being and opportunity range. Improved mental acuity, like memory, concentration, and learning and processing new ideas, will expectedly improve people’s chances of living a good, flourishing life, especially in the brute conditions of struggle, misfortune, competition, and inequalities. Richard Dees summarizes this consequentialist, welfare-based argument for enhancements, pointing out how their positive effects are not limited to those who are enhanced but also the lives they affect:

[A] world in which people have greater intellectual skills, have sharper memories, and can control their moods is a world in which people are more productive and happier. Because they are more productive, they may be able to accomplish more things in their lives, either by securing a better job or by pursuing other activities that they find rewarding. Thus, the quality of their own lives can be expected to be higher. But the good effects are not limited to their own lives. People in well-paying jobs generally are in a better position to contribute their time or money to help those who are worse off ... But more importantly, by becoming more productive, they may help create a prosperous economy that can raise the standard of living for everyone. In addition ... [mood enhancers] can make people more straightforwardly happy, a feeling that rubs off on others in many different ways, even when the others do not use drugs. Such enhancements would not create a utopia, but they could help make the world a better place.¹²

The connection between improved cognition and well-being is intuitively plausible, and proponents of cognitive enhancement build their arguments around it. Smarter, sharper, quick-witted, and confident people are expected to navigate and thrive better in our complicated world as well as contribute valuably to the welfare of others through their interpersonal interactions, contribution to knowledge production, and sophisticated ideas of improving our living conditions. For these reasons, cognitive enhancement is embraced as an important good and the value of beneficence calls for its realization.^{13,14}

Critiques of cognitive enhancement are more complex, encompassing a wide range of objections. They can be understood as problematizing any one of the following aspects: (1) the goal of enhancement, (2) the means of enhancement, and (3) the consequences of enhancement. The first kind of critiques challenge the underlying motivations and ends of enhancement technologies. Some critics have argued that suspect norms drive enhancement technologies. For example, Michael Sandel argues that the pursuit of enhanced human beings is motivated by a desire for perfection that is not only unattainable but denies the giftedness of human life.¹⁵ Another prominent critique is that endeavors to enhance human beings seek to remove defining components of our humanness, such as the ethical significance of vulnerability as sources of meaning and relationship-building.¹⁶ These arguments challenge the characterization that certain human limitations and vulnerabilities are deficiencies or pathologies that need to be mitigated or expunged through pharmacological or neurotechnological interventions.

The second type of critique challenges the means of enhancement. Enhanced cognition may not necessarily be an objectionable end, and if anything, it may be an important one, as reflected in our practices of education and healthcare. Instead, the problem lies in how cognitive enhancement is achieved. Even though both the processes of learning and neurostimulation may produce similar valued outcomes, for instance, a common reaction is that something important seems to be compromised when enhanced cognitive performance is produced passively via neurostimulation as opposed to through active learning and mental exertion. Various accounts try to explain this moral asymmetry, ranging from neurotechnology as an “unnatural” way to be enhanced to it being an unfair and “corrosive shortcut” that robs from the enhanced person any authenticity or responsibility for their accomplishments.¹⁷

The third type of critique challenges the consequences of enhancement. As noted earlier, the main justification for enhancement technologies is that it will likely increase individual and social utility. But some have questioned this presupposition. One major worry is that enhancement technologies would likely exacerbate social inequalities. Enhancement devices would be expectedly expensive, and thus, the goods of enhancement would only be available to classes of people with the material resources to access them.¹⁸ Others raise doubts that amplified mental capabilities—like memory, intelligence, and emotional control—would genuinely facilitate individual well-being, pointing out that there may be important utility in forgetfulness and experiencing negative emotional states.¹⁹ Also, there are legitimate worries that cognitive enhancement may impose burdensome expectations on enhanced individuals that may detract from their well-being and sense of agency.²⁰ These sets of arguments are critical of the common presumption that cognitive enhancement obviously promotes human welfare at both the individual and social level.

The ethical discourse of cognitive enhancement has primarily been engaged at the level of abstraction and theoretical speculation. This is understandable given that neurostimulation as a principal enhancement technology does not yet exist and assessing its ethical dimensions and implications is, in important ways, a futurist project. But Eric Racine and others have advocated for ethical analysis to take an “empirical turn” and look to psychology and social sciences to draw further insights and predictions. This is especially the case concerning the potential consequences of enhancement, where arguments are made about the likely effects of cognitive enhancement on human welfare and flourishing. So far, the arguments understandably have been more speculative and casuistic, with outcomes of neuroenhancement technologies inferred from other already existing interventions. For Racine and others, a more empirically informed discourse on the ethics of cognitive enhancement is needed. Since many statements supporting or opposing cognitive enhancements make claims about the social and psychological impacts of enhancement, the enhancement debate would inevitably be stalled without greater input and evidence from social and psychological sciences.²¹

We, too, recognize the need for more empirical work to bear on the cognitive enhancement debate. But, in addition, we note that empirical work on cognitive enhancement to date has focused on individuals who identify as or are presumed to be cognitively typical. People with cognitive impairment or with intimate connections to people with cognitive impairment have not been significant contributors to the discourse on enhancement. Given the ways in which experiences with cognitive impairment can shape one's perspective on the role and value of cognition, this is a significant gap. For this reason, we conducted qualitative studies to gather the perspectives of people intimately acquainted with the effects of dementia.

Before we discuss the preliminary findings from our qualitative study, it is first important to explore the idea of cognitive enhancement as a kind of transformative experience. Characterizing cognitive enhancement in this way may be a useful frame not only to interpret our preliminary finding but also point out the ways in which the cognitive enhancement debate could be stalled.

Cognitive enhancement and transformative experience

One idea we would like to explore is whether it is plausible to characterize cognitive enhancement as a kind of transformative experience. Transformative experience refers to the kinds of life-changing experiences that are (1) dramatically novel to the agent, (2) inaccessible to understand without going through them, and (3) can radically alter the perceptions and preferences of those who do undergo them to the extent that they might consider themselves as becoming a "different person." First, an agent may have an experience that is considered transformative in the sense that it is so unlike their prior experiences that such an experience is novel; it does not resemble an agent's antecedent experiences. Second, an agent could not have drawn from their past experiences or from the stories of others who went through the relevant experience to adequately grasp the character of the new experience prior to undergoing it, which makes it epistemically inaccessible. Third, since a transformative experience exposes an agent to new epistemic content, especially when the experience stems from changes in an agent's embodiment or social position in the world, it can significantly change an agent's interpretive lens and their scheme of values from which they make judgments. For these reasons, these experiences can be transformative in both the epistemic sense (it gives the agent new information in virtue of the experience) and personal sense (having that experience changes an agent's core beliefs and values and their subjective sense of being).²² Paradigmatic examples of transformative experience include having a child, going through puberty, choosing a new career, becoming disabled, and transitioning to different gender from what was assigned at birth.²³ These are considered transformative because they can alter people's subjective point of view in ways that are so unique and profound that one could not have imagined or understood what it would be like to undergo such experiences, and consequently, these experiences may shift how people perceive the world and what they value.

Transformative experiences are philosophically interesting, and one reason why is that they pose an epistemic, decision-making problem. When confronted with a transformative choice, how are we supposed to make a rational decision when we lack a robust understanding of the options? L.A. Paul's work has been influential in articulating and addressing this problem.²⁴ According to Paul, a normative standard for rational decision-making is to weigh the options and choose the one that will bring about a state that has the highest expected value. When the decision is about our future, then a rational decision procedure is to consider and weigh the possible future states of being and choose the outcome with the highest expected utility. Attaching values to each possible future outcome involves imagining what it would be like for us to be in those future states. Yet the problem with transformative experiences is that they are epistemically opaque. For them, we cannot know what it would be like to be situated in that future state without actually being in that state. Therefore, we are not able to put a value on the outcomes of the choices prior to deciding. For Paul, this creates a challenge to the possibility of making a rational decision when it comes to transformative choices.

The epistemic challenges of transformative experiences are deeply concerning when we look at neuroenhancement technologies and how their moral justification often depends on inferring or

imagining what it would be like to embody a certain state of being that these technologies create. If a neurotechnological intervention produces a state that is transformative, then it may constrain what claims we can make regarding the individual utility of that potential state of being. Is it plausible to conceive of cognitive enhancement as a form of transformative experience? This is a difficult question. At one level, it seems like the answer should be a negative. The experience of cognitive enhancement is wholly familiar. We think, feel, remember, problem-solve, make connections, and draw inferences and, if things are going well, sometimes we improve on these in various ways and to different extents. And even when we do not, it seems relatively easy to imagine taking these deeply familiar mental activities and amplifying them in one way or another, for instance, making us remember more, or recall more quickly, or learn and process information and draw mental connections more expeditiously. Viewed in this way, experiences of cognitive enhancement might seem to lack the kind of novelty that characterizes a transformative experience. Yet, at another level, describing the experiential aspects of cognitive enhancement as a mere extension of everyday cognitive activities seems unreasonably simplistic. However, the transformative potential of cognitive enhancement seems to depend on what capacity is being enhanced and to what degree cognitive enhancement could enable people to have experiences that are dramatically novel. Processing and retaining more information, or making more connections, or having a more expansive perceptual awareness may lead to qualitatively different experiences and perception of the world since we would be accessing content that we never had access to before. We will return to this discussion in Section “The “hard to imagine” problem: information deficit or transformative experience?”

If it is plausible to describe cognitive enhancement as a kind of transformative experience, then this would constrain what claims we could legitimately make about its effects on individual well-being and flourishing. It may also limit what kind of empirical work we can legitimately pursue to help inform the ethical discourse on cognitive enhancement. In the next section, we will discuss our qualitative study with people intimately acquainted with dementia, where we are studying their perspectives on certain kinds of cognitive enhancement. Their testimonies seem to lend some empirical support to the idea that cognitive enhancement is indeed a transformative experience, which then invokes the question of how we should proceed in exploring the ethics of cognitive enhancement.

Exploring the ethics of cognitive enhancement through hypothetical devices

We are conducting a qualitative study interviewing people intimately acquainted with dementia to inform the ethics of cognitive enhancement discourse. The interviewees are intimately acquainted with dementia in two ways: (1) they are people perceived to be at risk of developing dementia as determined by their family history or genetic testing and (2) they are or have been in intimate family relationships with PLWD. Given their adjacent experiences to dementia, we will often refer to the interviewees as “people living in close proximity to dementia.” We are inquiring about their perspectives on various forms of cognitive enhancement by presenting them with a range of hypothetical neural devices that might one day be used to enhance users in varied ways and gauging their views through a semi-structured discussion. This study follows a prevalent mode of inquiry in empirical ethics research of posing hypothetical cases to diverse publics to explore the plausibility of certain ideas or ethical desirability of certain options.²⁵ The Pew Research Center recently conducted such a study to measure public opinion on the potential future uses of brain implants, posing the possible ways that neural devices could enhance certain cognitive capacities:

New developments in understanding the brain are creating the possibility that doctors will be able to surgically implant a small computer chip in the brain. Right now, these implanted devices are being developed for people with some kind of illness or disability. But in the future, these implanted devices could potentially be available for use by HEALTHY individuals, giving people a much improved ability to concentrate and process information in everyday life.²⁶

Exploring the ethics of cognitive enhancement by means of probing people's moral reactions to hypothetical enhancement technologies is also closely connected to a broader methodological legacy in philosophy of using thought experiments in arguments. Briefly put, thought experiments are devices of the imagination that seek to elicit intuitive responses that are expectedly shared across various publics to serve as a reason to accept or doubt a particular thesis or idea. Think of classical thought experiments, like Judith Jarvis Thomson's Violinist analogy,²⁷ Phillipa Foot's Trolley Problem,²⁸ James Rachel's Smith, and Jones thought experiment,²⁹ among others. The function of thought experiments, according to Daniel Dennett, is to be "intuition-pumps" by invoking intuitive responses to often fantastical scenarios to isolate and test the plausibility of a concept.³⁰ As such, hypothetical cases are useful in generating intuitions that affirm or call into question a particular thesis or concept.³¹

Hypothetical neurotechnology cases, particularly when they are vivid and comprehensive, are effective vehicles for generating intuitions. Grant Gillett proposes that fanciful cases about implantable neurotechnologies are useful to "hone our intuitions" about human identity.³² Kasper Lippert-Rasmussen argues that using far-off but more powerful hypothetical states of technology is a legitimate argumentative approach for two reasons: first, it allows a clearer exploration of conceptual problems, and second, current technology may not be ethically problematic at all but its future iterations may turn out to be problematic.³³ These attributes seem to motivate researchers to turn to hypothetical devices to explore the ethical desirability of cognitive enhancement. There is a lack of philosophical consensus on what intuitions are (immediate, non-inferential responses to presented stimuli, considered judgments, or other) and how they function in argument (as data, illustration, heuristic, or other).³⁴ Yet they clearly play a prominent role in philosophical argumentation.

Another important feature of our study is that we focus on a specific group—people living in close proximity to dementia. Intuitions are importantly situated and embodied, and different ways of being can lead to differences in how hypothetical cases are imagined, interpreted, and reacted to. Some people may be, due to their positionality, more attuned to certain features of a case that may be overlooked, misunderstood, or underappreciated by others who are differently positioned. This means that some intuitions should be attended to more closely or given serious consideration when it comes to understanding and addressing certain philosophical and ethical questions. To give one example, philosophers of disability have challenged the usefulness of the bare intuitions of non-disabled people to inform discourse about the nature of disability, especially its relation to well-being. They contest that the embodiments and/or experiences of nondisabled people sets limits to their moral imaginations, leading them to misattribute or exaggerate the harms involved in being disabled.³⁵ Certain forms of experience confer epistemic advantage, making some stakeholders better positioned to inform a discourse than others through their testimony. Thus, it can matter whose intuitions we account for when grappling with certain philosophical and ethical questions. Our study worked from the premise that people living in close proximity to dementia may have the kind of experiences that afford them access to certain kinds of knowledge and insight that could valuably inform normative debates on cognitive enhancement.

In our study, we explore the perspectives of people living in close proximity to dementia by having them consider hypothetical neural devices and imagine what it would be like to use and live with them. In the construction and presentation of the hypothetical cases, we seek to present futuristic neurotechnologies that are realistic or believable and sufficiently detailed to enable participants to engage the cases meaningfully.³⁶ We also select familiar cognitive abilities that most people typically exercise in their daily lives, e.g., memory, language, visuospatial skills. These abilities are also ones for which there are ready examples of people who possess them to extraordinary degrees, such as knowing someone with a photographic memory or someone with mesmerizing speaking ability or with a seeming preternatural knack for finding their way around physical spaces or tasks, or conversely people whose abilities are compromised, e.g., PLWD.

The hypothetical cases are posed to interviewees through the presentation of short videos that demonstrate the proposed cognitive ability and are accompanied by a narrator describing the

enhancement and its potential real-world benefits. One example is a “memory device” to amplify a user’s short-term memory:

Imagine that there is a device that we’ll call a “memory device.” Electrodes surgically implanted in the brain would provide the brain with small amounts of electricity and this would improve your short-term memory. The device would make it easier for you to remember things that were not possible before. You might be able to remember long grocery lists without writing anything down or remember many of your appointments without using a calendar. As you imagine this hypothetical device, consider that it would make your short-term memory better than it ever has been before and maybe even better than anyone else’s you know.

After the video is shown, we conduct semi-structured interviews asking participants to reflect on the devices presented and have an in-depth discussion about their views on cognitive enhancement, including whether they expect it would increase their subjective well-being.

One notable observation we have made thus far is how some interviewees struggle at times with the thought experiments, expressing difficulties of imagining what it would be like to be cognitively enhanced in the ways that the hypothetical cases pose.³⁷ We observe people adopting different strategies to make sense of the hypothetical devices. For some interviewees, they simply ask for more details and clarification on the nature of the hypothetical devices. One person commented: “Do you get your short-term memory back for the last 24 hours and then it gets replaced by the next day? Or do you continue to remember it? Does it allow you to remember that you took your medication this morning, but not yesterday morning?” Another noted, “So how effective [would it be] and would it be able to, like stimulate different areas besides just short-term memory? Would it, you know, include memories of words or not?” Other interviewees turned to familiar examples in science-fiction to understand the hypothetical neurotechnology cases, such as relating it to bionic limbs or “... sci-fi movies where somebody’s wearing glasses with some kind of display built into them that identifies whoever’s walking up to them.” Others reached for analogies to other assistive devices to make sense of the hypothetical devices, such as pacemakers, hip and knee replacements, or cochlear implants, hearing aids.

We also came to recognize a kind of hesitancy that often emerged at some point in these interviews. The hesitancy came when people were asked to talk about how they personally might experience cognitive enhancement devices and whether they viewed these kinds of potential changes in themselves in positive or negative terms. What was often expressed was a difficulty in projecting what it would be like to be cognitively enhanced. This is nicely encapsulated in the response of one interviewee:

“So if you’re bringing me back up to a level of normal, the way I used to be when I was 20, whoa, cool. Now, if you’re going to zap me up a little higher than that, interesting, [but] I have no idea what that would be like.”

At some point, participants seemed to reach their imaginative limit with respect to hypothetical cognitive devices and were more reluctant to offer normative judgments about the devices or enhanced abilities. This sentiment was expressed in different terms, such as “It’s totally hard to imagine.” or “It’s hard for me to picture.” We refer to this common response as the “hard to imagine” problem.

In this section, we reviewed an important preliminary finding of our qualitative study of the perspectives of people living in close proximity to dementia about the ethical desirability of cognitive enhancement. The intended aim was to inform the ethics of the cognitive enhancement debate with the perspectives of stakeholders who might be more attuned to certain important features of the issue given how they are situated, especially in relation to the value and functional implications of cognitive abilities. This finding is that interviewees sometimes express difficulty in imagining what it would be like to be cognitively enhanced—we call this the “hard to imagine” problem. This raises the question of how we should understand this problem. In the next section, we will consider the idea that the “hard to imagine” problem is not necessarily the result of a methodological shortcoming of the study, but that cognitive enhancement may be a kind of transformative experience.

The “hard to imagine” problem: information deficit or transformative experience?

How should the “hard to imagine” problem be understood? One way is to see this as a methodological problem. That is, the design of the study may not provide the interviewees with the level of information or proper framing needed to enable them to imagine themselves cognitively enhanced and in turn limit their ability to anticipate how they would feel and respond were they to be in that circumstance. One could imagine such a methodological failure to have different sources. For instance, the video descriptions of cognitive enhancement devices might be inadequate to the task by not providing enough information for people to envision what cognitive enhancement by means of neurostimulation would be like. Perhaps more information about memory circuits and how stimulating them might change them is needed, as well as more information about human cognitive abilities and how they can change or better examples of cognition-dependent daily functioning. There are many ways in which the hypothetical devices could be presented differently. If the crux of the “hard to imagine” problem is due to a study design flaw of not presenting the hypothetical technology cases with the needed informational resources to help interviewees imaginatively project themselves as cognitively enhanced, then the empirical question of how to remedy this shortcoming in future iterations of this study or other studies is relevant. But this empirical question might be quite hard to answer. How much contextual information would be beneficial or needed? This is a familiar problem in anticipatory ethics.³⁸ How are the scenarios to be crafted? What needs to go into them? How realistic do they need to be? How likely and how detailed do the possible outcomes need to be sketched so that people can or feel comfortable giving their normative judgments about them?

Yet there has been little attention given to a more fundamental question of whether employing hypothetical cases to invoke people’s intuitions is an effective methodology to explore the ethics of cognitive enhancement, especially when inquiring its impact on individual well-being. The attention of many empirical ethics studies is placed on what people *think about* cognitive enhancement devices—do they like them, do they find them morally problematic, what concerns do they raise, etc.—and not whether hypothetical devices are constructive means of ethical exploration.

This raises another possibility that is worth considering. Maybe what explains the “hard to imagine” problem is not necessarily that the interviewees have not been provided with enough information about the hypothetical enhancement technology but rather that cognitive enhancement is a kind of transformative experience. The reason why it may be difficult for interviewees to participate meaningfully in the study’s imaginative exercise is that a cognitively enhanced state of being is exceptionally novel and interviewees may lack any prior experiences that would allow them to grasp what it would be like to engage and experience the world with extraordinarily amplified cognitive capacities. The imaginative act of putting oneself in the place of a cognitively atypical embodiment can seem relatively straightforward. For example, in trying to imagine what it would be like to be a person with boosted working memory skills, someone might simply draw from their own personal experience of their own working memory, extrapolating from the frustration that one might often feel when forgetting things or having difficulty keeping track of information, and imagine a state where they could hold and organize even more mental items at the same time and for a longer period than they presently could. Yet, what we have found is that this kind of imagining of being cognitively enhanced is more complicated than it seems. Like various forms of disability, various forms of enhancement may be too difficult and abstract for people in species-typical embodiments to imaginatively grasp given how our moral imagination is constrained by our specific embodiments and the experiences shaped by them.³⁹ Although acts of imagination are far-reaching, they are still, in important ways, bounded by our embodied experiences. If cognitive enhancement involves creating novel forms of embodiment and with it, new or unprecedented modes of engagement with the world, then imagining what it would be like to be cognitively enhanced may be too shaky and untrustworthy to undertake given how many of us are typically embodied, especially if cognitive enhancement involves perceptual and value changes that we just cannot clearly and reliably envisage.

If cognitive enhancement is indeed a transformative experience, then in some cases there is no amount of information that could be provided to the interviewees that would enable them to imagine what it would be like to be cognitively enhanced. To illustrate this point, consider LA Paul’s example of

the experience of becoming a first-time parent. Prior to the experience, most of us may have a descriptive understanding of what a parent is and have encountered innumerable encounters and stories of it in our everyday lives, but we may never really understand what it would be like to be a parent without assuming the role. Given its social significance and how it can permeate our lives, becoming a parent is expectedly a radical shift in one's situatedness and, in turn, one's point of view. Moving through the world as a parent is expectedly very different from moving through the world as a non-parent, such as how a bustling city street is experienced (potentially hostile to children versus exciting and vibrant) or how an unseasonably hot day is interpreted (an ominous sign of climate change that may threaten their child's future versus an annoyance). The point is that parenthood is a transformative experience in that it changes our perceptual experience, altering the valence of certain features of the world that someone may not, and even could not, recognize until they become parents. Thus, certain important aspects of parenthood are inaccessible or difficult to obtain without undertaking the experience.

It is worth considering whether cognitive enhancement is analogous to these transformative experiences. The epistemic hurdle faced by participants in studies of ethical views of cognitive enhancement may not be due to a lack of information but to perceptual limitations stemming from embodiment. That is, perhaps asking people to envision themselves living with far superior abilities, with whatever psychological and social complexity that entails, within their own limited embodied experiences may in certain cases be too much to ask. The changes related to cognitive enhancement might be transformative if they fundamentally alter a person's place and orientation in the world so as to reconfigure how the world is perceived. Consider how atypically extended cognitive skills—such as the memory, language, visuospatial, or other cognitive skills inquired about in the study—might change the way that people experience the world. Someone with a photographic memory, or the chess skills of a grand master, or the verbal eloquence of Shakespeare, would likely experience, interpret, and engage the world differently. How someone values an interaction with a stranger may shift if they could remember every detail of that interaction for days or months after. Friendships and other significant relationships may change if someone approached their conversations as opportunities for demonstrating eloquent prose, such as leading to feelings of alienation.⁴⁰ Walking into a house with dramatically enhanced visuospatial skills might produce an overwhelming desire to remodel or decorate. Such worries about cognitive enhancement are lent credence by the clinical descriptions or first-hand testimonies of people with superior cognitive abilities, such as hyperthymesic syndrome or highly superior autobiographical memory. For instance, Elizabeth Parker and colleagues describe the case of AJ who experienced her extraordinary autobiographical memory as a “burden”:

My memory has ruled my life It is like my sixth sense ... There is no effort to it ... I want to know why I remember everything. I think about the past all the time It's like a running movie that never stops. It's like a split screen. I'll be talking to someone and seeing something else ... Like we are sitting here talking and I'm talking to you and in my head I'm thinking about something that happened to me in December 1982, December 17, 1982, it was a Friday, I started to work at Gs (a store) It's all about dates ...⁴¹.

These considerations give us good reasons to take seriously the possibility that cognitive enhancement through neurotechnology might be a transformative experience, altering our embodiment in ways that would also likely alter our implicit frame of reference from which we interpret the world, form our values, and express our intentions. People may start to perceive the world in terms dictated by their enhanced cognitive abilities. What would that be like? Would they still value—or even pay attention to—the things they value now? If cognitive enhancement is indeed a transformative experience, then this kind of knowledge would not be accessible to the cognitively unenhanced. This may be the source of the “hard to imagine” expressions of participants: individuals might not lack information about a how device would work but they might be unable to imagine what it would be like to have these skills given how they are currently embodied.

If it is reasonable to characterize cognitive enhancement as a transformative experience to explain the “hard to imagine” problem, then there may be limits to what kind of empirical ethics research we can

legitimately undertake to advance the ethics of cognitive enhancement discourse. Certain inquiries about cognitive enhancement, like its expected utility, may be well beyond the purview of empirical ethics. Does this mean that testimonies, particularly from certain stakeholders, cannot contribute valuably to the normative debate about cognitive enhancement? Are the perspectives of people living in close proximity to dementia not relevant to the debate? We will address these questions in the next section.

The place and value of testimony in the cognitive enhancement debate

The idea that cognitive enhancement is a transformative experience presents a serious challenge to ethicists who seek to bring empirical ethical work to bear on the ethics of cognitive enhancement debate. One of the implications of characterizing cognitive enhancement as a transformative experience is that qualitative studies that turn to stakeholders' perspectives on the expected quality of life implications of cognitive enhancement may not actually help inform what would be the effects of cognitive enhancement to individual well-being. Moreover, it seems to undermine the relevance of testimony in the cognitive enhancement debate. Is there still value in looking to the perspectives of certain diversely situated stakeholders, as we are currently and others have done, to help illuminate how neuroenhancement technologies could alter the life prospects of individuals? After all, if cognitive enhancement can be a transformative experience, this calls into question who, if anyone, has the epistemic standing to speak authoritatively about its potentially transformative effects. Is the conclusion that must be drawn that empirical ethical projects that bring out stakeholders' testimonies are normatively impotent to the cognitive enhancement discourse and should be abandoned?

This is too quick. Although cognitive enhancement may be a transformative experience, there is still reason to perceive stakeholder testimony and engagement as importantly relevant to the ethics of cognitive enhancement debate. Paul may be correct that in most transformative experiences, we cannot know whether we will likely be better off or worse off after the experience. Furthermore, we are unable to know how our perceptions and preferences might change after the transformative experience. However, this does not mean that certain publics cannot provide unique and meaningful insights that are relevant to gauging the expected utility of cognitive enhancement. For one, the ethical desirability of cognitive enhancement is, in important ways, shaped by how we understand and appraise the utility of our current embodied and socially situated cognition. What is it about our present circumstances—our vulnerabilities, our limits, and our possibilities—that excites the public imagination about cognitive enhancement? What are the probabilities and costs of not pursuing enhancements? In this respect, many of us can contribute to this discussion as informed by our own lived experience and from our diversely embodied, socially situated standpoints.

Yet we also want to suggest that certain perspectives, for example, from people living in close proximity to dementia, may offer important insights that are relevant to the ethical debate about cognitive enhancement and worth attending to. Although they may not have direct personal experience of undergoing cognitive enhancement, they do have personal experiences observing, interacting with, and caring about substantive cognitive changes in family members that many people do not, and this may serve as an epistemic asset and confer normative insight to the cognitive enhancement discourse. For example, care partners of PLWD are intimately acquainted with the effects of cognitive changes and cognitive decline. They are highly attuned to the varied ways in which the world is differently represented to PLWD and how it shapes their experiences and perceived horizon of possibilities in the world. This is intimate knowledge that is gained through their lived entanglements and negotiations with PLWD, allowing them to effectively support the agency of PLWD, anticipate issues that may come up, and accommodate or work with them in their pursuit of their conception of the good. This aspect of interdependence and mutuality is why [removed for review] describe care relationships with PLWD as a "shared agency."^{42,43}

The background experiences of people living in close proximity to dementia may serve as an epistemic asset in the ethics of cognitive enhancement debate. In one sense, it adds epistemic diversity to the overall discourse. Like most issues in bioethics, the normative debate around cognitive enhancement could be

vitalized by more diverse perspectives to bolster innovation, robust thinking, and accountability. People living in close proximity to dementia may perceive cognitive enhancement in ways that are different from how people lacking such experiences might typically perceive it, indicating that the former are attentive to certain features of cognition that the latter would not necessarily be receptive to due to their limited experiences. For instance, living with someone who experiences anomia or paraphasia may lead one to become acutely aware of the structure and role of language in getting about in the world. Instances of calling a ball a “circle” or stalling completely over a simple word in the middle of a story are not just experienced as isolated mistakes of language. Families get a front row seat to how breakdowns in language can be sources of embarrassment, failed agency, and lost self-confidence for loved ones. It is a kind of special attunement to such instances that may privilege family members of PWLD when contemplating the potential effects of cognitive enhancement. Imagining how a cognitive enhancement device might improve self-confidence or self-efficacy might come easier to someone who has seen repeatedly the real-world implications of the opposite occurring for their loved one.

The underlying point is that there is still reason to take testimony seriously in the ethics of cognitive enhancement discourse even if we accept the idea that cognitive enhancement can be a kind of transformative experience. Adjacent experiences to dementia may confer an epistemic advantage, like a more well-rounded understanding of the effects of cognition on day-to-day function, rendering their testimony particularly relevant in speaking about the ethical desirability of cognitive enhancement. People living in close proximity to dementia may offer unique insights that could bear on the ethics of cognitive enhancement. What these insights could possibly be can only be brought out through more attention to their testimonies.

Conclusion

This paper responds to the consideration of neurostimulation as a potential form of cognitive enhancement and the increased call from neuroethicists to do more empirical research that could contribute to the ethics of cognitive enhancement debate. We argue for two main conclusions. The first conclusion is that cognitive enhancement via neurostimulation can be reasonably characterized as a kind of transformative experience. This helps explain the “hard to imagine” problem that we have encountered in our qualitative study with people in close proximity to dementia. If cognitive enhancement can be a transformative experience, then this poses a challenge to prevailing approaches of empirical ethics that turn to stakeholder views to inform the ethics of cognitive enhancement discourse. It would put limits to what kinds of questions can be reasonably addressed through qualitative studies. The second conclusion is the relevance of testimony in informing the ethics of cognitive enhancement debate. In our view, testimony, including testimony from people in close proximity to dementia, can still contribute valuably to the normative discourse on cognitive enhancement even when the possibility that cognitive enhancement as a transformative experience is countenanced. It is true that characterizing cognitive enhancement as a transformative experience would constrain what can be reasonably inquired through qualitative studies. For example, it may be misguided to presume that the ethical desirability of cognitive enhancement can simply be ascertained by asking people about the expected utility of being cognitively enhanced. But there may be other kinds of questions that could be asked that would be relevant to the ethics of cognitive enhancement debate. Acknowledging cognitive enhancement as a transformative experience may help inform best practices for empirical ethics research on cognitive enhancement. Again, the implication of our arguments is not foreclosing the possibility of doing qualitative studies to ethically assess cognitive enhancement but to rethink our approaches. Testimony still has an important place, but we must be more creative in the kinds of questions we ask. This is the task for future empirical ethical research.

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Competing interest. The authors declare that they have no conflict of interest.

Notes

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3. What counts as “non-invasive” in the realm of neurotechnology is not as obvious as it seems. See Klein E. What does it mean to call a medical device invasive? *Medicine, Health Care, and Philosophy* 2023;26:325–34. doi: 10.1007/s11019-023-10147-x.
4. One prominent example of exploring the use of implantable neurotechnology for enhancement purposes is Elon Musk’s company, Neuralink. In April 2023, Neuralink tweeted, “We want to surpass able-bodied human performance with our technology.” Neuralink [@neuralink]. (2023, April 18). We want to surpass able-bodied human performance with our technology. Using only his mind, here’s precision cursor control from Pager (star of Monkey MindPong) achieving 65% and 88% of the median Neuralinker using a mouse. Join us to breakthrough to 110% and beyond! #techtuesday [Tweet]. Twitter. <https://twitter.com/neuralink/status/1648478559093264387?cxt=HHwWhsDQ6f6gyeAtAAAA>. Also, at the time of this writing, the US Food and Drug Administration just approved Neuralink to conduct the first clinical trial of its experimental device in humans. Gilbert D, Siddiqui F. Elon Musk’s Neuralink says it has FDA approval for human trials: What to know. *Washington Post* 2023 May 26; available at <https://www.washingtonpost.com/business/2023/05/25/elon-musk-neuralink-fda-approval/> (accessed 1 July 2023).
5. Heschem S, Liu H, Jahanshahi A, Temel Y. Deep brain stimulation and cognition: Translational aspects. *Neurobiology of Learning and Memory* 2020;174:107283.
6. At times, we will be using DBS as a stand-in for a broad range of implantable neurostimulation devices.
7. The claim that emerging biotechnologies will be inevitably used for enhancement is a popular one. Richard Dees addresses this claim in note 8, Dees 2007. The inevitability claim is also made by neuroscientists as reported by Alix Spiegel in the *Invisibilia* podcast episode, “The Remote Control Brain.” Spiegel A. (Host). The remote control brain. In *Invisibilia*; 2019 May 29, NPR; available at <https://www.npr.org/transcripts/707639854> (accessed 8 July 2023).
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9. The current study is modeled on a prior study of ethical perspectives on the use of DBS for cognitive therapy. Much of the recruitment, consent and IRB approval process, methodology, and analysis planned for the current study is similar to this prior study [removed for review]
10. It is possible that this hypothesis may generalize to non-technological forms of cognitive enhancement as well, but here we hope to at least make the narrower point plausible.
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12. Dees R. Better brains, better selves? The ethics of neuroenhancements. *Kennedy Institute of Ethics Journal* 2007;17(4):371–95. doi: 10.1353/ken.2008.0001 (Dees 2007, at 374).
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14. In other places, Savulescu argues that cognitive enhancement technologies should only be pursued if other conditions are in place. With Ingmar Persson, Savulescu argues that the pursuit of cognitive enhancement should be accompanied with the pursuit of moral enhancement to mitigate the societal costs that may come from advancements in sciences, such as the discovery and development of more dangerous weapons. See Persson I, Savulescu J. The perils of cognitive enhancement and the urgent imperative to enhance the moral character of humanity. *Journal of Applied Philosophy* 2008;25

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 22. LA Paul limits transformative experiences to the types of experiences that are both epistemically and personally transformative. Although epistemic transformation does not always lead to personal transformation and personal transformation may still occur without having an epistemically transformative experience, transformative experience is meant to pick out the sort of experiences that are both epistemically and personally transformative, see [note 23](#), Paul 2014, at 16–17.
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31. It should be noted that not all take such a sanguine view of hypothetical cases. John Arras, for instance, argues that: “[H]ypothetical cases, so beloved of academic philosophers, tend to be theory-driven; that is, they are usually designed to advance some explicitly theoretical point. Real cases, on the other hand, are more likely to display the sort of moral complexity and untidiness that demand the (non-deductive) weighing and balancing of competing moral considerations and the casuistical virtues of discernment and practical judgment (phronesis).” Arras. John D. Getting down to cases. *Journal of Medicine and Philosophy* 1991;**16**:29–51, 36–37.
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36. Some of this information included: (1) how the devices might work, (2) the risks of brain surgery, (3) what cognitive abilities are being enhanced (memory, language, executive function, etc.), and (4) possible ways that cognitive abilities, or changes in them, might alter daily functioning (e.g., driving, shopping, paying bills, engaging in conversation).
37. We have found that these struggles imagining how hypothetical devices might be used for cognitive enhancement are present not only when individuals are specifically asked about cognitive enhancement devices, as in the current study, but also when individuals contemplate how devices intended for cognitive therapy also might be used for cognitive enhancement (see [reviewed for review]). The participant quotes included here reflect both.
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43. It is worth noting that dementia can also be reasonably understood as a transformative experience. Does this mean that people living in close proximity to dementia are foreclosed from any understanding of what it is like to live with dementia? This claim seems to be unreasonably strong. There is something to be said about certain adjacent experiences and how traveling with others as they go through a transformative experience grants people access to some “insider” knowledge. Think of a childless friend or relative living with and helping raise a child of new parents, someone intimately connected in the day-to-day lives of the parents and child before and after birth. Is it really true that this person is no better positioned than a stranger to understand the transformative experience of

becoming a parent? This seems wrong. Surely there is experiential overlap in some kinds of transformative experiences that is relevant to understanding those experiences, perhaps even undergoing the relevant perceptual changes. For this reason, we do not think that Paul is quite right that all transformative experiences are epistemically opaque, and an adequate decision theoretic account of transformative experiences must be sensitive to adjacent experiences as conferring some epistemic access to transformative experiences. Unfortunately, this cannot be adequately addressed in this paper and will be expanded in an upcoming paper.