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## The Bionic Brain: Pragmatic Neuroethics and the Moral Plausibility of Cognitive Enhancement

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## The Bionic Brain: Pragmatic Neuroethics and the Moral Plausibility of Cognitive Enhancement

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# **The Bionic Brain: Pragmatic Neuroethics and the Moral Plausibility of Cognitive Enhancement**

By

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## **ABSTRACT**

The seemingly infinite possibilities of contemporary neuroscience span from the augmentation of memory, executive function, appetite, libido, sleep, and mood, to the maturation and development of emotional health and personality. These prospects hint at the capacity to alter neurocognitive conceptions of reality. They also mark the unavoidable inculcation of nuanced individual responses, perhaps radical, to these “tailor-made” perceptions. Hence, there exists certain neuroethical, and even more generally, existential risks within this fascinating and expeditious enterprise. The primary question in the context of present-day neurotechnology is not what can be done, but what should be. To that end, this paper examines the concepts of memory, executive function, and emotional health and personality in the context of neurocognitive enhancement and posits the argument that neurocognitive enhancement can be justified as morally plausible in its potential to edify the caliber of overall cognition, and thus contribute to the ability to make pragmatically, robust moral decisions on the conditions that it (1) promotes general moral character, (2) compliments human nature, and (3) effects a deeper sense of individual and social identity.

**Keywords: Neuroscience, Neuroethics, Cognitive enhancement, Cognitive manipulation**

## THE BIONIC BRAIN: PRAGMATIC NEUROETHICS AND THE MORAL PLAUSIBILITY OF COGNITIVE ENHANCEMENT

Dr. Peter A. DePergola II

### INTRODUCTION

The seemingly infinite possibilities of contemporary neuroscience span from the augmentation of memory, executive function, appetite, libido, sleep, and mood<sup>1</sup> to the maturation and development of emotional health and personality.<sup>2</sup> These prospects hint at the capacity to alter neurocognitive conceptions of reality. They also mark the unavoidable inculcation of nuanced individual responses, perhaps radical, to these “tailor-made” perceptions. Hence, there exists certain neuroethical,<sup>3</sup> and even more generally existential, risks within this fascinating and expeditious enterprise. The primary question in the context of present-day neurotechnology is not what can be done, but what should be.

To date, the debate over enhancement has been riddled with fallacious and ambiguous rhetoric, and the effect has spawned a bitter stalemate between the primary interlocutors. One cause of the current impasse is the mistaken idea that to enhance something – or, in the neuroscientific context, to allow greater access into dormant but existent biological faculties – *de facto* denotes the pursuit of its mastery or perfection. This is the concern, for example, of the 2003<sup>4</sup> President’s Council on Bioethics<sup>5</sup> explored in their document “Beyond Therapy.”<sup>6</sup> For this group, neurocognitive enhancement<sup>7</sup> paves the already-too-tempting road to a brave new world in which humans are gods of their own. A converse view, to which this paper subscribes, contends that the concepts of enhancement and perfection are mutually exclusive, and that enhancement has little to do,

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1. Martha J. Farah, Judy Illes, Robert Cook-Deegan, Howard Gardner, Eric Kandel, Patricia King, Eric Parens, Barbara Sahakian, and Paul Root Wolpe, “Neurocognitive Enhancement: What Can We Do and What Should We Do?” in *Neuroethics: An Introduction with Readings*, ed. Martha J. Farah (Cambridge, MA: The MIT Press, 2010), 30-41.

2. Turhan Canli and Zenab Amin, “Neuroimaging of Emotion and Personality: Ethical Considerations,” in *Neuroethics: An Introduction with Readings*, ed. Martha J. Farah (Cambridge, MA: The MIT Press, 2010), 147-54.

3. For a clear and concise introduction to the expansive language, attributes, and perspectives of neuroethics, both past and present, see Eric Racine, *Pragmatic Neuroethics: Improving Treatment and Understanding of the Mind-Brain* (Cambridge, MA: The MIT Press, 2010), 27-51.

4. This group of scholars worked under and was formed by the political regime of George W. Bush.

5. Henceforth, “the Council.”

6. President’s Council on Bioethics, “Beyond Therapy: Essential Sources of Concern,” in *Neuroethics: An Introduction with Readings*, ed. Martha J. Farah (Cambridge, MA: The MIT Press, 2010), 58-72. See especially pp. 69-75.

7. It is important to clarify that the logic inherent to the Council’s general positions vis-à-vis biotechnological enhancement is herein applied specifically in the neurocognitive context. Hence, this paper does not intend to misconstrue the original content of “Beyond Therapy” as representative of the Council’s explicit address of neurocognitive enhancement, but only biotechnological enhancement generally, which in turn may (presumably) be applied in specific contexts.

in fact, with the desire to become perfected. The juxtaposition of these two polarized positions will comprise the framework of the arguments explored in this paper.

To be sure, the issues of immediate import to the debate surrounding neurocognitive enhancement are manifold, and any singular analysis of topics, no matter how sweeping, will unavoidably fall short of adequacy. This paper recognizes such limitations, and thus aims to briefly address but three: memory (recollection), executive function,<sup>8</sup> and emotional health and personality.<sup>9</sup> The aim and proposal of the paper is to examine the concepts of memory, executive function,<sup>10</sup> and emotional health and personality in the context of neurocognitive enhancement with the intention of positing the argument that neurocognitive enhancement can be justified as morally plausible in its potential to edify the caliber of overall cognition and thus contribute to the ability to make pragmatically robust moral decisions on the conditions that it (i) promotes general moral character, (ii) complements human nature, and (iii) effects a deeper sense of individual<sup>11</sup> and social<sup>12</sup> identity.

### *MORAL CHARACTER AND THE MEMORABLE-RECOLLECTIVE BRAIN*

A first point of divergence in the enhancement debate concerns moral character. Refocused in the context of neurocognition, it specifically concerns how moral character is affected by manipulating the natural human capacity to recollect. Generally speaking, human identity is reducible in part to the decisions one makes, the actions one pursues, and the responsibility taken for the sum of the parts. Hence, who one is flows forth from what one decides to do and acts on doing, and moral character is shaped by this means. Utilizing neurotechnological enhancement is one such decision and action that significantly affects and shapes moral character. Since more than just biophysiology is at stake in the choice to pursue neurocognitive enhancement, recognition of the promises and perils of its effects on identity, mentality, free will, and, particularly in considerations of the mind-brain relationship, memory, are things for which moral character, shaped by moral responsibility, must account.

### *Hubris and Humility*

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8. For coverage of both memory (recollection) and executive function, see Farah et al., "Neurocognitive Enhancement," 30-41. See especially pp. 31-34.

9. See Canli and Amin, "Neuroimaging of Emotion and Personality," 147-54.

10. By this phrase is meant the neurocognitive abilities that allow for flexible, task-oriented responses in the face of manifold and often competing neurological inputs or more habitual but inappropriate behavioral response patterns. See Farah et al., "Neurocognitive Enhancement," 30-41. See especially pp. 33-34.

11. These three conditions, among others, form the contra argument vis-à-vis enhancement of the 2003 President's Council on Bioethics. See President's Council on Bioethics, "Beyond Therapy," 58-72. See especially pp. 58-65.

12. For an expansive examination of the social implications of neuroscience accompanied by an epistemological framework for the neuroscience of ethics, see Racine, *Pragmatic Neuroethics*, 179-213.

With regard to moral character, the Council's rhetoric<sup>13</sup> against enhancement is couched in expressivist and consequentialist concerns. The former regards the idea that the pursuit of enhancement itself denotes moral viciousness and, hence, poor moral character. The latter regards the moral forecast that enhancement would inevitably lead to the weakening of moral character. The strongest expressivist concern lies in the Council's contention that pursuing enhancement fails to exemplify respect for "the given" in nature and instead exhibits the hubris of those who act with "hyper-agent" wisdom they fail to possess.<sup>14</sup> Since appreciation is the product of humility – a precondition for the possession of other moral virtues – enhancement inevitably proves a stumbling block for the development of virtues necessary to live a substantive moral life. In this sense, the Council's stance is equal parts essentialist and consequentialist.<sup>15</sup>

Applied in the context of neurocognitive enhancement, the Council's threefold premises include the notions that (i) appreciation for what one has been given is a human good of central importance that develops virtuous moral character; (ii) the pursuit of nontherapeutic memory enhancement as a form of mastery and perfection is ultimately at odds with this sense of appreciation; and (iii) the employment of memory enhancement and its products are an instance of the pursuit of mastery or perfection. From these premises can be derived two fundamental conclusions. The first is that the employment of memory enhancement is ultimately incongruous with appreciation for "the given" in nature. The second is that the employment of memory enhancement is ultimately incongruous with a central human good of which virtuous moral character requisitely consists.<sup>16</sup>

### *The Morality of Memory Encoding*

This paper finds such essentialist and consequentialist logic misguided. Essentialist and consequentialist concerns are typically the culprit of two primary errors. First, they assume that all persons who pursue enhancement possess an insatiable craving for mastery or perfection.<sup>17</sup> Second, essentialist and consequentialist concerns take the notion of gratitude at face value rather than considering it a vague concept expressive of something more appropriate and less bogged down by theological rhetoric.<sup>18</sup> To be sure,

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13. Included in the introductory remarks of "Beyond Therapy" is the Council's recognition that "it will be hard to say what is wrong with any biotechnological intervention that could improve our performances. . . . Indeed, in many cases, we ought to be thankful for or pleased with the improvements our technological ingenuity is making possible." They spend the remainder of the document, however, endeavoring to explicate precisely why they are not. See President's Council on Bioethics, "Beyond Therapy," 58-72. See especially p. 58.

14. The President's Council on Bioethics, "Beyond Therapy," 59-61.

15. This logic is echoed most notably by the political philosopher Michael Sandel. For a thorough analysis of the expressivist and consequentialist concerns of the "anti-enhancement" camp, see Sandel's *The Case Against Perfection: Ethics in the Age of Genetic Engineering* (Cambridge, MA: Harvard University Press, 2007).

16. See the President's Council on Bioethics, "Beyond Therapy," 59-61.

17. The necessitation of spectacles for night driving, for example, proves foolish this point. Surely the driver desires neither mastery nor perfection in the endeavor to ensure the safety of self and others.

18. Both the vagueness and the presupposition of the theological nature underlying the concept of gratitude are swiftly identified upon posing the question, "to what/whom?"

every person should be concerned with the risks of becoming exceedingly focused on the beneficial effects of enhancement to the extent that they cease to be appreciative of the things they have. But such risks are not *ipso facto* unavoidable, and a person who focuses on what is to be gleaned from neurocognitive enhancement at the cost of appreciating current possessions already exhibits a deficiency in moral character.

Moreover, essentialist and consequentialist concerns fail to acknowledge the possibility that memory enhancement may preserve, if not explicitly develop, one's sense of appreciation. If this can be defended, then memory enhancement can be said to fortify moral character. Consider the use of drugs that regulate APMA<sup>19</sup> receptors to aid in depolarization, or that increase CREB,<sup>20</sup> a gene-activating molecule that produces proteins and buttresses synaptic strength. Applied to middle-aged and elderly populations,<sup>21</sup> the ability to encode new memories would allow for a deeper experience *ex post facto* of critically significant life events.<sup>22</sup> This enhancement certainly possesses the potential to lead to a deeper sense of appreciation for the already given, not a movement away from it.<sup>23,24</sup> In the context of human health and well being, then, the "respect" argument seems to be one in favor of, not against, enhancement. Understood in this light, enhancing neurocognitive endowments seems to promote, not detract from, moral character, thereby edifying the caliber of overall cognition and thus contributing to the ability make pragmatically robust moral decisions.

#### *HUMAN NATURE AND THE EXECUTIVE-FUNCTIONAL BRAIN*

A second point of divergence in the enhancement debate concerns human nature. Refocused in the context of neurocognition, it specifically concerns how human nature is affected by manipulating the conception of one's existence in the world. The philosophical conception of human nature as a set of shared moral ideals between human beings that distinguishes them from all other beings can be traced to the Aristotelian corpus. If these ideals are considered natural, they are consequentially regarded as essential rather than contingent or superfluous. This logic lends to the interpretation that if human beings were to lose any of the moral characteristics considered essential to human identity, they would cease to be human. The question is thus raised over whether neurocognitive enhancement contributes to or depreciates human nature.

#### *The "Unnatural" Means of Human Dignity*

With regard to human nature, two primary concerns frame the Council's argument against enhancement. The first is that enhancement will alter or obliterate human nature,

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19. Amino-3-hydroxy-5-methyl-4-isoxazole propionic acid.

20. cAMP response element-binding protein.

21. Neurocognitive studies have indicated that this population in particular stand to gain most from memory enhancement technologies. See Farah et al., "Neurocognitive Enhancement," 31-32.

22. The analysis of increasingly controversial memory augmentations such as dampening and vivifying transcend the scope of this paper.

23. Farah et al., "Neurocognitive Enhancement," 31-32.

24. More to the point, an adequate sense of appreciation for "the given" in nature includes the appreciation of everything that is given, including memory enhancement techniques.

rendering it man-made and therefore “cheap.”<sup>25</sup> The second is that if enhancement alters or obliterates human nature, this will affect one’s ability to determine the good, because the ability to determine something is dependant on the nature of the determiner.<sup>26</sup> As it pertains to the first concern, the principal fear is that one or more of the characteristics essential to human nature will inevitably be manipulated by neurocognitive enhancement, rendering one an alien to oneself (and others). The continual creation of these “transhuman others”<sup>27</sup> might eventually result in the extinction of human beings. Since it is illogical to tamper with the wisdom of nature, it follows that it is illogical to attempt to become “better than well.” Thus, participation in enhancement would leave one with only the prodigality of free will.<sup>28</sup>

The second part of the argument is based on the notion that human goodness is inextricably linked to human nature. Transcending this nature – becoming “God-like” – undermines the apprehension and valuation of goodness, rendering nothing save for experiential, and thus existential, misunderstanding. Since understanding and valuing the good is essential to moral living, human beings must do everything possible to preserve it. Hence, any neurocognitive enhancement that would augment human nature is discouraged and must be avoided. In this view, human actions flow forth from human nature. Once nature is sacrificed by participating in enhancement, thereby “cheating” oneself out of oneself, the ability to determine the good and act upon it is lost.<sup>29</sup>

### *The Folly of Normative Essentialism*

This paper rejects such normative essentialism<sup>30</sup> as implausible for several reasons. First, there is nothing intrinsically wrong with altering human nature by means of enhancing executive function since the “naturally given” clearly contains both good and bad elements<sup>31</sup> and because there is no persuasive reason to believe that in every effort to nuance the poor elements there would exist a disproportionate risk posed to those considered good.<sup>32</sup> Second, if it were the case that executive function enhancement would “obliterate” human nature by transforming human beings into “hyper-agents,” this

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25. President’s Council on Bioethics, “Beyond Therapy,” 61-64. See especially p. 62.

26. The metaphorical language used by the Council to demonstrate this point includes the inevitable gap created between “the dancer and the dance.” See President’s Council on Bioethics, “Beyond Therapy,” 61-64. See especially p. 64.

27. The Council also invokes concepts such as “God-like,” “hyper-agency,” “better than well,” “cheating,” “self-alienation,” “better model,” “less than human,” and several others to describe transhumanist desires. See President’s Council on Bioethics, “Beyond Therapy,” 58-72.

28. President’s Council on Bioethics, “Beyond Therapy,” 61-64.

29. President’s Council on Bioethics, “Beyond Therapy,” 61-64; 65-71.

30. Normative essentialism is the belief that comprehensive moral rules may be extracted from reflection on human nature.

31. Consider, for example, executive function deficits such as attention disorders, working memory miscues, and inhibitory control issues. While these are “naturally given,” no reasonable person would consider them intrinsically good. See Farah et al., “Neurocognitive Enhancement,” 33-34.

32. To be sure, the use of drugs that target dopamine and noradrenaline neurotransmitter faculties carry particular risks in the effort to augment the “naturally given” neurocognitive deficiencies, but certainly not in every case, and almost always within the realm of reasonable proportion. See Farah et al., “Neurocognitive Enhancement,” 33-34.



action would not in itself be wrong and may in fact be morally right.<sup>33</sup> Third, it does not necessarily follow that adjusting human nature will result in the loss of the ability to make judgments about the good, because human beings requisitely possess a conception of the good by which they evaluate human nature itself.<sup>34</sup> Finally, appeals to human nature generally effect obscurity in the moral debate over enhancement and can be ameliorated with more apposite considerations.

Applied in the context of executive function enhancement, the third reason above deserves immediate attention. What underlies the erroneous normative essentialist claim that nature and goodness are inextricably linked is the idea that to decipher whether something is good, one needs to know if it conforms to, or “fits” with, human nature. This paper has already noted one reason<sup>35</sup> to reject this claim: appealing to the role nature plays in decision making is largely about recognizing constraints; therefore, rather than rendering human beings incapable of judging rightly – which is the (preexistent) existential plight of those to whom neurocognitive deficiencies have been “naturally given” – participation in executive function enhancement would simply require the consideration of new constraints.<sup>36</sup> Based on the innate desire to evolve, then, participation in neurocognitive enhancement may be seen in this light as complimentary of, not a detraction from, human nature, thereby edifying the caliber of overall cognition and thus contributing to the ability make pragmatically robust moral decisions.

### *IDENTITY AND THE EMOTIONAL-PERSONAL BRAIN*

A third point of divergence in the enhancement debate concerns individual and social identity. Refocused in the context of neurocognition, it specifically concerns the individual and social effects of augmenting one’s identity in ways pertaining to emotional health and personality. To be human is to be a particular person, with a particular history, and with particular loves and memories that bind one to behave in particular ways. The possibilities of neurocognitive enhancement offer entry into an uncharted plane of being within which who one understands oneself to be in relation to self and society<sup>37</sup> may be significantly amplified through techniques that would allow for emotional and personal

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33. *Prima facie*, the action in question may at worst be considered morally neutral but by no means clearly and objectively morally wrong.

34. This exemplifies, among others, the logical fallacy of *circulus in demonstrando*.

35. There is, however, a second and more important reason to reject this claim: human beings already make coherent and reasonable judgments concerning human nature that can persuasively argue in favor of augmentation. Recognizing flaws in human nature – e.g., deficits of executive function such as attention disorders, working memory miscues, and inhibitory control issues – suggests that human beings have a concept of human nature that is independent of human nature itself. See Farah et al., “Neurocognitive Enhancement,” 33-34.

36. One plausible constraint would be to allow enhancement therapies to be accessed by only those most likely to benefit from them, which has typically proven to be those with the lowest working memory capacities, significant attention disorders, and multiple inhibitory control issues. Interestingly, at least one study has shown that the use of dopamine agonist bromocriptine improves the neurocognitive performance of individuals with a less-than-average working memory but lowers the performance of those with the highest natural capacities. See Farah et al., “Neurocognitive Enhancement,” 33-34.

37. For a still further analysis of the sociological implications of the promised future of neuroscience and its accompanying neuroethics, see Racine, *Pragmatic Neuroethics*, 215-21.

maturation or blunting. Issues related to moral responsibility and “manufactured” perceptions are hence inevitably called into question.

### *Plentiful Ends, Partial Flourishing*

With regard to individual and social identity, the Council’s position against enhancement manifests itself in two primary veins. The first refers to the idea that enhancement threatens the most precious piece of human existence: idiosyncratic identity. The second turns on the first, and concerns the notion that participation in enhancement provides others with the means to manipulate the identity that should be solely one’s own to “work out.” As it pertains to the first concern, enhancement is viewed to remove the intelligible means necessary to understand one’s particularity in shared time and space.<sup>38</sup> Participation thus threatens this essential identity, which is inextricably linked to moral responsibility,<sup>39</sup> by allowing it to be usurped by the cold and impersonal hand of biotechnology. Consequentially, “self-alienation” is the inevitable destination on the journey toward actualizing this naïve “achievement.”<sup>40</sup>

The second part of the argument clings to the notion that enhancement effectively “de-agents” the subject and allows the “enhancer” to assume the subject’s identity as biotechnological puppet-master par excellence. Since personal achievements can only be personally achieved, it follows that impersonal achievements cannot be considered the work of individual persons.<sup>41</sup> While it can be said that an individual self uses cognitive drugs to, for example, increase alertness, it cannot be said that an individual self thereby does the “alerting.” Rather, pharmacologicals have acted in place of a self and goals have been achieved only by means of sacrificing personal independence. The cardinal idea is that to be independent essentially requires possessing individual limits. Thus, by the mere act of participating in enhancement one undermines<sup>42</sup> one’s own identity.<sup>43</sup>

### *Against Self-Reductionism*

This paper rejects such self-reductionism for reasons beyond its unfortunate tendency to paint the unflattering portrait of people who pursue neurocognitive enhancement as unintelligent “identity-thieves” who prostitute dignity for gain at the cost of personal integrity. The position here is that emotional health and personality enhancement can promote individual and social identity for at least two reasons. The first

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38. For the Council, “to be human is to be someone, not anyone – with a given nature (male or female), given natural abilities (superior wit or musical talent), and, most important, a real history of attachments, memories, and experiences, acquired largely by living with others.” See President’s Council on Bioethics, “Beyond Therapy,” 64.

39. In this way, identity is intimately linked with the conception and constitution of moral character.

40. President’s Council on Bioethics, “Beyond Therapy,” 64-65.

41. The metaphorical image used to capture this point is the student behind the calculator. Using the calculator does not *de facto* render the student a “knower” of mathematics, even if the student arrives at the correct answer through its use. See President’s Council on Bioethics, “Beyond Therapy,” 64-65.

42. In this case, a “pseudo-happiness” has been achieved at the cost of the same individual self necessary to secure a sense of happiness that can be called genuine and personal.

43. President’s Council on Bioethics, “Beyond Therapy,” 64-65.

concerns the idea that emotional health and personality enhancement may be used to correct existing individual neurocognitive deficiencies that result in individual injustices. The second concerns the idea that emotional health and personality enhancement may be used to correct individual neurocognitive deficiencies that result in social injustices. To exemplify the former, consider neurological studies that provide insight into the benefits of developing cognitive drugs that enhance underdeveloped neural correlates regulating negative emotions related to moral violations. The use of neurocognitive pharmacologicals may promise brain regions previously undeveloped, yet nonetheless implicated in moral development, a greater personal emotional content in moral stimuli.<sup>44</sup> So doing may combat individual injustices<sup>45</sup> by leading to a comprehensively balanced understanding of idiosyncratic moral responsibility and the essential role of emotion in systematic decision-making.<sup>46</sup>

The second reason may be exemplified by considering neurological studies that provide insight into the benefits of developing cognitive drugs that enhance underdeveloped neural mechanisms<sup>47</sup> that process moral sensitivity to issues related to justice and care. The use of neurocognitive pharmacologicals may promise activation to regions of the brain that experience abnormalities associated with dissociable neural processing events.<sup>48</sup> So doing may combat social injustices<sup>49</sup> by leading to a deeper awareness of concerns related to social justice while simultaneously developing one's individual identity as related to others in the collective mission to express care and respect for well-being.<sup>50</sup> In light of these reasons, then, neurocognitive enhancement may be defended as affecting a deeper sense of individual and social identity; thereby edifying the caliber of overall cognition and thus contributing to the ability make pragmatically robust moral decisions.

## CONCLUSION

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44. Racine, *Pragmatic Neuroethics*, 186.

45. Thus, rather than effectively sacrificing or annihilating one's sense of self, emotional health and personality enhancement can be defended as the gateway into one's authentic self and the individual moral responsibilities such a discovery demands one to observe.

46. Other emotional health and personality enhancement studies promotive of individual identity include, among others, the influence of bodily harm on neural correlates of semantic and moral decision making, the moral affiliation of disgust, and affective responses to one's own moral violations. See Racine, *Pragmatic Neuroethics*, 184-89.

47. These include the polar medial prefrontal cortex, dorsal posterior cingulate cortex, and posterior superior temporal sulcus. See Racine, *Pragmatic Neuroethics*, 185.

48. These would include a dormant left intraparietal sulcus, which is associated with sensitivity to justice issues, or a dormant ventral posterior cingulate cortex, ventromedial and dorsolateral prefrontal cortex, and thalamus, which is associated with sensitivity to care issues. See Racine, *Pragmatic Neuroethics*, 185.

49. Thus, rather than effectually obscuring and demoting social identity, emotional health and personality enhancement can be defended as an invitation to participate more deeply and responsibly in the social story of which one is an integral individual part, thereby promoting the rational capacity to decipher the good.

50. Other emotional health and personality enhancement studies promotive of social identity include, among others, gender differences in neural mechanisms underlying moral sensitivity, the neural basis of belief encoding and integration in moral judgment, and the functional networks in emotional moral and nonmoral social judgments. See Racine, *Pragmatic Neuroethics*, 184-89.

Memory, executive function, and emotional health and personality are but three issues of principal significance in the debate over the moral licitness of neurocognitive enhancement. Through the lens of a critical-dialogical framework, the aim of this paper has been to address the aforementioned issues with the intention of positing the argument that neurocognitive enhancement can be justified as morally plausible in its potential to edify the caliber of overall cognition and thus contribute to the ability make pragmatically robust moral decisions on the conditions that it (i) promotes general moral character, (ii) compliments human nature, and (iii) effects a deeper sense of individual and social identity. To that end it has been successful.

The implications here are significant. To be sure, the reality of enhancement extremism is a genuine and growing fear. But rather than allowing it to terminate human progress, it may instead serve to remind that while the benefits of neurocognitive technologies are important, how and how far they are utilized is more important still.

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