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## The Justice (Or Lack Thereof) of Brain Augmentation Through Nanotechnology

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## The Justice (Or Lack Thereof) of Brain Augmentation Through Nanotechnology

Currently, the majority of the ethical discussion around the expansive field of brain augmentation centers on the concept of cognitive enhancement, defined by Bostrom and Sandberg (2009) as, “the amplification or extension of core capacities of the mind through improvements or augmentation of internal or external information processing systems.”<sup>1</sup> But if this definition sounds broad and vague, that’s because it is. Part of the difficulty in discussing this field of neuroscience, and the controversy surrounding it, is making quite clear what specifically we are talking about to begin with. As Austin Caras and James DeJesus introduced in *Ethical Analysis of Brain Augmentation Through Nanotechnology*, methods of brain augmentation, a term which will be used here synonymously with the term cognitive enhancement, are abundant and diverse. The authors suggested that they would use a utilitarian lens to evaluate how nanotechnologies, a particular category of brain augmentations, would impact our society, but I believe they miss the mark here. While they give a compelling summary of the possibilities of this technology, they fail to do more than scratch the surface of the ethical implications surrounding their use. I intend to address one component I believe they have missed here, through my own evaluation and application of utilitarian justice.

Caras and DeJesus describe the variety of brain augmentation techniques available in a way that seems to place them on a scale of complexity and invasiveness. Here, the most mild or intervention-free methods of brain augmentation are things we have known to be beneficial for a long time: education, recreation, good nutrition, and exercise—all hard to argue with. We know that, almost intuitively, learning, playing, eating well, and getting physical activity all fulfill a very important role in growing and maintaining healthy brain function. But other brain augmentation techniques discussed by Caras and DeJesus in their article seem, to the layman, to harken from science fiction, and are markedly absent from current ethical discourse on this topic. Some of these are technologies using nanocapsules to improve targeting and delivery of pharmaceuticals, the use of a stem cell-hydrogel compound to replace missing gray matter in human brains, and decoded neurofeedback, a process that offers the capability of transferring learned knowledge from one

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<sup>1</sup> Bostrom N, & Sandberg A (2009) Cognitive Enhancement: Methods, Ethics, Regulatory Challenges. *Science and Engineering Ethics*, 15(3): 311-341. <https://doi.org/10.1007/s11948-009-9142-5>

individual into the brain of another. What these authors have made clear is that the technologies in focus are not so distant in their application, and thus demand ethical considerations.

While all of these technologies can be used in a therapeutic capacity, they can be used in the form of enhancements as well—particularly the decoded neurofeedback technique. This distinction between therapies and enhancements is crucial to the discussion surrounding these technologies, because, while therapies are intended to correct a pathology or a defect, enhancements are meant to *improve* something that *isn't broken*.<sup>2</sup> The argument for pursuing the creation of therapies is also much less controversial than that for creating enhancements.<sup>3</sup>

The focus of most ethical discourse on this topic, including that briefly pursued by Caras and DeJesus, primarily addresses accessibility to technologies, and the concern that only a small percentage of the world, the wealthy and powerful, would be able to afford these treatments, while everyone else would fall farther behind, a situation that has been dubbed an “opportunity gap.”<sup>4</sup> But while many authors do acknowledge that this gap reduces the accessibility of these technologies to certain groups,<sup>5</sup> they don't acknowledge that for many, those most simple forms of brain augmentation that I mentioned earlier, education, recreation, good nutrition, and exercise, are not accessible either.

It has been estimated that 59 million children of primary school age do not have access to education, and the same goes for almost 65 million adolescents.<sup>6</sup> Some 815 million people in the world do not have enough food to live a healthy and active life.<sup>7</sup> And for too many, there is no time for recreation, and their only form of exercise comes as hard manual labor. How can we discuss accessibility of brain augmentations, when these most basic forms are not available to so many people in the world? Caras and DeJesus suggested that the need for higher education could be eliminated in developing countries through simply placing knowledge into the minds of

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<sup>2</sup> Ibid.

<sup>3</sup> Racine E, Martin Rubio T, Chandler J, Forlini C, & Lucke J (2014) The Value and Pitfalls of Speculation about Science and Technology in Bioethics: The Case of Cognitive Enhancement. *Med Health Care and Philos*, 17(3): 325-337. <http://dx.doi.org/10.1007/s11019-013-9539-4>

<sup>4</sup> Hyman SE (2011) Cognitive Enhancement: Promises and Perils. *Neuron*, 69(4): 595-598. <https://doi.org/10.1016/j.neuron.2011.02.012>

<sup>5</sup> Racine E, Martin Rubio T, Chandler J, Forlini C, & Lucke J (2014) The Value and Pitfalls of Speculation about Science and Technology in Bioethics: The Case of Cognitive Enhancement. *Med Health Care and Philos*, 17(3): 325-337. <http://dx.doi.org/10.1007/s11019-013-9539-4>

<sup>6</sup> Watson K (2016) Global Citizen: 9 Facts to Know About Education Around the World. Retrieved February 28, 2018 from <https://www.globalcitizen.org/en/content/9-facts-about-education/>

<sup>7</sup> Zero Hunger (2018) World Food Programme. Retrieved February 28, 2018 from <http://www1.wfp.org/zero-hunger>

children—through the decoded neurofeedback technique—but how much can that offer to a child who is still starving?

A framework of utilitarian justice, such as that of John Stuart Mill, suggests that, “injustice involves the violation of the rights of some identifiable individual.”<sup>8</sup> Mill’s formulation of positive rights, things we have a right to receive, or someone is obligated to provide, includes education, food, shelter, and more. Under the United Nations Universal Declaration of Human Rights Article 25, “Everyone has a right to a standard of living adequate for the health and well-being of himself and his family, including food...”<sup>9</sup> and Article 26, “Everyone has the right to education.”<sup>10</sup> From both Mill’s perspective, and how we have defined human rights since 1948, great injustices are occurring every day for a large fraction of the world’s population. But we already know that. This isn’t new knowledge to us.

In the discussion of the ethics of brain augmentation, where the most foundational, and possibly the most influential techniques all come down to our access to education, good food, recreation, and exercise, we’re not discussing this. Instead, authors are debating whether brain enhancements will lead to discrimination or unfair advantages in the work place, or a loss of our ‘humanness’ as we continue to merge man with machine. I don’t intend to argue that these are not valuable or worthy considerations. But when a fraction of the world’s population is merely struggling to survive, funding for research and development of technologies meant to enhance the minds of the world’s most elite and privileged is more than a little hard to stomach. Of course, scientific advancements will always continue. For the researchers developing these nanotechnologies, the strife of individuals denied their most basic human rights on the other side of the world is likely far from their minds. I also don’t intend to propose that the humanitarian crisis occurring in the world today is the responsibility of these researchers to solve. But in the formulation of justice that I have introduced here, a solution is demanded to rectify the injustices occurring. The authors argue for an increase in net utility by giving more to the wealthy and powerful, but considering Mill’s justice formulation, I argue that an increase in net utility, and the

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<sup>8</sup> Mill JS (1863) *Utilitarianism*. London, England. Longmans, Green, and Co. Retrieved February 28, 2018 from <https://www.utilitarianism.com/mill1.htm>

<sup>9</sup> United Nations General Assembly (1948) *The Universal Declaration of Human Rights*. Retrieved February 28, 2018 from [http://undocs.org/A/RES/217\(III\)](http://undocs.org/A/RES/217(III))

<sup>10</sup> *Ibid.*

creation of a bridge over the ‘opportunity gap’, would be better achieved through giving the most to those that need it most.