EXPLORATION OF KERATIN FILAMENTS AND THEIR APPLICATION TO RADIATION BASED INJURIES

HOW WILL BIOHACKING INFLUENCE THE FUTURE WORKINGS OF SOCIETY

A Thesis Prospectus
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

Ever since the first use of implants by pharaohs for dental replacements in 2500 BC (Abraham, 2014), the world became more and more fascinated with the idea of implanting things to repair the human body. But as time went on and technology became more advanced and instead of reactively repairing the human body we began to proactively enhance the human body. Human enhancement is defined as any kind of genetic, biomedical, or pharmaceutical intervention aimed at improving human dispositions, capacities, or well-being, even if there is no pathology to be treated (Clarke, 2016). Human enhancement has been around since the conception of cyborgs and plastic surgery, with body modification as a central pillar (Pitts, 2016). As the field of biomaterials and biotechnology advances, the options for body modification only increase. This phenomenon of human enhancement created a movement for evolution of humans with the assistance of science and technology called transhumanism.

I aim to explore a company owned by Elon Musk called Neuralink. It's blurring the line between human and technology and causing discussion while bringing dramatic human enhancement into reality. According to the company's mission statement, the neural implants being developed are aimed to help people affected by paralysis by wirelessly transmitting signals from the brain to affected limbs (Neuralink, 2016). However, the neuralink website also said [the implant] will wirelessly connect the brain to the digital world, starting by connecting to a smartphone (Neuralink, 2016). Once the motivation defects from medical use, other factors associated with its commercialization need to be considered. Its advantages, disadvantages, power dynamic and impacts on civil liberties all need to be addressed, so for my STS project, I will discuss Winner's ideas

of inherent politics and use-politics to explore the potential of this Brain-Computer Interface(BCI) and its influences on its users and society.

Technical project

Chronic wounds cause the patient severe pain, physical distress and reduce mobility and these wounds can persist for weeks or months and even years. With the advancement in technology, radiation exposure has become a problem of the new age. It can happen anywhere, but a more direct form of radiation can come from radiation therapy for cancer patients. Radiation therapy was first used in the 1890s (Huh, 2020), and has since become one of the most successful forms of treatment against cancer but the side effects are undesirable. Current treatment for the side effects of radiation treatment strictly follow soothing pathways, such as hydrating creams and corticosteroids to reduce inflammation and help reduce the irritation associated with radiation dermatitis. But if these radiation burns do not get treated they have the potential to develop into chronic wounds and these soothing treatments do little to help the situation. The material being explored in my technical project is a nanoparticle called OKHP keratin which would actively begin repairing the damage done by radiation. The keratin will be subjected to a series of environmental settings that are congruent with radiation wound conditions. Our success of the project would provide enough evidence for continued research and testing of the keratin nanoparticle in more complex irradiated environments, and application to patients in the distant future.

As stated earlier, human enhancement can be defined as a biomedical intervention aimed at improving humans capacity for healing, and the keratin nanoparticles have been shown to do exactly that (Batzer et al, 2016). By definition, application of a keratin

treatment is human enhancement which brings into question ethical issues associated with it. While the keratin treatments were created solely for medical purposes, its classification as a human enhancement inspired the exploration of other advanced technologies with similar motivations, such as Neuralink.

STS project

The creation of human enhancement technologies have many effects and will be discussed in the context of inherent politics and use-politics. The first is the inherent politics that come with the technology's existence, which tend to shift the balance of power in one direction at the expense of others. The second is the use-politics that is determined by what the users accomplishes with the technology.

The commercialization and accessibility of Neuralink can have severe effects on categories like Race, Age, and Socioeconomic class. It has the potential to close the gap between groups or push them even farther apart. For example, factors like price can exclude those of the lower class and begin pushing them farther away. Similarly, reduced accessibility can exclude older citizens, even though they stand to benefit the most from the technology. The scenarios and repercussions for these interactions have been described by sources like Chapter 9 of *Transhumanism: Entering an Era of Bodyhacking and Radical Human Modification* (Earle, 2020) and *The Brain's Body* (Pitts, 2016). With the introduction of a new technology, come those who created it. The potential for misuse by the company, like collecting and selling data straight from the users consciousness, violates the users privacy and leaves them powerless. Also, too few or too many regulations from the government can leave users unprotected. Too few regulations, and the implants may be prone to a cyberterrorist attack, but too many regulations may make

the users feel like their civil liberties are compromised. These thoughts were also supported with the help of *Super Intelligence and Eternal Life* (Thomas, 2017).

The way that the technology is used by the consumers, can be used to predict the future of the product. For example, the appropriate use of the neural implant could be described as improving the quality of life of people that need it, regardless of their position in society. Once the implant gives unaffected users the ability to interact with each other on social media, the purpose of the technology becomes left to the users discretion. Much like how Koch compared Anakin and Luke Skywalker in *Enhancing Who? Enhancing What?* (Koch, 2010) The politics of the technology are now nonexistent, and it shows the technology is used that determines its worth. The use of technology in accordance with transhumanism can also be determined by a person's right to bodily autonomy. Drawing from ideas of transgenderism and feminism from *In The Flesh* (Pitts, 2006) and *From Transgender to Transhuman* (Rothblatt, 2011), I will begin to explore and understand the parallels between the the transgenderism and transhumanism movements. Both of which are deeply rooted in the rights presented to all people in their nations constitutions or respective documents.

Conclusion

My technical project will show how much the human body can be influenced by biomedical technology, and begin to provide insight into the fusion of technology and humans. And my STS project will gather information surrounding neuralinks politics, through the consideration of demographic groups, threats and safety nets, and the right to free will and bodily autonomy. When the discussion is complete, I will conclude how

the control and power over the company neuralink can influence the politics associated with transhumanism.

Key Texts

Pitts, V. (2015). *In the flesh: The cultural politics of body modification*. Palgrave Macmillan.

This book talks about body modification, identity, and sex and gender, with less complex technologies, but extrapolates her findings to transhumanism and more complex topics. My professor told me this would be a relevant source, but after reading some parts, the points about identity would help define what it means to be human in the context of complex implants.

Pitts-Taylor, V. (2016). *The brain's body: Neuroscience and corporeal politics*. Duke University Press.

This book talks about how social structures interact with the brain with studies of neuroscience. I read a part about ethnicities/race and the economic/social classes. I think it can be tied in with Winners ideas on artifacts, and provides insight into how neural implants will be treated and adopted by various groups in the population.

Koch, T. (2010). Enhancing who? enhancing what? ethics, bioethics, and transhumanism. *Journal of Medicine and Philosophy*, *35*(6), 685–699. https://doi.org/10.1093/jmp/jhq051

Talks greatly about use-politics, and draws from popular topics well known to most people. It is relevant to the project because it talks specifically of transhumanism.

Although, I am starting to question using this source because its argument is rooted in genetic enhancements, which is not in my project.

Winner, L. (2017). Do artifacts have politics? *Computer Ethics*, 177–192.

https://doi.org/10.4324/9781315259697-21

Outlines and provides examples of technologies with inherent-politics and use-politics. Neural implants' existence brings in factors of authority and subordination. I think this source is almost necessary to include for analysis of BCIs on society as a whole and the balance of power.

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