

Cybernetic Augmentation - a Key to Utopia or Dystopia?

WM0324LR Ethics Essay 2014-2015

Seong Hun Lee 4145623, Manan Siddiquee 4185692

Abstract

Here goes the abstract

I. Introduction

Humanity's ability to make tools to complement itself can arguably be the most important contributor to its success over the last few millennia; we have made tools to adapt the environment to our needs, ensure our food supply, increase our strength and dexterity, widen our knowledge and improve our ability to carry out mental activities. However, after millennia of progress we are approaching a new dimension of technology; a dimension which some believe will be our salvation while others think it will be our undoing. The dimension referred to is the prospect of actively and intrusively improving the human mind and body. Developments in fields such as electronics, nanotechnology, robotics, cybernetics, information technology, neurotechnology, genetic engineering and pharmacology, among others, are enabling a new field of technology labelled by some as Human Engineering' to emerge.

The authors of this paper realize that human engineering is a very broad and trans-disciplinary field, and it would take volumes to analyse its ethical implications; thus this paper attempts to narrow the field by only looking at the ethical implications of one form of Human Engineering; namely cybernetic human augmentation. For the purpose of this paper cybernetic human augmentation is defined as the following: any (1) electro-mechanical addition to the human body that (2) becomes a natural part of the human body and that (3) improves the performance of an individual beyond normal human capacities. Needless to say genetic or chemical forms of human augmentation are external to the purview of cybernetic augmentation. Also, another important remark should be made that the scope of cybernetic human augmentation defined in this paper deals with the enhancement of the human capability "beyond the statistically normal standard", and therefore it does not consider the therapeutic use of the technology (e.g. prosthetic limbs for the amputees, artificial eyes/ears for the blind/deaf, memory chip for the patients suffering from Alzheimer's disease, etc.). Although there are complications for making this divide between therapy and enhancement, they will also be considered external to the scope of this paper.

The paper is structured as follows; the first part of the essay looks at the effects of cybernetic human augmentation on

society; following this an ethical perspective is used to analyse the effects of augmentation. After looking at the effects and their ethical implications, recommendations are made to support the implementation of cybernetic augmentation on society. Finally, the conclusions are drawn regarding the viewpoints and approaches towards cybernetic augmentation, its ethics and its effects on the future of humanity.

II. Analysis

To explore the potential ethical implications of cybernetic augmentation in a more structured manner, a distinction is made between the two types of cybernetic augmentations:

1. Augmentations to enhance the user's physical ability
2. Augmentations to enhance the user's cognitive/sensory ability

In this essay, physical cybernetic augmentation is defined as any kind of cybernetic augmentation that enhances the physical (i.e. of the body) qualities of a human being. For example, if one's arm is replaced by a robotic arm which gives the user a superior arm with better strength and agility, then it is seen as a physical cybernetic augmentation. Another example is a modification of the body to adapt to diverse environments (e.g. giving human beings gills and webbed feet to adapt for life underwater or improving the lungs and skin to tolerate different types of atmospheres). Cognitive cybernetic augmentation is defined as the any kind of cybernetic enhancement that improve the cognitive qualities of the user; these qualities are its ability to acquiring (perception), selecting (attention), representing (understanding) and retaining (memory) information (**CITE BOSTROM AND SANDBERG PG312**). There are mainly three primary types of cybernetic augmentation; they are: 1. improvement of thinking capacity; 2. improvement of sensory capacities; 3. accommodation for a interfacing with the external world.

With such a distinction in mind, let us analyse and discuss the ethical implications of cybernetic augmentation. Before we start, it is important to ask ourselves "What is meant by an ethical implication?". According to the Longman Dictionary of Contemporary English, an implication means

“a possible future effect or result of an action, event, decision, etc” [1]. Therefore, an ethical implication would mean the possible future effect or result with regard to associated moral values and principles of morality. For analysis, this section is divided into three main parts:

1. Potential benefits of cybernetic augmentation
2. Potential risks of cybernetic augmentation
3. Application of ethical theories

The first two parts provide an insight into the possible social, economical, and technological influence of the development and application of cybernetic augmentation technology, as well as its potential direct impact on users' physical and psychological state. Finally, the ethical implications of the technology are analysed and discussed by relating to the existing ethical theories and models.

A. Benefits of cybernetic augmentation

There can be numerous potential benefits when the cybernetic augmentation is implemented to enhance the user's physical and/or cognitive ability. In this essay, some of the main benefits of cybernetic augmentation are considered and discussed. Certain technologies are mentioned as examples to illustrate these benefits; the authors realize that these technologies can easily be risks, however in this part of the discussion only the prospective benefits are mentioned. The benefits are: ease hardships, improve health and survivability, create new opportunities, improve safety and welfare, improve efficiency and create happiness. Of course, there will be many other unmentioned potential benefits (and risks), but it should be noted that our intention is to give an overview and “food for thought” that is useful and adequate to comprehend the general implications, rather than to give you an exhaustive list of every possibility in the future.

(1) Ease hardships

One way that the cybernetic augmentation can be used to achieve the sense of better well-being is by enabling the users to carry out their daily actions in a more convenient way. For example, with augmented arms or legs, one may never have to struggle when lifting or carrying things. Also, the level of pain might be controlled in those augmented organs - for example, when you touch something very cold or hot beyond a certain threshold level, then it may regulate the synaptic information to your nerve system that you do not feel the pain you would have felt if you were not augmented. Such technology of physical cybernetic augmentation can give the user more control over their bodies, and thus reducing the level of inconvenience and stress. Furthermore, one can also consider the use of sensory/cognitive augmentation, such as an augmented eye which enables the user to see clearly during night with little light; this may be done by modifying or improving visual prosthesis devices **CITE**

TO VISUAL PROSTHESES FOR BLIND. Another kind of cognitive augmentation can be a computer chip that can be implemented in the brain to enhance the memory capability **CITE TO NEURAL PROSTHESIS BERGER ET AL.** Such technology of cognitive cybernetic augmentation can lead to the better perception and management of the daily-life information.

(2) Improve health and survivability

Since cybernetic enhancements will enhance the mind and the body of the person in question, it can be argued that their chances of survival will increase. A stronger, smarter person will be able to handle herself better in case of dangers such as natural disasters or accidents. In addition, the cybernetic augmentation can help the users maintain or improve their health by incorporating advanced medical technology. For example, the research is ongoing on the development of the nanorobots which are designed to navigate through our bodies' blood vessels, detect cancerous cells, and kill them [4]. Through the technology of cybernetic augmentation, such nanorobots can monitor our body more comprehensively, and perform medical tasks more quickly and efficiently at an early stage.

(3) Create new opportunities

Imagining further into the future, cybernetic augmentations may give us the ability to inhabit currently uninhabitable environments; for example, underwater or other planets with hazardous environments. Also, enhancements may lead to the creation of newer jobs and professions; the tasks which are considered as currently impossible or very difficult may become practicable when a workforce with enhanced ability are engaged. Additionally, once the cybernetic augmentation becomes an active trend of the society, there will be more initiatives for the further research, development and application of the technology in the fields of not only in cybernetic augmentation, but also in other fields of technology and industries.

(4) Improve safety and welfare

Cybernetic augmentation will improve safety beyond the discussed health and physical improvements of the individual. Society will be physically and psychologically better equipped to deal with its problems. Society will have a stronger physical presence with improved capacities of the armies and police forces; psychologically our society will be better equipped as our leaders will have enhanced minds which will improve their faculties to solve social and political problems **CITE TO BOSTROM AND ROACHE.** We can also increase safety and moral behaviour of users of cybernetic augmentation by incorporating safety and morally right decision making processes or fail safes in the augmentations. As an example imagine cognitive augments which informs the user of locations of rubbish cans if he needs to dispose of some waste; the 'moralization of technology'

will be easier and more effective **CITE TO Achterhuis, 1995 AS IN ETHICS BOOK PG 172.**

(4) Increased efficiency and productivity

Enhanced physical capability of the workers by means of cybernetic augmentation is most likely to increase the efficiency and productivity of humanity. Humanity will be able to better optimize and specialize its manpower, meaning as a sum effect we will get more done. Augmentations can be doctored to suit the professions of individuals; for example, construction workers can get physical augmentation that make them stronger, miners may consider improving their lungs to filter out harmful pollutants, businessmen can consider neural implants that will keep his mind connected to important information networks.

(5) Create happiness

Although it can be argued that the cumulative effect of the aforementioned benefits will be a general increase, the authors wish to assert that cybernetic augmentation in and of itself can be a source of greater happiness. Besides the obvious improvement to self image from being able to do more, people maybe able to use cybernetic augmentation to fulfil lifelong dreams that were previously unattainable; for example, someone with physical augmentations, wishing to scale mountains but with no previous experience will be safely able to do so. Cognitive augments can monitor the brain for depressive thoughts pattern and attempt to alleviate them for the user by suggesting her activities or providing more context for the sadness by referring to the arts, thereby allowing her to cope better. As extreme cases, neural implants may allow the user to experience a virtual reality or even directly stimulate parts of the brain that make people feel happy.

B. Risks of cybernetic augmentation

Cybernetic augmentation may also have negative consequences. As mentioned in the previous section, the examples of technologies discussed can be imagined to be a double edged sword; it may help humanity but it may as easily harm it. These possible of risks of cybernetic enhancement are: detrimental restructuring of human life, loss of humanity, hazards to health, decreased safety and security and finally unhappiness.

(1) Detrimental restructuring of human life

Cybernetic augmentation will most likely make many of the current social institutions and regulations meaningless; they would require them to be redefined and rethought accounting for the effect of new augmentations. For example, new laws would need to be defined for physical cybernetic augmentations that may allow human beings to run at really high speeds; academic performance may become meaningless if cognitive implants capable to storing or recalling

information like a computer become available **MAYBE REFER TO BOSTROM AND ROACHE.** Cybernetic enhancements may drastically increase the life expectancy of people which may require us to change the way approach reproduction. A great deal of jobs will be lost because fewer people would be required to perform jobs; this may lead to a global economic crisis. It will most likely intensify the already problematic situation of social stratification in the world; if augmentations are expensive the rich will get an even greater edge over the poor. Different types of enhanced humans may create their own closed communities and due to their enhancements maybe assigned different (possibly greater) rights over non-enhanced humans.

(2) Loss of humanity

Critics of cybernetic augmentation (and human enhancement in general) often present what is referred to as the argument of naturalness **CITE TO PEOPLE ANDY MIAH CITED IN PG190(24)** against augmentation; there is an intuitive belief that changing human biology would be detrimental to what it is to be human **CITE TO PEOPLE 25QA.** Supplanting these arguments are, among others, the fear of 'playing god' and the notion that a human being is forged through hardships she overcomes; if augmentation make those hardships easy to obtain, they may lose their meaning.

(3) Hazards to health

There are many potential health hazards to cybernetic augmentation. Due to its invasive nature, there would be great amount to risk to human life both in the research and development phase of such technology, because it will need to be tested on human beings. Assuming the technology is developed and implemented, there would be the perpetual risks of having a malfunctioning cybernetic device inside the human body; besides the possibility of malfunction there would be risks of hazardous interaction with the environment.

(4) Decreased safety and security

Safety may also decrease since augmented criminals will be better criminals. The controlling of cybernetic augmentation may lead to the formation of black markets which will contribute further to crime. Wars may become more dangerous since both there will be deadlier soldiers and more capable generals leading them. With cognitive augmentation there is the risk of loss of autonomy and privacy; there maybe the risk of thought monitoring by criminals or governments. In an extreme case, ones mind maybe hacked or their personality significantly altered without their consent.

(5) Unhappiness

Besides the above mentioned risks and their consequential unhappiness, cybernetic augmentation may cause unhappiness intrinsically. If augmentations are impossible or riskier to remove than implement, than there would be the chance that one would limit the possibilities of her life by choosing

a specific type of augmentation. A highly prolonged life may be a source for unhappiness; one may find herself to be bored of life and find nothing meaningful left to pursue. If ignorance truly is bliss, cognitive enhancement that would lead to greater amounts of intellect may end up leading to unhappiness.

C. Application of ethical theories towards cybernetic augmentation

The main ethical issue that the introduction of cybernetic augmentation technology imposes on the society can be viewed in two different (but closely related) approaches: (1) an approach to deal with the ethical aspects of the technical risks by analyzing whether or not such risks are acceptable, and (2) an approach of duty ethics or virtue ethics which judges the act of cybernetic augmentation itself by directly relating to the moral values, such as human dignity. In the following sections, the two approaches are elaborated so as to discuss the ethical implications of cybernetic augmentation.

C.1 Analysis of the acceptability of the risks

According to [2], a risk can be considered morally acceptable only after considering the following aspects:

1. The degree of informed consent with the risk
2. The degree to which the benefits weigh up against the risks
3. The availability of alternatives with a lower risk, and
4. The degree to which risks and advantages are justly distributed (among the people)

First of all, the principle of informed consent states that the potential risks and benefits must be fully informed to the people who might be influenced by the activity, and if they all agree to take the risks, then the risk can be considered morally acceptable. This is based on the freedom principle which respects the moral autonomy of the individuals and suggests that everyone is free to strive for his/her own pleasure, as long as there is no harm to others [2]. This alone however cannot become the sole criterion for judging the acceptability of risks because it is practically impossible to get consents from every individual who is influenced by the technology. As shown in the previous section, the potential risks of cybernetic augmentation exist not only towards the direct users, but also on the general society in the long term. It therefore becomes impractical to ask for consents from everyone. Moreover, considering the fact that the cybernetic augmentation technology is a newly emerging field, it is very difficult to fully comprehend the potential risks beforehand.

The second consideration is the use of risk-cost-benefit analysis. This is based on the idea of utilitarianism (i.e. a type of consequentialism based on the utility principle which strives for the greatest happiness for the greatest number). Such approach can be useful as it can give us an intuitive idea on the overall impacts of the activity. It is for this reason that the potential benefits and risks are discussed in the previous section. However, one should be careful to avoid the fallacy of pricing (i.e. expressing every value in monetary terms) and realize that the implication of the cybernetic augmentation technology is multidimensional.

The third criterion for the acceptability of the risk are rather subtle in this case, as this paper focuses on the evaluation of the technology itself, rather than an engineering problem which strives to solve an existing problem.

The last consideration to be taken into account is whether the risk and benefits are evenly distributed among the people. As discussed in the previous section, it is predictable that the rich will enjoy the benefits of cybernetic augmentation more, thereby causing an inequality issue. Nevertheless, it is also assumable that the users of cybernetic augmentation in the earlier phase of the development would take more risks than the users in the later phase of the development where the application of technology has improved with more maturity.

All in all, it can be reasoned that the acceptability of the risk of cybernetic augmentation should not be judged based only on each criterion that is mentioned, but also through the continuous reflection and multidimensional considerations during the process of development and deployment of the technology.

C.2 Duty ethics or Virtue ethics approach

Whereas the analysis of the moral acceptability of the risks appears to be rather existentialistic, the approach from a duty ethics or virtue ethics allows us to consider a different aspect of the issue - Is cybernetic augmentation virtuous? Does it deteriorate moral values, such as human dignity? Is it the right thing to do?

If

III. Authors' Opinions and Recommendations

Despite a multitude of identified technical risks and ethical concerns, the authors of this paper claim that the emergence and development of the cybernetic augmentation should not be simply avoided, but should rather be encouraged in such

a manner that the moral autonomy of those who are willing to utilize the technology is respected while the possible risks are striven to be minimized. Moreover, we argue that an excessively conservative view which tries to indiscreetly restrict the entire human augmentation technology itself will not only hinder the gateway to the great benefits of the technology, but also limit the possibility to develop a more encompassing social, economical, technological, and ethical framework which would help us better comprehend the implications of the related technologies and allow us to deal with the risks more effectively.

As a way of utilizing the technology while minimizing the technical risks and ethical concerns, the authors propose the following recommendations:

- Active encouragement of the application of cybernetic augmentation technology for therapeutic purpose (e.g. prosthetic limbs for the amputees illustrated in Figure 1, and visual prostheses for the blind illustrated in Figure 2). Since such kind of use of the technology is much less controversial, it is recommendable that the development of the augmentation technology be focused on these medical fields for the time being. Once the technology gains more maturity and people become more familiar (and knowledgeable) with it, we can then have more meaningful discussions concerning the acceptability of the cybernetic augmentation technology that is intended to enhance the human ability “beyond the normal level”.
- Active encouragement of the development of non-permanent/wearable cybernetic devices, starting from the smallest scale. If the intrusive nature of the cybernetic augmentation is removed, there will be much less technical risks and ethical concerns. Therefore, it can be a great stepping-stone for the introduction of the cybernetic augmentation technology for the similar reasons as in the previous item.
- A discussion as to whether the cybernetic augmentation is a key to Utopia or Dystopia can be meaningful as long as the discussion actively continues throughout the development and deployment of the technology, whilst refraining from making hasty conclusions (i.e. slippery slope fallacy). Note that cybernetic augmentation is a very broad technology. Therefore, instead of judging the final possible outcome of the entire concept of the technology, one should rather try to find specific fields and aspects in which the technology can be applied with the highest acceptability.



Figure 1: Prosthetic arm developed by DARPA. An artificial arm is connected to the user's existing muscles and nerves[5]

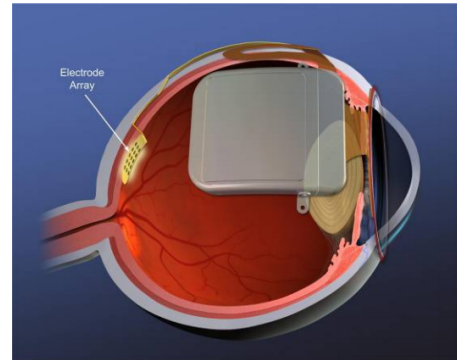


Figure 2: Prosthetic retinal implant concept illustration [3]

IV. Conclusions

This is the conclusion

References

- [1] Pearson Education. *Longman Dictionary of Contemporary English*. 2007.
- [2] Ibo van de Poel, Lamber Royackers. *Ethics, Technology, and Engineering - An Introduction*. 2011.
- [3] Jr John L. Wyatt. The Retinal Implant Project. <http://www.rle.mit.edu/media/pr151/19.pdf>, 2009.
- [4] Alla Katsnelson. DNA robot could kill cancer cells. <http://www.cs.york.ac.uk/hise/cadiz/home.html>, 2012.
- [5] Mariella Moon. DARPA developing muscle-controlled prosthetic limbs that can feel. <http://www.engadget.com/2013/05/30/darpa-muscle-controlled-prosthetic-limb/>, May 2013.