Cybernetic Augmentation - a Key to Utopia or Dystopia?

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Abstract

Here goes the abstract

I. Introduction

The source of the prosperity that humans have achieved in the last few millennium is the ability to make tools to complement ourselves; we have made tools to adapt the environment more habitable, ensured our food supply, increased our strength and dexterity, widened our knowledge and improved our ability to carry out mental activities. However, after the millennium of progress we are approaching a new dimension of technology; a dimension which some believe will be our salvation while others would easily relate to the legends of Icarus, Pandoras box and Prometheus fire. 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 labeled 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 necessarily 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.).

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 the cybernetic augmentation, its ethics and future 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 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).

As for the cognitive cybernetic augmentation, there are mainly three primary types: 1. improvement of thinking capacity; 2. improvement of sensory capacities; 3. accommodation for a interfacing with the external world. Current innovations have only began to scratch the surface of devices that may lead to the second or third type of enhancements. Most of the devices being researched are not intended for enhancement rather aiding people with existing mental or physical disabilities; however, one need only apply a little imagination to see how the application of these technologies to people without illness or disabilities may lead to enhancements of their functionalities. Examples of this type of cybernetic augmentation are: a computer chip that is implemented in one's brain to increase the user's

memory capacity, or an electronic lens that is augmented to enable the user to see infrared rays.

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. These are: better well-being, higher chances of survival, increased efficiency and productivity, self-defense, and further development of technology. 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) Better well-being of the user
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, or a computer chip that can be implemented in the brain to enhance the memory capability. Such technology of cognitive cybernetic augmentation can lead to the better perception and management of the daily-life information.

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 the cancerous cell, and kill it [2]. 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.

Another view with respect to the well-being is that cybernetic augmentation can positively affect the users not only physically, but also psychologically, as the extra abilities can plausibly help them gain higher self-esteem and confidence. In particular, for those people with the psychological complex about certain parts of their body, or abilities which they feel inferior themselves, the cybernetic augmentation could be used to overcome such complexes and give them more sense of happiness and better well-being.

(2) Higher chances of survival and adaption to the new environment
The enhanced strengths and intelligence gained by the cybernetic augmentation are very likely to increase the chance of the user's survival in the wild nature amongst the beasts of prey or other hazardous creatures as the technology can possibly allow him/her to evolve into a stronger and more protected species. For the similar reason, the chances of survival will become generally higher for the cybernetically enhanced person when encountered disasters or catastrophic accidents. More futuristically, the cybernetic augmentation can exploited to allow the users to live a sustainable life in those places that are currently considered uninhabitable - for example, underwater, or other planets with hazardous environments. Such extension of the habitable territory for the humans can be viewed as beneficial in many ways. One obvious benefit would be the alleviation of the problems caused by the overpopulation.

(3) Increased efficiency and productivity
An enhanced physical capability of the workers by means of cybernetic augmentation is most likely to increase the efficiency and productivity of the work and industry. This would be a good news to the employers, since they can either reduce the labor cost by employing less number of people to do the same job, or increase the profits with the

same number of employees because the they would have enhanced efficiency and productivity, thanks to the cybernetic augmentation. Another economical benefit would be the new creation of jobs; the tasks which are considered as currently impossible or very difficult may become practicable when the workforce with enhanced ability are engaged. Despite such economic benefits, one should however still keep in mind the side-effect that the currently existing jobs may require less people once the qualities of workforces are drastically enhanced through cybernetic augmentation, and therefore can lead to the short-term rise of the unemployment rate.

(4) Self-defense and military application
One may claim that cybernetic augmentation which enhances the physical ability would lead to more security as it can be used as means of self-defense. However, this is indeed subjected to the dispute that it can be used also as a weapon to attack others, which is analogous to the current debate regarding the gun control issue in U.S. Nevertheless, it is hard to deny that the cybernetic augmentation can be used to enhance the level of self-defense of the user, compared to the non-users of cybernetic augmentation.

Such advantage of cybernetic augmentation can be most extensively exploited in the field of military application; the soldiers with high-level cybernetic augmentation can gain enhanced physical combat ability.

(5) Further development of technology
Once the physical 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. For instance, the design of the interfaces of many electronic gadgets or machines can change into a more efficient form (e.g. semi-automated guns that can be attached to the part of an augmented arm, or infrared monitors/screens when the visible frequency of our eyes can be controlled using an advanced electronic lens, etc)

B. Risks of cybernetic augmentation

This bullet-list is made by Seong - These are the risks of physical CA

- Short-term risks that the lack of knowledge and maturity of the technology may harm the bodies and decrease the convenience, as opposed to the original intentions.
- Unknown psychological side-effect
- Increased life expectancy has side effects: over population, increased social-welfare cost, youth unemployment, etc.
- Increased sense of insecurity (Analogous to gun control issue)
- Employment issue (i.e. few people replacing many people's job)
- Military application can be problematic in view of ethics. Can we justify the use of cybernetic augmentation to produce a stronger army? What is the soldiers' point of view, and what is the significance for the humanity?
- Necessity to change many regulations and laws, as well as to create ones
- Inequality issue - The rich is most likely to get an earlier (or even monopolistic) access to such technology and gain an unfair advantage of cybernetic augmentation.
- Human dignity - loss of "humanness"

The following bullet-list is made by Manan - These are the risks of cognitive CA that you wrote in the first draft

- Risk to humanbody, humanity and way of life
- Affordability leading to human segregation and social startification (violation of utilitarian ethics)
- Communicatability between two types of sensory enhanced human
- Need for rethinking of most institutions; e.g. having memory chips would nullify most academic tests we have now.
- Manipulation of memory which maybe argued as fundamental to the fabric of human character formation (violation of virtue ethics; barrier to eudamonia)
- Misuse of this technology; potential harm that humanity can unleash on itself with these enhancements. This may express itself as the following (violation of duty ethics):
  - Mind reading
  - Potential hacking of other human beings
  - Misuse by the government; e.g. with interrogation, monitoring of citizens thoughts, or altering their personality

C. Ethical implications of CA

This is the Ethical implications of CA

III. Recommendations

These are our recommendations

IV. Conclusions

This is the conclusion

References

[1] Pearson Education. *Longman Dictionary of Contemporary English*. 2007.

[2] Alla Katsnelson. Dna robot could kill cancer cells. `http://www.cs.york.ac.uk/hise/cadiz/home.html`, 2012.