Intelligent prosthetics - between transhumanist enhancement and the subversive culture of diversity and acceptance

The most basic goal of a prosthetic is to enable the users of the prosthetic the full functionality of the their bodies, comparable to this available to people without the disadvantage of missing a limb. The optimal success would be if prosthetic limb would be indistinguishable from the biological, both for its users and their closest surroundings. Such goal is ambitious but not impossible. Human hands are engineers saint grail due to the complexity of its construction, strength, flexibility, fineness of its movements and the insane richness of the sensory information it provides. Such a biological miracle is not easy to be replaced.

Following such a goal can lead to a variety of possible developments, among which undesirable and controversial solutions can be found. Among undesirable scenarios, especially from the technological point of view, the goal of making a prosthetic limb, that would be indistinguishable from the biological one, optimally minimizing the disadvantages of prosthetic users, is simply not achieved. Here, the prosthetic arm has, due to insufficient technology, still so many negative sides, that any comparison with the biological hand seem inappropriate. Stiff, inflexible, not reliable enough, cold, not pleasant to touch or be touched by, providing none, or very limited sensory feedback prosthetic is not good enough and even might be dangerous when dealing with soft and fragile materials and living bodies - babies, animals, intimate partners. Moreover malfunctions and breakdowns needs to be taken into account. Such prosthetic significantly lowers the overall life comfort of their users, causes psychological problems, and negatively influence their social lives and intimate interactions. This couples with discriminations prosthetic users face in their private and in their work life. All in all - this reflects much the current situation and assumes that technology, especially material science and engineering, will not be able to solve this problems in the future. The enhancement is insufficient.

Though imaginable is as well quite an oppositional scenario. Here the state of the technology not only enables the intelligent prosthetic users to enjoy their lives fully. It actually makes it possible for them to go beyond the limitations that biological limbs have. Already there are much controversies in the public debate about

prosthetic limbs used by athletes in paralympics. On the one hand specific features of the prosthetics can win their users unfair advantages towards their competitors. On the other hand it raises questions about the financial accessibility of high-tech technology for the paralympics' athletes from developing countries[1]. Moreover intelligent prosthetics, that are stronger, faster and more persistent than the biological limbs are of a great interest for the military industry. Unfortunately it is not surprising that one of the most advanced current projects in the field of the intelligent prosthetics - the research run by John Hopkins University on the mind-controlled bionic arm with a sense of touch, is founded by DARPA - The Defense Advanced Research Projects Agency responsible for the development of emerging technologies for use by the military[2]. These opens up a dystopian imaginative space where intelligent prosthetics are being used as weapons by cyborgian soldiers, terrorists and criminals. The connected ethical questions and issues, however huge, interesting and extremely important, were not the focus of our investigation but we acknowledge that it is necessary that they are the subject of public debate, and need to be addressed by philosophers of technology and ethicists.

Besides the dangerous enhancement of the intelligent prosthetics for the military industry purposes, there are plenty of functionalities of artificial limbs for civilian use, which our group concentrated on. Assuming that the intelligent prosthetic would be supported by an AI based software one could imagine that tasks that the AI is good at at the moment could be implemented onto prosthetics. This could provide plenty of advantages at work and school - spell checking by writing or programming, hints for making music or painting. But the software used for intelligent prosthetics is not where going beyond biological limitations ends. The main thing are of course changes of the design of hardware. After all the prosthetic users do not have to stick to the realistically looking artificial hand. The possibilities that the open source and cost efficient 3D printing technology open up are almost endless. From the futuristic,

---

[1] Nir, Sarah Maslin, 2012, 'Paralympics' Equipment Raises Debate on Fairness', in: The New York Times, 8. September, accessed 23 January 2019, https://www.nytimes.com/2012/09/09/sports/equipment-used-by-disabled-athletes-fuels-debate-on-fairness.html

[2] Revolutionizing Prosthetics, John Hopkins Applied Physics Laboratory, accessed 6 Dezember 2018, https://www.jhuapl.edu/prosthetics/

blinking and shiny robo-hands to shapes that would hardly resemble a biological hand at all anymore. After all, why not to change an arm for a tentacle from time to time? [3]

One of the problems, that needs to be addressed when the advanced technology of intelligent prosthetics is widely available for creative, individual design are the cultural and social norms of a body image. Taken from current perspective, the norms and standards for bodies in western societies, are the main cause of psychological suffering of people not conforming the norms, like those missing one or more of their limbs. The body in the western culture is supposed to be fit, young, healthy, slim and of course abled. Not meeting these standards can cause serious identity problems. Here, the role of the prosthetic is to minimize the gap between the actual self, and the ideal self defined by the culture and inevitably desired by the individual, thus minimizing the psychological suffering of the disabled. The most optimum design in this case is a naturally looking prosthetic limb, that is indistinguishable from the biological one. Its basic function is the compensation.

However in the neoliberal culture of advanced technoscience, celebrating progress, efficiency and optimization it is only logical that the possibility of going beyond biological limits of our bodies, eventually changes into a oppressive norm of having to do so. How the advanced technology allies with the neoliberal values for the always better, fitter and healthier bodies and always more efficient and more skilled selves can be clearly observable in the case of the flourishing business of AI based applications for tracking and improving our health, sleep, fitness, diet, skills, hard and soft competencies and skills etc. It seems unavoidable that the technology, that is to be psychically incorporated in our cyborgian man-machine bodies - like intelligent prosthetics - would also follow this path. The compensatory role of the prosthetic would not change much. What would change is the cultural and social ideal for the body and self, as the individuals would have to meet always higher system expectation towards them. Such development is likely to cause a great wave of psychological problems, not only for the prosthetic users defined by current

[3] Beyond bionics: how the future of prosthetics is redefining humanity, in: The Guardian YouTube Channel, accessed on 23 January 2019, https://www.youtube.com/watch?v=GgTwa3CPrIE

standards. After all the intelligent prosthetic could offer a wide range of advantages and possibilities for designing own look and shape, inaccessible for non-users.

Technologically supported cyborgian bodies in the service of neoliberal transhumanist enhancement. Regardless of how alarming this may sound, technophobia does not seem to be the right answer either. In this context it is hard not to think about Donna Haraway's subversive take on technoscience, which she elaborates in her, already almost thirty years old essay, 'A Cyborg Manifesto'. She acknowledges a very important thing - advanced technoscience deeply changes the traditional order of things in western societies in many ways and in most cases there is no turning back. The inherent and formative for our culture dichotomies like culture and nature, man and machine, man and animal are getting dissolved by biotechnology and cybernetics. The reality is a hybrid of all the sides of the traditionally oppositional elements at the same time and it seems that we are damned for relativism and authoritarian neoliberal technological determinism. Haraway explores the metaphor of cyborg to offer an alternative path[4]. The cyborg is simultaneously man and maschine, female and male, artificial and natural. At the same time it is neither of these. One can not use traditional categories to describe it. New language and new definitions are needed. In this way the figure of cyborg opens up an imaginative space for future changes. These are possible exactly because of the dangerous technoscientific reconfigurations. In the society of cyborgs one cannot use naturalizing, and, too often oppressive categories like the biological nature of human, sex, race or even class. Unintentionally, the advanced technoscience creates a space for subverting oppressive power relations. Embracing these dangerous possibilities rather than reacting with technophobia is therefore, according to Haraway, the necessary and the only ethical position. This pragmatic and ethical approach seems to be as convincing today, as it was already thirty years ago.

It is not easy to find a balance or a clear border between neoliberal enhancement cheering the optimization, progres, efficiency and individualization and positions that could lead, intentionally or not, to subverting the given, discriminative

[4] Haraway, Donna J, A Cyborg Manifesto: Science, Technology and Socialist-Feminism in the Late Twentieth Century, in: Simians, Cyborgs, and Women. The Reinvention of Nature, Free Association Books, London 1991, p. 127-149

narrations and power relations. In the case of intelligent prosthetics the technology could be used to diversify the body norms. When all bodies are technologically possible, with prosthetics coming in all colours and shapes, no bodies are to be taken as natural anymore. With the bodily norms changing like that, maybe it would be even possible for a person lacking the biological limb to not replace it with an artificial one? To be a normal one-hand part of society?

What we now need the most are spaces for experiencing and debating the future technological developments. Rolf Pfeifer, the famous swiss roboticist, who is concerned about the gap between the academia and the public, and sees the need for engaging the public into the debate about our future lives with robots before the research ideas get implemented into the market, conceptualized a project called Robolounge[5]. Robolounges - cafes and bars where the robots rather than human would take care of the clients, are supposed to be spaces for naturally-felt (thus they are placed in a real-world public environment) intimate interaction with future technology for wide and diverse groups of society. Spaces for testing and expressing concerns about the solutions given by academia and industry at early stages, long before they would or would not be widely implemented.

Creating and promoting more innovative spaces like Rolf Pfeifer's Robolounges for civilian and collective directing and redirecting future technology seems to be a reasonable way to go. Extending them for presentation of cyborgian solutions for people with disabilities, would not only provide a forum for debates about future. It could help to rise the acceptance and understanding towards prosthetic users and to strengthen the diversity narration around the topic. For subverted and better future for everyone.

[5] Pfeifer, Rolf, Living with Robots, Conference Abstract, accessed 23 January 2019 https://www.swissnexchina.org/en/event/living-with-robots-the-next-generation-of-intelligent-machines/