

LUISS GUIDO CARLI
DEPARTMENT OF POLITICAL SCIENCE –
CHAIR: Roberto D'Alimonte

TOO HUMAN?
ON HUMAN BIOLOGY, TECHNOLOGY AND SOCIETY

SUPERVISOR
Prof. Marcello Di Paola

CANDIDATE
Jan Reineke [074362]

ACADEMIC YEAR
2015 – 2016

Abstract

We seem to be living in a golden age for humanity. Economic growth is at unprecedented levels, as is the well-being of people on the planet. There is now over 7 billion of us on this planet, more than anyone could have imagined only fifty years ago. Humans have harnessed the power of nature, the very power of the planet, and are reshaping their environment to suit their needs and desires. Cities stand in the middle of deserts, or rise on artificial islands in the sea. The course of rivers is changed, their flow used to produce energy. Where once was wilderness, urban environments now sprawl. Truly, humanity has dominated nature and placed itself on the very top of our planet's causal chain. Most, if not all, natural events occurring on the Earth are, as of today, at least partly caused by our own actions.

And at a closer look, not all of them are positive. Climate change? Our fault. Acidification of oceans? Our fault. Drying up of rivers and lakes? Our fault. Desertification and land erosion? Our fault. At a closer look, the idea of a “golden age” is revealed as a worldwide, collective delusion. Humanity, in its resource-hungry push for expansion, is indeed dominating nature, but is still not mastering it. Sooner or later we will have to face the consequences of our actions. If we do so soon enough, we might survive. Otherwise we will face extinction.

At this point we must ask ourselves a fundamental question. Why don't we just change? Most of the environmental and social problems we face today are not new to us, they have been around for at least a couple of years. From a purely biological point of view, no species actively seeks the destruction of its environment. Yet we are doing this very thing. We are destroying the very natural environment that allows us to live. In this paper I argue that the chronic inability of mankind to effectively tackle environmental and development issues stems from the very being of humanity itself. We evolved in a way that just doesn't allow us to solve these issues efficiently. Yet modernity has brought about a unique possibility, to outgrow the process of evolution and topple the “tyranny of nature” as we proceed to be our own masters. In short, to control and direct human evolution in ways that make human existence sustainable.

- **Why We Need Enhancement – And Control**

Humanity has inhabited this planet, through its various evolutionary steps, for about 200,000 years. This is a relatively short time when compared to the age of our planet. And yet, in such a short time, we have managed to accomplish great things. Humans are the only species that can live everywhere. We call lush, temperate forests as much our home as dry deserts and freezing glaciers. From their place of origin in what is today western Africa, we have spread throughout the whole world.

And not only have we spread, we have also changed – ourselves, and the lands we settled in. Humans have always had the desire – and the power – to change the world around themselves. From building rivers and dams to cross and contain rivers, to chopping down more and more trees every year to make space for further expansion of human settlements. From the first farms, thousands of years ago, to the advanced techniques used nowadays to gain more and more land from the sea, or from the desert. If there's one thing humans have always been doing, it's changing the world to fit our own needs.

Then, why is there so much talk about humans and their influence on the world, today. Cutting trees, changing the course of rivers, farming – haven't we been doing this for hundreds, thousands of years? The answer is yes, but today we face many challenges that were once unheard of, even unthinkable.

Enter the Anthropocene. What exactly is it, and why does it matter? The Anthropocene is a concept which exists since the 1960, but has been widely popularized by Eugene Stoermer and Paul Crutzen in the 1980s. It refers to the (proposed) epoch in which humans and human activities have a significant global impact on Earth's geology and ecosystems. In short, what humans have been doing for hundreds of years has now reached such far-reaching effects that these effects are global, extreme, and, maybe, irreversible.

Here are some examples. Earth is facing what is sometimes called its "sixth major extinction" or "Holocene extinction". Human activities have increased, and are still increasing, the rate of species extinction worldwide. Biomass of marine algae has decreased by almost 40% in recent years, and the rate is only accelerating. Macrofauna has gone extinct on every continent reached by humans, and just shortly after humans reached them. In many regions, especially isolated ones, the arrival of human settlers has coincided with a large extinction of native species in a few hundred years. Other extinct animals include, but are not limited to, Quaggas, two families of tigers, passenger pigeons, and others. Currently, bats in America are dying by massive numbers (in some colonies, 90% in about five years) since the introduction of European

bats and a fungal infection which they carry and to which their American counterparts are not immune. More importantly, global climate change, ocean acidity and warming, and other environmental effects attributed to humans are the biggest factors of the death of hundreds of species of plants and animals worldwide.

Now, while biodiversity is surely a good thing to have, it is not necessarily a value per se, and one could argue whether it is really important how many species die and how fast. However, such considerations aside, there is still the point of ecosystems. Humanity has shown the fatal flaw of thinking of itself as external to many natural processes, but we are not. As much as we'd like to ignore this, when we compromise ecosystems we ultimately compromise our own survival and future.

What can we do about this? Surely, if humans can have such far-reaching effects on their environment, they should also be able to correct or at least diminish them. Technology has brought us a long way, after all, and it's not unreasonable to think of technologies that could help us preserve not only biodiversity – but our planet itself, and thus our future. In fact, the technology is already there, or almost. Some of it is being researched, some of it is available. The fundamental problem, however, is not the possibility. It is the willingness. Humans are not willing to go to great lengths to protect the environment – no matter what they say. It's as much a cognitive problem as it is an ethical one – and a biological and evolutionary one, as well.

It is a cognitive and biological problem because humans are not made to think on a global scale. Our minds, the connections in our brain, are simply not adequate to think of these problems, they are much more focused on immediate, nearby threats – while global problems in the Anthropocene are far-reaching, often happening far away, and they take place over such a long time period that effectively tackling them is an enormous effort.

But it must be done, for the rate of man-made changes to the environment is only increasing and may well be irreversible soon. Humanity stands at a crossroad, and the choice is ours: to either change ourselves, or to keep on doing the way we have been doing things in the past, and slowly watch our planet go to waste – and our future with it. The problem is: How can we efficiently solve problems that seem so foreign to us?

The answer may sound both easier and more alien than thought – through practices of human enhancement, more precisely, through targeted enhancements and modifications that change the human being in such a way as to make it more environmentally sustainable.

- **Enhancing What, Whom, and How? Enhancement Explained**

Human enhancement may sound like something more suited to science-fiction literature rather than serious academic debate. In fact, authors of the genre have anticipated many of the technologies that are available today, or may be available soon. We might be catching up to the technological utopias (or dystopias, as we will see) of science-fiction.

In the best laboratories around the world, the technological revolution of enhancement is already happening. And in many, formerly unthinkable ways. Designer bodies and designer minds, everything can be improved and enhanced, either in the future or even right now. Let's have look at a few examples.

2.1) Designer Bodies

A large number of hormones exist that can increase human efficiency, strength, and endurance. The most well-known, and abused, is EPO (Erythropoietin). EPO regulates the concentration of red blood cells in the blood and, thus, the flow of oxygen through the body, and EPO injections are commonly used by patients suffering from anaemia or certain forms of cancer, as they suffer from reduced red blood cell counts. However, EPO is also used, illegally, by athletes looking to bolster their performances – regular EPO injections in healthy individuals can improve endurance and strength by up to 10%. And that is exactly the problem – regular. In order to be effective, EPO shots have to be taken three times a week.

Now, imagine gene therapy. By splicing EPO-producing genes directly into the human genome, the body learns to produce more of the hormone on its own. This is done by inserting the “instructions” for the EPO gene into a virus. Viruses are perfect vessels for gene splicing, as that's what they do by default: Enter human cells and insert their own genes into them.

In an experiment conducted by Jeffrey Leiden at the University of Chicago, groups of mice and monkeys were injected with viruses containing extra copies of the EPO gene. And their red blood cell production soared. The mice went from 49 to 81% haematocrit (the percentage of blood that is red blood cells) and the monkeys went from 40 to 70%. More importantly, however, was how long their haematocrit stayed above average – respectively for a year in the mice, and for twelve weeks in the monkeys.

The possibilities do not stop at this. EPO injections can be used to increase human (and animal) stamina, strength, and resistance. Another, similar study by Jeffrey Rothstein et al. from John Hopkins University in 2003 studied the effects of IGF-1

(Insulin-like growth factor) on ALS patients. ALS, which stands for Amyotrophic Lateral Sclerosis, is a neuropathy which causes the gradual degradation of nerve tissue that moves the muscles. Eventually, ALS patients will be unable to move – trapped in their own body, fully sentient, but unable to do anything. There is no known cure for ALS – at least, there wasn't.

IGF-1 is a compound found in our bodies that promotes, among others, muscle growth and repair. Normally, ALS progresses too quickly for IGF shots to be truly effective, and they only slow down the progression of the disease. However, Rothstein studied the effects of insertional gene vectors for IGF-1 in ALS – that means, splicing the gene for IGF production directly into the genome. Lab mice were injected with the gene as soon as they started showing the first symptoms of ALS.

The effects were astounding. Not only did the disease not advance – the mice actually showed muscle growth, and the nerve cells repaired themselves. Injection of IGF-1 genes into healthy mice, furthermore, increased their muscle mass as well, as well as preventing muscle degradation: IGF-1 receiving mice with no training gained as much strength as regular mice subjected to strength training (climbing cages with heavy weights attached). They even retained their increased strength for longer than the other mice. Rothstein is now looking for possibilities for human trials with injection of IGF-1 genes.

This shows an interesting trend. Enhancement stems, more often than not, from medicine. The distinction between “cure” and “enhancement” is constantly blurred. This is interesting, as it shows that enhancement is not a theoretical thing. It stems, instead, from real, existing problems, the solutions to which promise to enhance our own bodies – and our minds, as we shall see now.

2.2) Designer Minds

Not only our bodies can be enhanced, but also our minds, to create smarter humans, able to better process information and efficiently tackle the complex problems we face today – and this is where the focus is. This is what really matters, and what could really change things: The possibility of changing and enhancing human thought.

One out of ten people aged 65 or older suffers from Alzheimer's Disease, an illness that causes the rapid shrivelling up and eventual death of neurons in the brain – especially of the axons, the long “tails” used for communication between neurons. Worldwide, over 12 billion people suffer from Alzheimer's. So it's no wonder that pharmaceutical companies are looking for a cure.

Gene therapy seems to be one of the more promising approaches. In a series of

studies, Mark Tuszinsky and his colleagues from the University of California in San Diego found that the growth and repair of nerve cells in mice was controlled by a gene for NGF, or Nerve Growth Factor. As one of the first ever human trials in gene therapy, his team implanted genetically modified neurons into the brain of a 60-year-old woman suffering from Alzheimer's. The neurons had extra copies of the NGF gene, and thus produced more NGF. After following the patient for several years, Tuszinsky and colleagues found that while the therapy didn't cure the disease, it halted its progression significantly.

And again, a cure turned out to be a potential enhancement. In subsequent studies by Howard Federoff at the University of Rochester, it was shown that NGF could do way more than halt Alzheimer's disease. In fact, it could speed up nerve cell growth – and thus, learning and memory. In a series of tests performed on mice, those that had extra copies of the NGF gene learned new things roughly four to five times faster than normal mice. Not only that, but they also unlearned things faster than normal mice, which is another unforeseen and important achievement.

Researches think that NGF, which has already entered human trials as a cure against Alzheimer's, could soon be approved by the FDA (Food and Drug Administration) as a cure against AAMI, age associated memory impairment – in short, the degrading of memory and brain functions in older individuals, which is already classified as a disease in the US. From there, it is only a short step towards gene therapy even for healthy individuals that wish to boost their mental skills.

2.3) Designed Sustainability?

We have now seen some of the more promising examples of human enhancement, and what enhancement is really about. But enhancement is not an achievement in itself. What some fail to realize is that enhancement itself is not a goal. It is the means to an end, and this end is a better, more sustainable and equal society. There is in fact no point in creating smarter, more resistant, or generally better humans only for the sake of creating them, but instead every enhancement should have a purpose – the furthering of human evolution and the improvement of human existence on the planet.

Right now, as we have seen in the introduction, humans are facing a plethora of environmental and social problems, many if not all of them directly caused by humans themselves. And as we have seen, many of these problems are so alien and out of scope for our human perception that we cannot, at this stage, hope to effectively tackle them. A simple question comes to mind: If we cannot do so at this stage, why not try to reach the “next stage”?

Human enhancement opens up possibilities for sustainability that were previously impossible. A great deal of these may seem alien or even intrusive into our private lives. But as I will argue at a later point, the “paternalism issue” is not really an issue. After all, who would not exchange a few minor personal freedoms (and often unhealthy ones, at that!) for the promise of a future for mankind.

Some of the first, and surely of the most interesting, suggested “sustainability” enhancements were laid out in a now famous paper by Matthew Liao, titled “Human Engineering and Climate Change”. The main argument of the paper is that humans can engineer themselves (and engineering is slightly different from enhancement) to solve some of the problems we have already laid out. More specifically, it focuses on the possibility of biomedical modifications to make humans more sensitive about, and resistant to, climate change.

Liao goes so far as to suggest making every person a vegetarian “by force.” Through pharmacological meat intolerance, roughly 18% of worldwide greenhouse gases emissions could be cut, as they are, in one way or another, tied to the production of meat. He clearly states that “even a minor (21-24%) reduction of red meat consumption would achieve the same reduction in emissions as the total localization of food production, i.e., having zero ‘food miles’”.

Another possibility in which human engineering could help us fight climate change is by reducing birth rates. It is no mystery that humanity is slowly but steadily outgrowing, in the literal sense, the carrying capacity of its environment. More people means more resources, more space, more food, more water, more everything, while Earth's resources are mostly finite. So how can we act on that? In a very human, and smart, way, Liao proposes cognitive enhancement for birth control. Birth-rates are negatively correlated with access to higher education for women. But not only. It's not just the access to education that lowers birth rates, but also the general cognitive ability score. In short, the smarter a woman is, the less likely she is to get pregnant, especially at a young age. Cognitive enhancement would have the double positive effect of both creating a smarter population and lowering birth rates, especially in modernized, high-income countries which also contribute more to climate change.

But all the examples that Liao gives (except maybe for the cognitive enhancement) are examples of human engineering, not enhancement, and there exists a slight difference between the two. Engineering humans is aimed at changing humanity as-is. If there's a problem, biomedical engineers identify and act on it. An example is the pharmacological intolerance to meat. It does not fundamentally improve humans; it is merely the solution to a problem. Human enhancement is different in that it is aimed at improving the person itself as well as humanity as a whole. Its aim is not to change humans, but to make them better – in a sort of cascading effect in which better humans create better enhancements that in turn create even better humans. Thus, human enhancement promises even greater results without directly aiming at them.

Simply making humans “better” can already solve a large number of issues we are facing.

Smarter, more ethical humans, enhanced to have greater brain capacity and empathy, think about and solve problems of climate change and sustainability not because they are engineered to do so, but because they realize the importance of it. Human enhancement allows us to get rid of the paternalism issue of human engineering.

In a book titled “Radical Evolution” American journalist and author Joel Garreau explains of human enhancement is potentially pushing us towards a trans-human and post-human future. Thanks to so-called GRIN technologies (genetics, robotics, information technology, nanotechnology) humans are increasingly able to shape their own bodies and minds – and thus their very existence. Garreau also makes some hypothetical predictions about the future, some of which admittedly grim. They range from the destruction of life on Earth to the annihilation of the entire universe. But while these options exist, they are highly unlikely. What is more likely, instead, is the creation of a post-human, post-scarcity and sustainable society. GRIN technologies are more or less direct counters to many sustainability problems we face today. Genetics can make us resistant to climate change, but also more receptive to, and able to better understand, the impact we, as a species, have on the planet. Robotics may free us from the reliance on exploitation of cheap labor and cheap resources, which makes the poorer parts of the world, and ultimately everyone, worse off. Better information technology speeds up and simplifies other processes. Nanotechnology, last but not least, in another thing entirely. The availability of technology which is able to modify matter at a molecular level promises possibilities never seen before, in both human enhancement and other sectors (medicine, construction, industry).

All of these factors combined can lead to a dramatic change in human society, in human existence in itself, and allow us to truly become masters of ourselves. The environmental problems we face in the 21st century are ultimately caused by humans, but rarely understood, and never to their full extent. While we live in the Anthropocene, despite what geologists may say, we have no control over it. In the end, human enhancement will allow us to become masters of ourselves.

- **Bioconservatists and Transhumanists: Three arguments and confutations**

Like every ground-breaking discovery that promises to fundamentally change the lives of humans, human enhancement, too, is a complex and multifaceted topic with as many (if not more) detractors as supporters.

It is easy to see why that is the case. Enhancement technologies are something so new and so alien that people can hardly understand or foresee just how much they could change us, as since it is man itself we are talking about, enhancement technologies also awake our darkest fears about what it means to be human. American author Francis Fukuyama has famously defined human enhancement as “the most dangerous ideology of the 21st century”, and as we shall see, many other scholars do not think very differently. From President’s Councils to scholars to politicians – the attacks on human enhancement come from many different sides.

It would be impossible, and probably pointless, to argue against every single one of these points. However, most of the doubts about human enhancement can be roughly classified into three separate categories: Doubts about what it means to be human, doubts about the safety of enhancement technologies, and doubts about whether it is right or not to enhance humans. We shall call these, respectively, taxonomical, practical, and ethical doubts, and I will give brief examples of every one of these and argue against them.

3.1) Taxonomy

The taxonomical problem, so to speak, is that according to some, enhanced or otherwise "different" humans are not, in fact, human at all. This view opens up a whole range of problematic topics to discuss, ranging from human rights to biology to ethics. In the end, we are forced to ask ourselves: what makes us human?

In the views of human rights lawyer George Annas and his collaborators, Lori Andrews and Rosario Isasi, what makes us human is ultimately the fact that we are part of the same species. One of the greatest achievements of mankind is, according to him, the Universal Declaration of Human Rights.

"Membership in the human species is central to the meaning and enforcement of human rights, and respect for basic human rights is essential for the survival of the human species."

Thus, being a member of the human species is essentially a taxonomical definition. If you are a human, you enjoy human rights. If you are not, you don't. This is questionable at best, even without looking at the topic of human enhancement. When we turn to that, though, Annas states, in an even more radical way, that

"In fact, cloning and inheritable genetic alterations can be seen as crimes against humanity of a

unique sort: They are techniques that can alter the essence of humanity itself [...] by taking human evolution into our own hands and directing it towards the development of a new species, [...]"

Annas words are harsh, and followed by an even harsher proposal for a "UN Convention on the Preservation of the Human Species." Annas is, in fact, afraid of two things about human gene alteration.

The first is that such alterations might change mankind so much as to not be human anymore, and thus lead to a loss of human rights. This is a view advocated by many left-wing, environmentalist opponents of human enhancement. Rather than insisting on ethical or religious boundaries we should not cross, these scholars think that human enhancement brings with it dangers to ourselves and our fundamental rights. Such a view is questionable at best. Again, such a view defines humans as such only through taxonomical means - which was a very mainstream line of thought in the 40s maybe, but has ultimately been proven wrong. Any classification of "human" and potential "non-human" or "post-human" is quite simply impossible, because such a classification would affix a moral status to a single creature. In such a view, taxonomical definition determines moral status. Even more so, what taxonomy, what "definition" of human should be chosen? Humans have evolved over countless millennia, and it is arbitrary at best to choose humans of the 21st century to be the standard from which we should not deviate. And which of these standards, then? New insights from medicine and biology show that human cells interact continuously and in complex fashion with a large number of other cells: natural symbionts such as bacteria, foreign DNA in our own bodies, and others. The very definition of what a biological human is is unclear, and as such unfit to serve as a basis for the enjoyment or not of fundamental human rights.

The second thing Annas is afraid of is, strangely, the opposite of the first: That enhanced humans might turn into oppressors and make everyone who is not enhanced, not "posthuman", a second-class human. Such an argument plays on the left-wing, environmentalist fears of humans interfering with nature, and of the introduction of geo-destabilizing species at the hands of humans themselves. This view, too, is arbitrary. In saying this, Annas implicitly suggests, and later explicitly states, that mankind should "protect" its current DNA, and that the human genome is some sort of "common heritage" of mankind. This view falls prey to the exact same flaws as the first. Annas take a very small sample of humans, those living at this moment of our evolutionary stage, and raise them to some sort of "universal standard" we should strive to maintain. Species "altar-ing" against species altering. It is easy to see that these views ultimately lead to nothing.

Another argument against taxonomical definitions of mankind - and of lending

moral status to taxonomical definitions - comes from our recent history. I made a reference to the 1940s earlier. There have always been attempts at affixing moral status to biological differences. Mixed-race public and sport events, even marriages have been a rare sight for the bigger part of the 20th century. In the same way, only recently has feminism challenged traditional gender roles, and (mostly) equal roles in society been established for men and women. As history has shown, such moral classifications based in biology are more often than not arbitrary and wrong.

3.2) Practice

The second set of common doubts about human enhancement is a much more practical one than the others. It is all about the practice itself, and mostly, whether enhancement technologies and practices are safe, or if they carry risks - and when they do, which ones? And do these risks outweigh the benefits?

But another point has to be considered, too. One which is more up to engineers and biologists to work on, but open to discuss nonetheless. It is the problem of practice: How and how much do we want to enhance humans? How many humans, and to what extent? In short, this paragraph will also deal with all the practical challenges that technology faces while working towards the direction of human enhancement. Any philosophical and political discussion about this topic is necessarily incomplete, but I believe that it might nonetheless be the most fruitful debate of all, because it puts up our hopes and fears against the realm of the realistically feasible.

The whole arguments will heavily lean on a paper by famous scholar and enhancement-advocate Nick Bostrom, titled "The Wisdom of Nature: An Evolutionary Heuristic of Human Enhancement" written together with Anders Sandberg.

There exists, or seems to exist, a thing we could call a "wisdom of nature", which is the belief that nature, and nature alone, understands itself well enough to modify itself. Every being on this planet is terribly complex - and humans more so than any other being. When we try to change, engineer, or enhance such a complex organism, we might easily commit errors, some of them small, others huge. Enhancement might actually backfire and create a negative effect. Until now, this concept of "wisdom of nature" has been used, both implicitly and explicitly, by many of those that are against the practice of human enhancement, from religious leaders and their fear of humans "playing god" to conservative politicians and their insistence on "human limits and boundaries" and even, as we have seen, left-wing progressivists and environmentalists who fear that altering humans might have negative effects on the environment, or on mankind itself. Now that enhancement is more real, more possible than ever before,

those that argue for it are arguably those that have to come to terms with this concept more than their detractors. After all, it falls to those that are in favour of enhancement to prove that there is nothing wrong or dangerous about it.

Bostrom and Sandsberg introduce some sort of test to see whether a potential enhancement would be beneficial or feasible, called the evolutionary optimality challenge (EOC). In their own words,

"Suppose that we liken evolution to a surpassingly great engineer [...]. Using this metaphor, the EOC can be expressed as the question 'How could we realistically hope in improving on evolution?'"

In short, a "challenge" or "filter" potential enhancement technologies have to pass in order to be deemed acceptable or not.

The EOC is a surprisingly easy and yet reliable method of controlling enhancement, and far more effective, and unbiased, than questions and doubts coming from detractors of human enhancement. It gives nature back its rightful position as wise and great engineer while still allowing for, and even actively encouraging, the study on enhancement. One could argue, for example, one of the most common arguments against human enhancement, that it bears risks that might outweigh the potential gains. One such example we have already seen: Increasing mental capacity and memory. However this also brings a series of risks and problems. The human brain is incredibly complex and still not fully understood. Neuroscience has just begun to uncover the secrets of our minds, while evolution has shaped them for millennia. How could we possibly hope to do a better job, and even if, how exactly should we do it?

Others could call the very concept of such a filter a dangerous hybris, an unsafe attempt of becoming more than we are meant to be. After all, if nature is such a great engineer, not all of its creations can possibly be fully understood. The very thought of thinking about modifying human nature, they could argue, is dangerous.

But in the end, human nature will evolve based on our actions, no matter our intentions. It is already happening, and has already happened. Never before has human nature, and the human brain, changed so drastically as in the past century, and the rate of change is only accelerating. In my opinion, taking a stand is necessary. By arguing for, and thus promoting, human enhancement technologies we will actually be able to shape this change, rather than being shaped by it.

Arguably, modern technology brings many tools for enhancement to the table. At the same time, new insights are made every day in the fields of biology, genetics, medicine, and neuroscience. This is an ongoing debate that will probably be discussed in the years to come. In the meantime, however, we must not forbid human enhancement. The future is uncertain, but human enhancement is the most promising

way to go to solve the problems that we will face. Whether it is feasible and risk-free, both for individuals and societies, however, is, at the current date, not certain.

3.3) Ethics

The ethics problem is a fundamental one whenever it comes to profound changes in society. Philosophers have asked themselves at all times whether what is happening to their societies is right or wrong, and what impacts such changes would have on humans and human nature. Now that it is the very fundamental nature of mankind that is being questioned, this approach seems more important than ever. Both supporters and detractors of enhancement technology come from the fields of philosophy and politics, and many of them ask the same question: Whether it is feasible or not, is it right to change what we are? How much, and how exactly? It is not a taxonomical problems, as for Annas and his colleagues. It is a more overarching issue about what it ultimately means to be a human being - and whether we should change this, or not, and who should be in charge of this change.

One of the most prominent scholars who argue against human enhancement on the basis that it fundamentally alters, and negatively impacts, the core notion of humans is Francis Fukuyama, who, in the September/October issue of *Foreign Policy* (2004), called transhumanism the “most dangerous idea to the welfare of humanity”. Fukuyama went so far (too far?) as to say that “transhumanists are just about the last group I'd like to see live forever”. He believes that the very notion of people using technology to become smarter, or to live longer and healthier, is fundamentally wrong, even abhorrent.

In his words, there is a common feature of humanity, and that

“underlying this idea of the equality [...] is the belief that we all possess a human essence that dwarfs manifest differences in skin color, beauty, and even intelligence [...] but modifying that essence is the core of the transhumanist project.”

Many other scholars and policy advisors have given, in time, similar explanations for the inherent “evil” of human enhancement. Many of those came from the conservative right, and some of them, including Leon Kass, Elizabeth Blackburn and Fukuyama himself, have been part of the much-discussed President's Council on Bioethics. Again, we see how the Council was more of a political than a scientific platform.

And again, after careful consideration, it is fairly easy to understand and reply to the words of Fukuyama. The following confutation, partly based on a similar one by Nick Bostrom, shows how faulty Fukuyama's assumptions really are. His argument focuses

on three main points: There is a unique human “essence”. Only individuals who possess this essence can have intrinsic value. And, finally, human enhancements would change humans by eliminating this essence.

At first, this seems similar to the taxonomy problem of George Annas. Fukuyama is not, however, talking about a certain human genome or about preserving one evolutionary stage of mankind because “nature wants it”, but rather with the intrinsic nature of humanity. The confutation, however, is similar. Consider the following example: After a disastrous shipwreck, a group of survivors find themselves on a previously undiscovered island in the Pacific. Here, they stumble across a previously unheard of, sentient lifeform. These island people are not human, but they are capable of speech and complex thought, have a highly evolved society and culture, language, and moral agency. Would we consider these islanders to be inferior just because they are not human. In short, does the lack of human “essence” deny them moral status? In Fukuyama's words, yes, it would.

Supporters of Fukuyama's views could reply that no, it doesn't. That this island population misses this particular “spark” or essence, but because they are not humans, they are not to be considered in this debate. If this essence is exclusive to humans, and humans only, however, not to undiscovered lifeforms or even aliens, than we are back at the taxonomical problem: The moral status comes not from such a mysterious “essence” but rather from being biologically human – and we have already discussed that argument thoroughly.

Similarly, if a person would alter her own body, mind, or both in order to enhance herself, would that deprive that particular person from their human status? The nonsense of Fukuyama's words is apparent here, as is that of the other scholars that insist on this. A similar opinion comes from Leon Kass. While welcoming biotechnology for its therapeutic uses, he draws a strict line between this and the use of “enhancing” technologies, just as the Bioethics council, of which he was part, did. In the foreword to *Beyond Therapy: Biotechnology and the Pursuit of Happiness*, Kass worries mostly that enhancement technologies might substitute for human virtues such as hard work, study, or love, and ultimately rob us of our humanity by making things “too easy”.

There is an old expression: to a man armed with a hammer, everything looks like a nail. To a society armed with biotechnology, the activities of human life may seem more amenable to improvement than they really are. Or we may imagine ourselves wiser than we really are. Or we may get more easily what we asked for only to realize it is much less than what we really wanted.

And again:

We close the inquiry with a lingering sense that tremendous new biotechnical powers may blind us to the larger meaning of our own American ideals and may narrow our sense of what it is, after all, to

live, to be free, and to pursue happiness.

In Kass words there is some sort of appreciation for the harder things in life. Granted, some people (and not even all of them) might prefer to work hard for their goals rather than obtaining them easily. But this is a personal decision which is valid only in respect to personal achievements. Where the health and welfare of the public is important, it is childish to insist that “the easiest way is too easy”. Kass' personal conservative, somewhat sado-masochistic view that people have to work hard, sweat, fail and try again in order to accomplish their goals find no place in an analysis about the welfare of entire populations. Again he fails to realize that it is not some mysterious “essence” (in this case, the will to fight in order to reach one's goals) that makes us human. Rather, we are human by definition, and if something defines us as such, it is our diversity and freedom to choose. For or against the view of Fukuyama, Kass, and others.

Finally, even if all these arguments held value, there is a final thing to consider. Those scholars speak of something, an essence of sorts, that makes us human – yet they always fail to clearly define it. Surely human enhancement bears the burden of proof when it comes to whether an enhancement is truly good or not. But those arguing against it bear the burden of proving their own views in order to form coherent arguments. Both Kass and Fukuyama fail in this regard. Both insist that there is something that makes us human, which would be altered or destroyed by enhancements. However, despite great efforts, they fail to identify just what this “something” is.

- **The Great Debate: The Issue of Paternalism**

After having discussed the various pros and cons of human enhancement, and how and why people try and argue against it, we are not yet ready for the final words. Instead, we ought to look at one last, but very important issue. Enhancement technologies and augmentations promise to radically change what we are, who we are, and the way we live. We already argued that the process is much less scary and much more useful than many might think. However, a final question remains, and it is a difficult one to answer.

With the changes brought by enhancement potentially changing entire societies – and populations – for generations to come, we must ask ourselves whether we have the right, today, to decide on the fate of future generations as well as of those that are not in the position to make these choices. In short, as human enhancement promises to fundamentally change the way we live, we must stop and ask: How much are we allowed to change someone else's life?

This paternalism issue is an old one, maybe as old as politics itself. However its importance when discussing such far-reaching changes as those brought by enhancement might be greater than every other issue. Enhancement does not only mean to enhance our bodies and minds, but also those of our children, either by intervening directly on them, possibly before they are born, or by acquiring genetic enhancements that are then passed down through generations.

What exactly is paternalism, anyway? Paternalism is the political and social doctrine that says that to intervene in peoples personal lives is good when said intervention aims to maximise social welfare. Even if this means interfering with a person's personal freedom, and even if said person thinks they are doing something good. In short, paternalism suggests that “the state knows best”, and that many, if not all, of the problems we face today could easily be overcome if everyone would be guided (and sometimes forced) to do the right thing.

Admittedly, it does sound rather harsh. How is something that is supposed to free us from the shackles of the supreme paternalism, that of nature, compatible with political and social paternalism?

Human enhancement brings with it the real possibility of paternalism, that is to say, it brings the real possibility of influencing and constraining future generations, possibly against their own will. How can these two, contradicting aspects be combined into a single whole, into a coherent, effective policy for a brighter future?

First of all, we ought to look at the two different types of paternalism. There is one, the hard paternalism, that evokes unpleasant memories of totalitarian regimes of

the past, if only vaguely. And then there is the so-called soft approach to paternalism, which we shall discuss in more detail. My analysis of both of these will lean heavily on the book “Against Autonomy” by Sarah Conly, while also incorporating insights from others sources. Finally, we will look at, and anticipate, possible issues of paternalism and look at what it means to be paternalistic in regards to human enhancement.

4.1) Hard Paternalism

The so-called hard paternalism approach is based on a simple, hard fact: People are way less informed than they think they are. They make errors all the time because of miscalculations, biased choices, or simply ignorance, and they make them all the time. In the past few years, Conly states, social psychologists and behavioural economists such as Tversky and Kahneman have (as in “Prospect Theory: An Analysis of Decisions under Risk”) studied, interviewed, and simply observed many experts in the fields of politics and economics, and they have come to a conclusion: Failures to reason well are pervasive and numerous.

We tend to think that we are rational and informed all the time. Of course there are people who are not, but we tend to see them more as outliers than the norm. This is not true, however. People are unduly influenced by a the presentation of options (people are more likely to choose a medical procedure with a 20 percent chance of success than one described as having an 80 percent chance of failure). They are unduly prone to think themselves superior to failure even when others are not, and even in events that are completely random (such as being hit by lightning). They are prone to many errors of judgement they commonly think are below them. This misconception itself is already an error of judgement.

Hard paternalism then aims to correct these errors of judgement. Scholars, behavioural economists, psychologists, politicians, all of these are experts in their field, and they can predict, with reasonable success what is and is not the optimal way to do things. Accepting such guidance would involve many state interventions into private lives. The common citizen cannot be expected to choose the best insurance option or retirement plan. The state will look to it. In the same way, the common citizen is prone to errors of judgement when it comes to his personal health. The public should look after him and guide him – yes, even when it comes to such personal things as health, even relationships and children.

China is a striking example with its (now relaxed) one-child policy – and it's working. The chinese people do not know what is best for them, the government says. But the government does. Since there are too many people in the country already, do

not make more than one child. What may seem harsh at first is actually a decision based on precise calculations and the very concept of hard paternalism: People do not know their own good. They have to be guided – if necessary, by force.

4.2) Soft Paternalism

Soft paternalism, also called libertarian paternalism, does sound much less harsh, and is much closer related to the social policies of liberal western democracies – in fact, we live in partly paternalistic states already without even realising that our personal freedom is limited and we are guided towards our own good. Soft paternalism is nothing more than offering some sort of incentive for those people who do well, while possibly imposing penalties on those that do not follow what is better for them. In the words of Cass Sunstein and Richard Thaler, the two scholars (one of law, the other of economics) who first coined the term, it is paternalism because

It tries to influence choices in a way that will make choosers better off [...]

But at the same time it is libertarian because

People should be free to opt out of specified arrangements if they choose to do so.

Soft paternalism is founded on the same research and insights hard paternalism is based on: The fact that people are less informed than they think, and that they tend to make irrational decisions even when they believe they do not. However, it takes a different approach for the solution to this problem.

This second type of paternalism surely appeals much more to us, as some of its mechanisms are already ingrained in our societies:

Take, for example, dental care. While failing to floss your teeth can, as any dentist will tell you, lead to serious gum disease, it also may not, and in any case such a condition is not likely to ruin your life. Some people do not floss their teeth. But it would not only be useless (and incredibly costly), but ultimately counterproductive to create a “dental police” to ascertain whether everyone does floss their teeth. What we can do (and what many countries actually do) is to give incentives to those that show up at their dentists with healthy teeth, such as reduced medical bills or (in a perfect world) free healthcare. Who shows up with bad teeth might instead have to pay higher bills.

4.3) Paternalism for human enhancement

We have seen that different types of paternalism exist, and we have also seen that human enhancement somehow requires us to be paternalistic in some way.

Even more so, I argue that enhancement ought to be at least weakly paternalistic. If the aim of enhancement is to be sustainable, but we currently are not,

then there is a mildly coercive aspect to it which cannot be denied. As already said, human enhancement is sustainable and should be our path towards sustainability. Matthew Liao is the most active proponent of human engineering against climate change, but a wide variety of other applications exist. By making us more empathetic, less selfish, and engineering us in order to act in more environmentally sustainable ways, human enhancement might be the real change required to fully understand and effectively tackle such problems as climate change, pollution, and exploitation of the third world and of our planet in general. But doing so requires that we change – ourselves, and possibly our children, even against their own will.

But just how far should we take this paternalism? People are naturally opposed to the very idea of having their decisions overridden even by their most trusted friends and family, and accepting government (or any other institutional) interference is something most people would compare to authoritarian regimes taking away their liberties. It plays on our fears of malevolent governments that want to control our lives. And even if the intent is good, the effects may not be as good.

At the same time, it is necessary. Interfering in people's lives, and in those of future generations, might be the only way to save ourselves – from ourselves. Isn't it more favourable to give up some liberties rather than our descendants dying to floods and global warming? Any reasonable person would agree.

I believe that here, too, enhancement offers a good answer to the problem. In her work, Sarah Conly describes another, third way of what is essentially an “ultra-weak” paternalism: Education.

While errors arising from cognitive bias are not easy to root out, not even through education, it seems possible. The whole point of Conly's book is to find a way to make education useful and efficient as a way to allow people to make better decisions. But ultimately, education has the problem that it requires a smart and receptive population.

And that is where cognitive enhancement comes, quite literally, to mind. Cognitive enhancers of some kind or another already exist, mostly in the form of pills, with more being tested right now. The first step towards human enhancement might not be artificial limbs or bio-mechanical organs, but gene therapy that makes us smarter. Imagine the possibilities: All it takes is one single pill, or one single injection, every few months (at most), and suddenly, we understand things we couldn't understand before. We might see the sense in this education Conly talks about, and agree that, indeed, this is the way to go.

In the end, enhancement itself is required to prove that changing ourselves

through enhancements is right and good. This might seem, at first, like a paradox. After all, a problem cannot be the solution to itself. But keep in mind that people are already using these cognitive enhancers right now. The step towards true enhancement, as we shall see in the next chapter, is really short.

- **We're Already There**

In this final chapter, we will look at how enhancement has already found its way into our everyday lives, often without us even noticing. The line between what we consider “helpful technology” and what instead is seen as “enhancement” is thin, and blurred, and in many cases largely artificial. We will look further into this.

Before we move on to the final conclusion, however, another topic needs to be addressed. Many of the arguments against enhancement technologies discussed in the previous chapters are, explicitly or implicitly, based on the assumption that the process of enhancing ourselves is unnatural, defying some natural order or “higher will”. Instead, I will conclude by saying that enhancement is not only good and should be pursued, but it is also inherently natural. In fact, enhancing ourselves – in body, mind, and spirit, is just another step in our evolution.

5.1) We are already enhanced

Ironically, the debate about human enhancement, which has grown in scope and importance over the past few years, is ultimately useless. This might sound strange, especially as the closing words of a work about enhancement, so this point requires further clarification.

Going back to the President's Council on Bioethics and its, erraneous, definition of enhancement, we can see how the lines between cure and enhancement are blurred in the medical and biomedical fields. The Council praised the advancements of technology that allowed for curing diseases and improving the health of people while at the same time condemning the use of the same technologies as enhancements – that means, to allow for performance and feats a “normal” body would not be capable of. The contradiction, as we have already said, is clear: A “normal” body would succumb to diseases that we cure every day.

In the same way, enhancements has already found its way into our societies. We are enhanced in multiple ways, operating at level well above the “natural” average, 24 hours a day. Cellphones, GPS navigators, Computers, Vaccines, even an activity as simple as writing down an important date in a notebook is an enhancement to our natural functioning.

People might be afraid of cognitive enhancements, of taking pills to improve their learning and memory. Yet they use the internet to research information, take notes to learn faster and recall more information, and more than just a few highschoolers use their cellphones in creative ways to cheat on exams. All of this is not, strictly speaking, the natural order. We live in enhanced societies, as enhanced beings, and life without

these enhancements would be impossible for us now.

As between cure and enhancement, the line between external help and enhancing oneself is thin and blurred. How is a camera in your cellphone different from one in your eye, and how is a notebook more convenient than the real possibility to store all that information in your brain? The distinction we make between what is and what isn't enhancement, and this, what is acceptable and what is potentially dangerous instead, is artificial, even counterproductive as it keeps us from moving forward.

5.2) Enhancement as evolution

Talking about moving forward, there is another topic to discuss: That enhancement is not only good, but natural as well.

The image on the covers of so many biology textbooks and found in so many museums, the one of the ape “walking” through the various evolutionary steps until he becomes a modern human, is known to us all. What we often fail to recognize, however, is that it is far from complete. Contrary to the belief of Annas, and all those that support him, the current human genome is neither stable nor homogenous, and most of all it is not final. There are hundreds, thousands, even million other evolutionary steps to take, infinite ones in fact.

We are but one step, one stage of the million-year long evolution of humans on this planet, and we ought to move forward. Human enhancement is natural because it may well be the next step to take - a step towards greater species consciousness and sustainability. It promises to free us from the shackles of evolution as we have experienced it until now – as passive subjects of the process of evolution. Instead, we will become masters of ourselves as human enhancement and GRIN technologies promise to lead us into a new age, one in which it is mankind itself that decides its fate – and possibly of the entire planet.

Back to the anthropocene. If humans are really the cause of what happens to the ecosystem of the entire planet, we can see that we share, as mankind, a heavy burden: To care for the planet, or perish. So far, we haven't been able to do the former, while getting closer and closer, maybe irreversibly close, to the latter. It is only through the possibility to enhance ourselves, and to make us both sensible to, and capable of tackling, the problems that we face in this “era of humanity” (for that is the Anthropocene).

Enhancement of ourselves is not an end. It is a way to achieve greater things. First and foremost, our freedom, sustainability, and well-being on a global scale.

Riassunto

La presente tesi di laurea tratta di un argomento che, nonostante sia di interesse recente, è già causa di molteplici discussioni in campo accademico e scientifico. Si tratta del cosiddetto Human Enhancement – termine inglese difficilmente traducibile. Una traduzione approssimativa potrebbe forse essere “aumento” oppure “potenziamento” umano, ma in mancanza di un termine italiano ufficiale continueremo ad usare, per ora, quello inglese.

In particolare, la tesi guarda ad un aspetto spesso ignorato del potenziale uso di queste tecnologie di human enhancement, cioè la possibilità non solo di migliorare l'uomo, ma anche e soprattutto di cambiarlo per renderlo più adatto ad una serie di problemi e situazioni che deve affrontare al giorno d'oggi, e che invece sembra non essere in grado di superare. La premessa, in realtà, è semplice: L'uomo si trova in un momento cruciale della sua storia su questo pianeta, ed ad un punto di non-ritorno per quanto riguarda il rapporto che ha con il suo ambiente. Studiosi di campi diversi hanno ormai individuato che viviamo in quello che è l'Antropocene, un'era geologica in cui è l'uomo stesso il fattore determinante dei processi naturali della terra. In particolare, siamo talmente tanti e le nostre attività così vaste che le nostre azioni influiscono su tutto l'ambiente, in modo globale e spesso incontrollato.

I grandi disastri ecologici che così si creano, però, sono spesso incomprensibili all'uomo. Il fatto che le nostre azioni abbiano ripercussioni su scala globale, e che spesso debbano passare anni, se non decenni, perché si vedano le conseguenze rovinose di molte nostre azioni non giocano a nostro favore: Semplicemente, l'uomo non è “fatto” in modo da poter identificare, analizzare, ed agire su questi problemi in maniera efficace.

Da qui la necessità di affrontare questi problemi, pressanti, in altro modo. Se l'uomo, così come si è evoluto fino ad ora, non è in grado di affrontarli, eppure dalla soluzione di questi dipende il nostro futuro, allora l'unica via sembra essere quella di cambiare l'uomo, renderlo in grado di risolvere le sfide che attualmente gli si pongono.

Ma sul termine stesso, e sul significato di cosa sia e non sia human enhancement vi sono ancora molte incertezze e discussioni, e questa pratica, che suona così fantascientifica eppure è già reale, ha molti detrattori e critici. Per comprendere, e rispondere alle, critiche, è prima necessario fornire degli esempi di cosa sia e non sia, effettivamente un “potenziamento” e quali potenzialità e possibilità ci vengono offerte da queste nuove tecnologie.

Di ciò tratta il primo capitolo, che analizza tre diversi tipi di enhancements. I primi due sono già ben noti, dal momento che si tratta di tecniche che provengono in

gran parte dalla medicina e che solo recentemente hanno rivelato le loro potenziali applicazioni quali potenziamenti, cioè come trattamenti adatti anche a persone perfettamente sane, per renderle in grado di superare, in un modo o nell'altro, i normali limiti dell'uomo. Ripercorriamo quindi alcuni degli esperimenti e studi più famosi nell'ambito dello studio del potenziamento fisico e mentale.

Un esempio ormai famoso è lo studio sull'EPO, un ormone trovato naturalmente nel corpo umano che regola la produzione e concentrazione di globuli rossi nel sangue. Iniezioni di EPO vengono somministrate regolarmente a persone affette di anemia o di simili malattie. Eppure, un altro uso, più tristemente noto, è quello del doping da parte di sportivi. Iniezioni di EPO causano un aumento della concentrazione di globuli rossi anche in persone sane, e con essa una migliore e più efficiente circolazione dell'ossigeno all'interno del corpo, portando ad un aumento delle prestazioni fisiche anche del 10%.

Le iniezioni, però, sono frequenti quanto rischiose, dal momento che una concentrazione troppo alta di globuli rossi può rendere il sangue più denso, ad un punto tale da affaticare maggiormente il cuore. In casi estremi, con conseguenze fatali. Alcuni studiosi dell'università di Chicago stanno ora sperimentando su un modo alternativo di somministrare EPO, cioè tramite splicing genetico, inserendo quindi copie in più del gene che regola il rilascio di EPO nel sangue. In studi condotti su topi e scimmie, i ricercatori hanno riscontrato un aumento del conto di globuli rossi nel sangue, così come un aumento della forza e resistenza fisica negli animali. Altri studi condotti da laboratori biomedici in America sono già al lavoro per creare “terapie” di EPO adatte agli umani, che durino, a differenza delle iniezioni, mesi, se non anni. Alcuni di questi laboratori hanno sviluppato un gene EPO “dormiente”, che si attiva solamente in presenza di un ormone attivatore che può essere assunto sotto forma di pillola. L'obiettivo finale è di dare la possibilità ai “pazienti” di assumere una pillola per aumentare le proprie capacità fisiche, come e quando desiderino, e senza complicazioni ed effetti nocivi.

Similmente, ricercatori e medici si sono a lungo interrogati su come poter curare, o per lo meno contenere l'avanzamento, della SLA (Sclerosi Laterale Amiotrofica), una malattia degenerativa che causa la morte delle cellule neuronali responsabili del movimento muscolare. Finora l'unica possibilità reale erano iniezioni di un fattore di crescita, IGF-1 (Insulin-like growth factor 1, fattore di crescita insulinico 1), ma questa “cura” si limita a rallentare il progredire della malattia. Ma Jeffrey Rothstein della John Hopkins University potrebbe aver trovato un altro modo. In uno studio condotto su topi di laboratorio che mostravano primi sintomi di SLA, si è

dimostrato che una terapia genetica a base di IGF-1 (quindi di DNA produttore dell'ormone, non dell'ormone stesso), i topi non solo riparavano fibre nervose e muscoli – guadagnavano addirittura una maggiore forza e resistenza fisica. In seguito, Rothstein si è impegnato nel trovare possibili applicazioni nell'uomo.

E questi sono solamente alcuni degli esempi di una nuova generazione di cure che poi sono diventate, o potranno diventare, “potenziamenti” dell'uomo, adatti anche, e mirati in particolare, ad individui sani.

Esistono altre possibili applicazioni di enhancements, però. Più interessanti sono, per il discorso sull'ambiente e la globalizzazione, quelli che mirano a potenziare le facoltà intellettive piuttosto che fisiche. Un esempio di queste tecniche viene, ancora una volta, dalla medicina: Più specificamente, dalla ricerca ad una cura per l'Alzheimer.

Al mondo, oltre 12 milioni di persone soffrono di questa malattia, che causa la morte progressiva delle lunghe “code” dei neuroni, responsabili del trasferimento degli impulsi elettrici nel sistema nervoso. L'uomo possiede un gene specifico che, di solito, provvede alla creazione di un ormone, NGF (nerve growth factor, fattore di crescita nervoso), che a sua volta ripara i danni ai neuroni. In studi clinici, è stato dimostrato che iniezioni di copie extra del gene NGF rallentano in modo significativo il progredire della malattia.

Da lì, ulteriori studi in laboratorio hanno dimostrato anche qui una spiccata possibilità di potenziamento, oltre che di cura, come quello condotto da Howard Federoff all'Università di Rochester. Trattando topi da laboratorio sani con ulteriori geni per la produzione di NGF, ha dimostrato che questi diventavano “super-intelligenti”, capaci non solo di acquisire nuove informazioni più a lungo, ma anche sia di ricordarle per più tempo, sia di poterle dimenticare e rimpiazzare con nuove con più facilità. Già oggi, sulla base di questo ed altri studi, la FDA (Food and Drug Administration, amministrazione per il cibo ed i medicinali) degli Stati Uniti ha approvato i primi test su umani di una simile “cura” che dovrebbe alleviare la perdita di facoltà intellettive che viene con l'età.

Dopo aver quindi individuato cosa sono, e da dove vengono, questi “human enhancements” dobbiamo individuare in che modo, però, possano essere utili a risolvere i problemi che l'uomo affronta in questo mondo complesso e globalizzato. Il primo lavoro in questo senso è di un gruppo di accademici guidati da Matthew Liao, autori dell'articolo “Human Engineering and Climate Change” (Ingegneria umana e cambiamento climatico). In questo articolo, Liao identifica i problemi, soprattutto ambientali, da affrontare oggi, e come l'uomo può adattarsi artificialmente ad essi.

Un'intolleranza (o ridotta tolleranza) alla carne, per esempio, può essere resa

possibile tramite determinati farmaci. Dal momento che la produzione, ed il trasporto, di carne (soprattutto rossa) è responsabile di una buona parte delle emissioni di gas serra, questa è una possibilità.

Un'altra è un potenziamento delle facoltà intellettive, soprattutto nei paesi del terzo mondo. Molteplici studi dimostrano il legame statistico tra educazione (soprattutto femminile) e numero di figli. In un mondo già sull'orlo della sovrappopolazione, stimolare artificialmente l'interesse per l'educazione e le facoltà intellettive della popolazione può rivelarsi utile.

C'è però una differenza, in quanto Liao parla sempre di “engineering”, cioè di ingegneria. Il fine è cambiare e (ri)adattare l'uomo, non renderlo migliore. Invece, il “enhancement” offre le possibilità di andare alla radice dei problemi, piuttosto che curare i sintomi.

Una teoria e pratica così complessa non è però priva di contraddizioni, e non essendone priva, e per il suo aspetto rivoluzionario, è oggetto di molte critiche e molti dibattiti. I macro-temi su cui ruotano la maggior parte di queste discussioni sono quattro: Uno tassonomico, uno pratico, uno etico, ed infine, forse il più importante, il problema del paternalismo.

Il problema tassonomico parte da un problema prettamente biologico: Persone modificate e “potenziate” rischierebbero di perdere, secondo alcuni detrattori, il loro status di esseri umani. Farebbero parte, a tutti gli effetti, di una nuova specie o “razza”, e ciò comporterebbe una serie di gravi problematiche. Il maggior portavoce di questa tesi è il giurista americano George Annas, che, nelle sue opere, identifica di fatto due problemi.

Il primo è che, privandoli del loro status di umani, questi nuovi “esseri” potrebbero o essere sottomessi, o sottometterci. Più precisamente, perdere il loro status di umani li priverebbe dei loro diritti umani e naturali, in quanto “non umani” e quindi non-persone. Non avrebbero protezione da alcuna ingiustizia, nessuna difesa. Dall'altro lato, esiste, sempre secondo Annas, la reale possibilità che, in quanto potenziati e migliori, queste persone si rivolterebbero contro gli umani. Dal momento che loro umani non sono, potrebbero ridurre i “veri uomini” in una sorta di schiavitù.

Il secondo problema di cui parla Annas è più sottile, ed, ad uno sguardo poco attento, apparentemente ambientalista. Sostiene, infatti, che esista una specie di “buon senso” della natura che ci ha fatti evolvere nel migliore dei modi – altrimenti non saremmo qui. Facendo presa sulle paure e sui timori delle persone di fronte ad altri, disastrosi interventi dell'uomo in natura, Annas sostiene che il presente codice genetico dell'umanità vada difeso e preservato quanto patrimonio dell'umanità.

Una risposta ad entrambi i punti è facile. Per il primo, è semplice vedere che Annas tenta di affiggere ad uno status biologico (del tutto arbitrario) un valore etico. Ecco perché il problema è tassonomico: Annas (ed altri) sostengono che l'appartenenza ad una non meglio definita specie biologica abbia valore etico, legale e sociale, mentre chiaramente non è così. Un uomo è uomo per le sue qualità morali di uomo, non per il suo codice genetico “puro”.

E la (supposta) purezza del codice genetico umano è anche la risposta alla seconda obiezione di Annas. Non ha alcun senso scegliere un “genoma umano” in modo arbitrario per definirlo “quello giusto” ed elevarlo a patrimonio dell'umanità intera. Il DNA umano è in continua evoluzione e variazione. Annas dovrebbe essere disposto ad accogliere tutte le possibili variazioni (e sono miliardi) del genoma umano come “standard”. Ed a quel punto, la teoria cade.

Il secondo problema, quello pratico, è forse il più facile a cui dare risposta, ma anche quello che ci aiuta di più ad identificare i limiti del potenziamento. Infatti, la questione posta in questo ambito è la seguente: La natura è estremamente complessa, più complessa di qualsiasi creazione umana. E lo siamo anche noi. Come possiamo sperare di migliorare un insieme così complesso, dal momento che nemmeno lo comprendiamo appieno?

La risposta viene da un ormai famoso articolo di Nick Bostrom e Anders Sandberg, in cui introducono una specie di meccanismo di controllo sui potenziamenti umani, chiamato EOC (evolution optimality challenge, sfida di ottimizzazione evolutiva). Paragonando l'evoluzione dell'uomo all'opera di un geniale ingegnere, si chiedono: Come possiamo sperare di migliorare questa opera?

La EOC è una specie di meccanismo di controllo o filtro, che ci permette di discernere quando un potenziale enhancement potrebbe migliorare una nostra qualità già presente, in che modo, e con quali (probabili) effetti. Le moderne tecnologie offrono innumerevoli possibilità di alterare noi stessi, e non tutte sono, o saranno, efficaci, possibili, o positive. La sfida di ottimizzazione evolutiva può aiutarci ad identificare quelle possibilità che possono essere più utili, e che al contempo siano più sicure.

Il terzo problema da affrontare se si parla di human enhancement è quello etico. È un problema che sembra simile a quello tassonomico, ma in realtà è più profondo e complesso. Mentre Annas si preoccupava dello status di umano da un punto di vista biologico, ci si occupa di etica affronta la domanda di quale qualità ci rende umani – e se questa qualità possa essere alterata da eventuali potenziamenti.

Le principali accuse alle tecnologie di enhancement sono, da questo campo, due.

Una è che l'uomo posseda una sorta di “essenza” che lo renda umano. Questa essenza non è meglio definita, ma molti, primi tra tutti lo studioso americano Francis Fukuyama, credono che alterare le persone in modi tanto profondi di fatto la elimini.

La seconda, un grande esponente della quale è l'americano Leon Kass, è che questi potenziamenti eliminerebbero il significato di ciò che vuol dire essere umani. Nelle parole di Leon Kass: la lotta per raggiungere i propri obiettivi. Dice che, con le potenziali facilitazioni portati dalle nuove tecnologie, si andrebbe a perdere il significato della felicità, perché tutto sarebbe raggiungibile con la tecnologia. Non vi sarebbero più sforzi necessari, per nulla, ed alla fine, la felicità si ridurrebbe a ciò che può essere creato o raggiunto con la tecnologia.

Le argomentazioni questa volta sono più complesse, ma anche qui, è possibile contraddirle. Anche se il problema di fondo è diverso, Fukuyama compie lo stesso errore di Annas: Da' valore etico ad una categoria non-etica. Questa volta è una “essenza umana” non meglio definita, non una specie biologica, ma l'errore è lo stesso. Nelle parole di Fukuyama, una civiltà avanzatissima che vive su un'isola sconosciuta del nostro pianeta sarebbe eticamente inferiore a noi – perché non possiede questa “essenza” misteriosa.

Invece, Kass pecca di ciò che potremmo definire masochismo intellettuale. Nelle sue parole, essere umani significa combattere, sforzarsi, anche fallire. Di fatti, soffrire. Ma cosa è e non è felicità è una preferenza personale e non può, di fatti, determinare l'appartenenza o meno ad una specie o una categoria di essere – in questo caso, umani.

L'ultimo argomento da affrontare è la grande discussione sul human enhancement: Il problema del paternalismo. Le scelte che compiamo hanno sempre un effetto anche sulle generazioni future. Ma nel caso di alcuni enhancements a base genetica, questi effetti sono ancora più profondi, e forse irreversibili. Sulla base di un libro della studiosa americana Sarah Conly, segue una riflessione su quanto la società debba essere guidata e decisa da chi sta al potere – o da chi è più esperto. Una serie di studi sociologici e di economia comportamentale hanno rivelato, negli ultimi anni, quanto le persone siano spesso incapaci o irresponsabili senza nemmeno rendersene conto, e quanto sia facile manipolare le informazioni. Quindi, prosegue Conly, dal momento che siamo ben felici di accettare l'intervento pubblico a favore di terzi (poveri, senzatetto, minoranze, ecc...), dovremmo accettare questo intervento anche nelle nostre vite personali, in modo da evitare decisioni dannose.

Esistono vari tipi di paternalismo, da quello più duro a quello più misurato. La differenza sta in quanta libertà il pubblico lascia al privato. Quello più misurato, ma

anche più efficace a detta di Conly è sicuramente l'istruzione: formare cittadini più informati ed intelligenti riduce le possibilità che compiano scelte sbagliate o mal informate.

Anche qui, il human enhancement ci aiuta. Formare una popolazione intelligente è un processo lungo, costoso, e non sempre facile. Invece, potenziamenti come quello basato sul NGF permetterebbero un aumento rapido e facile dell'intelligenza collettiva della società, il che, a sua volta, porterebbe alla formazione di società più intelligenti ed efficienti, in una specie di circolo virtuoso in cui ogni miglioramento, ogni potenziamento dell'uomo, è il primo passo verso quello successivo.

Infine, rimane una cosa da dire a tutti i detrattori, critici e scettici delle enhancement technologies. La verità è che l'enhancement non è solo, come abbiamo visto, un modo di migliorare non solo l'uomo stesso, ma il suo ambiente, la società in cui vive, ed il pianeta stesso, ma la trasformazione in umani “potenziati” (o “aumentati”) è già iniziata – e ne stiamo vivendo la prima fioritura.

Dai telefoni cellulari ai gps ai computer, persino un blocco note è un potenziamento, in quanto aumenta le capacità naturali dell'uomo. Questo offre due spunti di riflessione. Il primo è che, in varie forme, il potenziamento dell'uomo è stata una costante nella storia della sua evoluzione, da sempre. Ci apprestiamo solamente ad inaugurare la sua versione più recente.

Il secondo, invece, è che tutte le critiche fatte sono, di fatto, inutili. Il potenziamento di noi stessi ed il nostro elevamento al di sopra dei nostri limiti fisici e mentali non è una possibilità, ma il futuro reale. La fondamentale discussione sul human enhancement non deve essere se sia giusto o meno, ma come sfruttarlo per rendere noi stessi realmente “migliori”. Alla fine, tutti gli “enhancements” non sono fini a loro stessi, ma possibilità che abbiamo per rendere noi, ed il nostro pianeta, un posto migliore.

Bibliography

- [1] N. Bostrom, J. Savulescu, *Human Enhancement*, Oxford University Press, 2009
- [2] S. Conly, *Against Autonomy. Justifying Coercive Paternalism*, Cambridge University Press, 2013
- [3] R. Naam, *More Than Human: Embracing the Promise of Biological Enhancement*, Broadway Books, 2005
- [4] J. Garreau, *Radical Evolution: The Promise and Peril of Enhancing Our Minds, Our Bodies – And What it Means to Be Human*, Doubleday Books, 2005
- [5] N. Bostrom, *Transhumanism. The World's Most Dangerous Idea?* From www.nickbostrom.com, 2004
- [6] D. Kahneman, A. Tversky, *Prospect Theory: An Analysis of Decision under Risk*, in