

**APRIMORAMENTO HUMANO:
UM NOVO TEMA DA AGENDA FILOSÓFICA**

**PERFECCIONAMIENTO HUMANO:
UN NUEVO TEMA DE LA AGENDA FILOSÓFICA**

**HUMAN ENHANCEMENT:
A NEW ISSUE IN PHILOSOPHICAL AGENDA**

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Resumo: O desejo de superar nossas limitações biológicas é antigo. Este desejo certamente desempenhou um papel importante no advento da técnica; porém, como é sabido, a técnica tem uma dupla face: além de benefícios, oferece riscos. A sabedoria recomenda alcançar o melhor resultado sem comprometer a segurança; no entanto, possíveis desvios estão sempre no horizonte. O temor de perder o controle de nosso poder é antigo. O problema é que, atualmente, a tecnologia pode servir não somente para promover capacidades humanas (buscando preservar ou restaurar a saúde, promovendo o bem-estar humano), mas também pode ser empregada com o objetivo de superar nossos limites muito além do nosso "design natural". Temos razões para temer esses novos rumos da biotecnologia? Devem a medicina e a saúde pública mudar seus objetivos tradicionais e passar a buscar aprimoramentos artificiais? Neste artigo, meu objetivo será apresentar e discutir brevemente os principais tópicos sobre esse novo tema, o *aprimoramento humano*: a distinção terapia-aprimoramento, a possibilidade de aprimoramentos cognitivos e físicos, a luta contra a senescência, os argumentos a favor e contra a eugenia, os desafios da busca pela perfeição, o aprimoramento moral, o problema de prioridades públicas e sobre algumas consequências da aceitação do aprimoramento humano para a ética médica. No final, pretendo apresentar algumas perspectivas realistas.

Palavras-Chave: Aprimoramento Humano, Aprimoramento Cognitivo, Aprimoramento Moral, Transumanismo, Eugenia Humana, Responsabilidade Moral.

Abstract: Since before we can remember, humanity aims to overcome its biological limitations; such a goal has certainly played a key role in the advent of technique. However, despite the benefits that technique may bring, the people who make use of it will inevitably be under risk of harm. Even though human technical wisdom consists in attaining the best result without compromising anybody's safety, misuses are always a possibility in the horizon. Nowadays, technology can be used for more than just improving human capacities, preserving and restoring health or promoting

human well-being. It also enables us to overcome human limitations and reach way beyond our "natural design". That being said, what could possibly justify the fear for these new directions of biotechnology? Should medicine and health care change their traditional goals and begin searching for artificial improvements to wellness in human nature? In this paper, I will hereby present and briefly discuss the main topics of the contemporary issue of *human enhancement*: the therapy-enhancement distinction, the possibility of cognitive enhancements and better physical performances, the fight against senescence, the arguments for and against human eugenics, the search for perfection, the quest of moral enhancement, the problem of public priorities, and some questions on medical ethics. Then, finally, I will want to present some realist perspectives on the subject.

Key-words: Human Enhancement, Cognitive Enhancement, Moral Enhancement, Transhumanism, Human Eugenics, Moral Responsibility.

Introduction. In the mid-seventies, the pharmaceutical company Eli Lilly developed a new antidepressant called Fluoxetine, a new selective serotonin reuptake inhibitor (SSRI). It was approved for the treatment of several psychiatric disorders, including major depression, obsessive-compulsive disorder, bulimia, panic disorder, and premenstrual dysphoric syndrome. One of its advantages over traditional antidepressants is its smaller collateral damage rate. Soon enough, people began to notice that even some non-pathological variations of mood could be managed by the medication without serious side effects. This eventually led people to use "Prozac" (Eli Lilly's commercial product) as a kind of stimulator or an euphoric drug, as opposed to an antidepressant. Soon, Prozac was widespread among persons who did not present any mental diseases, at least not within the official standards of psychoanalysis. Since then, several other SSRI drugs were developed, and the medical indications of drugs from the same class were stretched. Whether Fluoxetine, as well as other SSRI medications, is in fact an "enhanced drug" is a controversial notion. In spite of this, nowadays, there are more liberal prescriptions of such medical substances, that include not only the treatment of mental disorders, but also the modulation of normal mood oscillations.

Something similar happened with another drug, Methylphenidate (MPH), first sold as Ritalin by CIBA-Novartis Corporation. The drug is indicated to treat Attention Deficit Hyperactivity Disorder (ADHD) and Narcolepsy. The substance was originally synthesized in 1944 to control Orthostatic Hypotension ("low pressure"). It was only in the 60's that the drug started being used to control symptoms of ADHD as well. Several studies now

show that using MPH is effective in the treatment of ADHD (Faraone et al 2004): it reduces the overactivity, impulsivity and inattentiveness of ADHD patients while improving on-task behavior, academic performance, and social functioning. Since those last mentioned capabilities are consequential benefits desired by any persons, individuals who did not show typical symptoms for ADHD began to request prescriptions for MPH. There were no surprises when it started being widely used as a "smart pill" by persons (especially students) without any diagnosed psychiatric or neurological disorder (Smith & Farah 2011). Nevertheless, studies on the cognitive effects of this drug in healthy populations still do not have the same methodological rigor of studies conducted with children or adults with ADHD (Elliott & Elliott 2011). We are still waiting for better studies on the real affectivity and efficiency of MPH in those populations without clear psychiatric disorders.

The therapy-enhancement distinction and the slippery-slope argument. Prozac and Ritalin are typical examples of drugs originally developed for medical reasons, but immediately employed in situations that did not follow medical guidelines. This led to several stricter regulations on the drugs' distribution. In several countries, it is illegal to distribute them without controlled prescriptions, and using these drugs without medical prescriptions configures a criminal offense. However, does it mean that using these drugs or distributing their prescriptions should be forbidden? If there is the possibility of using them within a minimal or controlled risk range, why shouldn't people use them?

One reaction is related to the so-called *therapy-enhancement distinction*. An intervention that aims to prevent or treat some pathology or to correct an organic defect is called *therapeutic*. (Although this designation is misleading, for medical and health care actions include preventive actions as well as strict therapies, I will follow the common usage and use the term 'therapeutic' here in its broad meaning, in order to cover all professional healthcare actions and services.) Let us accept the view that an enhancement can be any intervention that improves an organic subsystem "in some way other than repairing something that is broken or

remedying a specific dysfunction" (Bostrom & Sandberg 2009: 312). That is, enhancements are interventions in organic subsystems that do not aim to prevent, promote or rehabilitate some individuals' capacity of avoiding serious diseases (or, as I prefer, being free of chronic dysfunctions, diseases, disorders or disabilities that can compromise the individual's likelihood of dying or becoming chronically ill or disabled—that is, *clinical health*); they aim to improve capabilities beyond any basic human needs or basic absolute form of human well-being, including health. In this sense, "to enhance" means to go *beyond* health, and also to go beyond any kind of standard or basic form of human well-being.¹

Some people think that going beyond health means going *too far*. Accepting this can lead us to a slippery slope. A slope is *morally* slippery if, once we are led to it, we end up inevitably being led to an absolutely immoral final step. The argument runs like the following: treatments, as such, are completely justified; but *enhancements* are not treatments. An enhancement "is the directed use of biotechnical power to alter, by direct intervention, not disease processes but the 'normal' workings of the human body and psyche, to augment or improve their native capacities and performances" (TPCB 2003: 13). And the problem is that, "[o]nce we go beyond the treatment of disease and the pursuit of health, there seem to be no ready-made or reliable standards of better and worse available to guide our choices" (TPCB 2003: 4). Then, we may be led to a slippery slope, which ends up in unacceptable practices. These final steps may be unacceptable for different reasons. One can be a *medical* reason: the end of the slope can be one of much more health problems to patients, like addiction to substances, that are of harm to general health. This suggests that the use of enhancements may, in the long run, be more harmful than beneficial. Other reasons are based in claims of *equality*: people can use those drugs to improve capabilities, but since some will be more benefitted than others, this may worsen the already huge inequality gap (including inequalities in power) in our society

¹ See Derek Parfit for a statement on the ideal of a standard of absolute form of human well-being as priority in social distributive justice (Parfit 2000: 81-125). I will return on this issue below.

(Buchanan et al 2000). A third threatening reason is *prudential*: some enhancements can represent threats if enhanced individuals are simply the wrong ones, that is, for example, those inclined to promote violent actions, like crimes and acts of terrorism, or those, like several of us, that are not (yet) motivated to prevent more environmental degradations (Persson & Savulescu 2012).

Enhancing cognition. Let us call a “smart substance” (or a "smart pill") one that increases the cognitive ability of the person who is on it, this person is cognitively impaired or not. This is clearly the case of caffeine. Caffeine is a well-known smart substance. It can be used as a drink, *inside* drinks, or in pills. Some people like coffee; they like the smell, and some like the taste. Coffee improves peristalsis; it facilitates digestion and other gastrointestinal functions. But people love coffee for its cognitive effects. Caffeine increases short-term memory, choice reaction time, incidental verbal memory and visuospatial reasoning (Jarvis 1993). Caffeine is an enhancing cognitive substance. It doesn't require a medical prescription and it benefits everyone who uses it.

Nevertheless, caffeine is not a drug that improves our natural cognitive abilities beyond what is attainable by "natural" methods. So it is a *mild* smart substance. People use it for the sake of its good effects in health or well-being, mainly as a means to improve cognition, a mental capability that helps us to attain several of our most fundamental interests in life. The example of caffeine serves as evidence that there is nothing wrong in cognitive enhancement (as opposed to healing some disease). Actually, it is quite the contrary!

Cognitive enhancement can be defined as "the amplification or extension of core capacities of the mind through improvement or augmentation of internal or external information processing systems" (Bostrom & Sandberg 2009: 311).² Accordingly, cognitive

² Bostrom and Sandberg offered this definition aiming to amplify the scope of substances, drugs and even actions, behaviors or practices whose effects directly or indirectly enhance cognitive human abilities. They also suggest we distinguish between "conventional" and "non-conventional" enhancements. Conventional enhancements include health care, environment improvements, education, mental

enhancement is within that group of goods John Rawls called primary goods in his first careless formulation of this concept in the first edition of *A Theory of Justice* (1971): things that we presume every rational person wants, whatever else it is that they want or whatever else is said person's life plan. An important characteristic of such goods, however, is that people would rather have more than less of them. Intelligence is a natural primary good for Rawls. It is *natural*, not *social*, just because, "although their possession is influenced by the basic [social] structure, they are not so directly under its control" (1979: 54). Intelligence can be distributed by society indirectly. If the social structure could control the distribution of intelligence, then it would be a social primary good. Only social primary goods, says Rawls, can be distributed by political means. We may infer that, even if we can offer coffee, nicotine (also a cognitive substance, as some studies have show³) or other stronger cognitive pill to persons, there is a natural limit to human cognition that is a product (or a by-product) of natural selection and is not under our control.

The question now is: why should people be denied the access of those other kind of cognitive pills? MPH is a cognitive pill; another one is Amphetamine (AMP), usually prescribed as mixed salts consisting primarily of Dextroamphetamine (d-AMP), known in some countries by the trade name Adderall. Is there any moral reason to forbid people of using those "artificial" pills? Would a Rawlsian conclude that, in spite of the fact that intelligence is a *primary good*, to grant wide access to "smart [non-natural] drugs" is contrary to justice? Is there any political reason to think that the widespread use of those pills could generate some kind of political insecurity? In fact, most such reasons are *medical*: health risk is higher in the case of these pills (and very low in the case of mild substances, like caffeine); but this is in fact a paternalist

training (and perhaps "collective minds", software assistance and brain-computer interfaces), besides medical drugs. Drugs used not for the sake of medical treatments, eugenics, cerebral transcranial magnetic stimulation (or cerebral implants and other forms of direct intracranial stimulation) are examples of "non-conventional" enhancements.

³ See Rusted et al (2005), Newhouse, Potter & Singh (2004).

controversial reason, as some think.⁴

Hence, if there were low risk smart pills, there would be good reasons for people to claim its non-prohibition. Would it make any difference if these pill did not only enhance human natural abilities, but also improve them beyond their "normal" state? Physiologists think that most human abilities can be improved, but not too much than 10 or 20% above the species' average. So, modifications of our actual physiological constitution are necessary for enhancements beyond our natural limits. We don't have these improvements yet, but they are not biologically impossible. One possibility is that these smart changes will emerge by means of eugenic technologies. In this case, those pills should be used by (or on) unborn individuals. These future enhanced humans will be born with different, higher capabilities. That is the essence of *transhumanism*.

Why should we remain restricted to our natural frames? And note that, since the modification of our natural frame and constitution is for our own best interest, why should it be illegal? Would a rational person, following Rawls thought-experience of a decision in an "Original Position" under a "Veil of Ignorance", infer that this technological advance should be forbidden? Would he surmise that eugenic changes are *essentially* unjust? Would one following Mill's Harm Principle find, in this case, some predictable harm to others that could support its prohibition? It is hard to find liberal arguments against technological advances, except *medical* arguments. But medical arguments are not based in categorical principles, but hypothetical. Concerning liberal principles, medical arguments are only intermediate or instrumental.

Reasons against cognitive pills can be principles or

⁴ People could argue that prohibitions of a free access to medications that only cause harms to its users are unjust. Philosophers would cite John Stuart Mill in defense of this principle. It is called "The Harm Principle" (see Mill 1879): "[T]he only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others. His own good, either physical or moral, is not a sufficient warrant" (23). But there are certainly reasons to limit the access to those medications if a State-funded Health Care System distributes them. The existence of scientific evidences that some kind of drug is harmful is a sufficient reason not to offer this drug to people by the public system (thanks to Roger Crisp for the this comment).

instrumental reasons that serve as principles. Nevertheless, there are disagreements about which are those reasons of principle. Liberal political philosophers understand that reasons of principle are general norms based in the values of liberty and freedom (this include the values of human rights as ultimate political values); but other philosophers think that ultimate reasons are grounded in human well-being (consequentialist philosophers usually take well-being as the ultimate principle of ethics) (Crisp 2006). These divergences can have consequences in philosophical scrutiny, especially on non-conventional forms of human enhancement.

Enhancing physical performances. Think of yourself as a stronger or faster being, or one endowed by a better sensory apparatus. There are several things you can do in this situation that otherwise you wouldn't be able to. Your new form wouldn't necessarily improve your health. Some people think that all physical improvements are also health-related, which is a misconception. Vigorous exercise causes physiological changes that can be dreadful in persons with occult heart diseases (Thompson et al 2007). In fact, an athlete can even be healthy, but arduous training submits him (or her) to several harms and injuries, which can sometimes be chronic and even quite serious (Savulescu, Foddy & Clayton 2004: 668-669). Endurance sports' athletes have a low incidence of coronary disease, but they have a higher incidence of left ventricular hypertrophy, with a higher risk of cardiac insufficiency in the long run (Maron et al 1996; Maron, Poliac & Roberts 1996). By their turn, athletes of power sports have a higher incidence of coronary disease (Kujala et al 1996). It is well-known that boxers have a very high incidence of brain injuries and ex-boxers are more vulnerable to aging and brain diseases. Obviously, climbers have a higher death risk than non-climbers. Hence, advantages in physical performances are desirable, whether they preserve or reduce health.

Some philosophers think that physical capabilities represent comparative advantages. Thus, one capability compared to another may be considered a relative physical disability. Disabilities are undesirable; so, the argument runs as thus: all persons are interest

in improving their physical capabilities that can be seen as disabilities if compared to better performance capacities.

Some people can improve their physical abilities by means of prosthetics devices. See the case of Aimee Mullins. She is an athlete as well as a fashion model. Born with fibular hemimelia, a congenital disease characterized by the absence of fibula bones, she was amputated when she was still a toddler, since this is the best way for adapting a child to prosthetic legs. Aimee became an athlete and is perfectly adapted to her artificial legs. In fact, she can run faster and do things that non-amputees cannot. It is very plausible to say, then, that the prosthesis improved her capabilities beyond the ones of a person without her "disability".

Aimee's case poses puzzling questions. It is certainly possible to improve some of our physical capabilities by means of prosthetics that have better performances than natural limbs or organs. If there were eyes that allowed humans to see better and for longer periods, would you replace yours for a pair? Aimee Mullins does not see herself as a disabled person, but would people whose members function with perfection rather exchange their flesh and bone legs for titanium-built, arguably better ones?

Now, consider physical performance drugs. In 2007, Scientists at Case Western Reserve University in Cleveland, Ohio, created a transgenic mouse that can run for six hours at a speed of 20 meters per minute before needing a rest. During strenuous exercise, the mouse uses fatty acids as fuel more efficiently and produces far less lactate than control animals (Hanson & Hakimi 2008). The modified animal had better reproductive capacities and lived longer than other mice. Then, some people wondered if the same could be recreated in humans. This is what the scientists that created the PEPCK-Cmus mice said on the subject:

We are often asked if the remarkable physical activity of the PEPCK-Cmus mice, their longevity and reproductive vigor has direct application to human performance. Can we introduce the gene for PEPCK-C into human skeletal muscle and see a similar alteration in metabolism and behavior? Performance sports, such as bicycling, clearly would benefit from the type of activity noted in our PEPCK-Cmus mice. To be able to use fatty acid as a fuel for long periods of strenuous exercise while generating little lactate, is the metabolism that wins the Tour de France! However, there is a down side to all of this. The PEPCK-Cmus mice are very aggressive; our world

needs less, not more aggression. Most importantly, there is currently no way to over express PEPCK-C in all of the skeletal muscles without introducing the gene into the germ line of humans, as we do with the transgenic mice; this is neither ethical nor possible.

The transgenic mouse has better capabilities: he could run faster and did not need much rest; he lived longer (and, compared to other rats, presented higher reproductive rates!); but he was also more aggressive. It seems that, technically, it is very difficult to get an advantage without also getting some disadvantage in the same package. The reason is that our animal capabilities were not developed or biologically selected for isolated, independent purposes. Also, besides evolution, human capabilities can be co-opted for different utilities, which are not adaptations for their current function (Gould 2002). The same applies to bionic changes. What would happen if violent persons were improved by means of those bionic increments?

Living longer: the anti-aging front of human enhancement. Is it good to live longer? Is there a virtue in mortality? Some thinkers argue that even if we could live longer, it would not be a good choice; mortality and finitude are essentially connected with the human virtues (Kass 1988). This seems edifying, but there are at least two great objections. It is true that human natural aging (we all begin as babies, then we turn into children, and so forth through the phases of adolescence and finally maturity) is a natural aspect socially related to human virtues: parental love, friendship, solidarity, companionship and all nurture-related ones. But those virtues are not incompatible with living a longer or less accelerated aging process. We all desire to have a longer life, even if we do not wish to live forever. One can, after all, hope for a longer and more satisfying life without ever consciously formulating a wish to live forever (TPCB 2003: 62). Moreover, to live longer does not imply to live without companionship or solidarity. No one plausibly wants to live longer by oneself.

Another objection is that, even if mortality is an ineliminable part of our nature, it does not mean that living longer is not desirable. Mortality can be connected to human virtues, but this

does not make death a desirable outcome. It is desirable to prevent death, or, at most, postpone it. Hence, we should think more seriously of the possibility of enhancing human life with the goal of living longer and better.

Aubrey de Grey (2007) thinks it is feasible to prolong human lives. Since the aim is not only to live longer, but to live well, this aim implies retarding senescence, which actually makes anti-senescence drugs therapeutic: "All gerontologists know", say de Grey, "full well that it's no accident that age-related diseases are age-related: they appear at advanced ages because they are consequences of aging, or (to put it another way) because aging is no more and no less than the collective early stages of the various age-related diseases" (2007: 18). De Grey puts forward the idea that we should attack senescence, the consequence of such an act being a longer as well as healthier life. His strategy is based on implementing therapeutics of rejuvenation (because, by technical reasons, he thinks it is plausibly more efficient than trying to retard senescence), like when people do maintenance in vintage cars. He thinks that, some decades from now, we will be able to start using these new technologies.

So, it is certainly better to live a longer, healthier life than an equally longer, albeit unhealthier one. This could make us rethink about the difference between treatments and enhancements. Note that there is a difference between "treatment" and "therapy". One may be medically cured of some morbid condition or disease by means of a treatment, that is, one must be diseased to receive some kind of treatment, whereas one can undergo therapy for any reasons necessarily other than preventing, curing or treating a disease. For example, physical therapies are usually restorative or rehabilitative. Rehabilitation is a form of functional rehabilitation for the sake of health promotion (if we accept the broad concept that includes disabilities in the concept of health). Physical therapies play a part in treatments, not by means of rehabilitation, but by means of procedures that enhance, for example, physiological mechanisms (like mucocilliary clearance in respiratory rehabilitation). In those cases, the aim is to use such methods to aid treatment by enhancing physiological restorative actions.

Hence, the aim of rehabilitation procedures may be function restoration usually related to health. But, besides physical therapies procedures, there are other kinds of health-unrelated (at least not necessarily) therapies. Psychoanalysis and several psychotherapies are other kinds of therapies that do not necessarily involve treatment or rehabilitation. Therefore, there are both enhancement therapies and enhancement treatments. Enhancement therapies do not only include procedures for the sake of enhancement *with* health, but enhancement *beyond* health; whereas enhancement treatments aim to protect and restore health, with enhancement as a by-product.

Rejuvenating therapies or anti-senescence therapies are a paradigmatic example of enhancement therapies (even if they are actually only technological possibilities). Their purpose may be medical, preventive or restorative; the aim is to prevent aging, or at least to restore the consequences of aging by preventing or restoring damages in genes, cells, tissues, or organs. These therapies also aim to prevent or to restore damages to the physiological integrity of organs or organic systems. It must be noted that rejuvenating therapies may, but are not necessarily medical treatments. A person can be rejuvenating even if her health is not actually previously compromised or at risk.

Sometimes, aesthetic procedures aim at rejuvenation; sometimes, their goals are aesthetic changes or aesthetic enhancements. A 70 years old woman that submits herself to plastic surgery may wish exclusively to appear younger, even if she cannot be healthier. She aims at rejuvenation, even if, unfortunately, she may only *appear* younger. In this case, to appear younger is a kind of palliative solution; if she really could rejuvenate, she would probably want to be younger, besides merely to look as such. Nevertheless, there is nothing wrong with looking younger, neither with looking more beautiful. Note also that these procedures are acceptable as procedures in the medical profession, even if they do not aim to protect, promote and maintain, or even restore health. Rejuvenation can, at any rate, promote health. If rejuvenating therapies could interfere in the aging process in a large way, it would be possible to make older persons much younger, or to prevent them to become much older (hence unhealthier, for aging is

a process associated with the onset of chronic diseases and higher taxes of morbidity and death).

Then, it seems that living longer is desirable if it is possible to live a healthy and pleasurable longer life. In fact, humans are living for longer periods, but there are nasty consequences on the whole. Unfortunately, nowadays, to live longer means to live many more years of life beyond maturity—as an elder person—, for it simply means to age, which only increases the length of senescence, which, by its turn, is not exactly the desired aim. The consequences of that, for persons and society, are highly problematic: more chronic diseases, more time living in hospitals, more dependency and more disabilities. It also means more people living beyond their productive lives, more dependency on others and on community help, more costs and population increase (causing more environmental problems). It is good for both individuals and societies to live longer, better, healthier, more productive and more peaceful lives. Anyway, since more people living longer implies more people alive, it requires some strict population control and perhaps new kinds of families.

Eugenics: improving embryo's genetic traits. Is there something wrong in improving the genetic traits of our children? Let's see now the ill reputed issue of eugenics.

Buchanan and others stressed a difference between negative and positive eugenics. They say that, in the beginning of the last century, some people argued that health care could have the consequence of promoting dysgenic effects. The focus was the control of populations, and there were scary political consequences (Buchanan et al 2000). The Nazis, aiming at preventing dysgenic effects, promoted negative eugenics, thus their means included the sterilization and extermination of people. It is of general agreement that these practices represent violence towards an individual's rights.

Positive eugenics consist in strategies for improving health and the genetic capabilities of a population by incrementing the rate of reproduction of those harboring the best traits or the ones genetically associated to better human capabilities. It can be applied in populations (and here there are also issues of non-discrimination:

why should some people be privileged, whereas others are not?). Nevertheless, if we consider the issue in the individual level, the complaints against possible injustice change substantially. In the individual level, positive eugenics consist in artificially selecting the best traits of an embryo for the sake of improving the likelihood of said embryo developing better capabilities. It can be argued that this measure is taken for the best interest of the future individual. We certainly agree that parents have a duty to choose for their offspring the best they can offer (regarding education, healthcare, love and care and even money) for the sake of improving the likelihood of their son or daughter having the best of possible futures. If it were possible to change his or her bad genes, why wouldn't they also have the duty to do so? This was exactly the geneticist's argument in the movie *Gattaca* [1997] (Frias 2012).

That being morally acceptable, would parents not have also a duty to choose the best embryo among their options? If we assume that embryos can be selected (and they actually are, for instance, in procedures such as In Vitro Fertilization, or IVF), it can be argued that, if parents are able to do so without significant cost or inconvenience, they also have an obligation to select—out of the possible children they could have—the one that they think is prone to have the best prospects of having a good life. This way of thinking has been termed the *Principle of Procreative Beneficence* (PPB) (Savulescu 2001).

Sometimes, people react to this thinking due to other issues, like the permissibility of manipulating or discarding embryos. IVF procedures actually depend on the moral acceptance of discarding embryos (some are chosen and others are frozen or discharged). So, the PPB applies as an extension to this practice. It could nevertheless be argued that acts of procreative beneficence are morally permissible, but are not strictly required; that is, parents do not have strict obligations in selecting the best embryos with the best traits. But one could argue that parents are responsible if the consequence of their omission in selecting the best traits were for the worst. Suppose a couple has the possibility of selecting the best within a variety of embryos, but they decide not to do so (just like the couple in *Gattaca*). Then, a baby girl is born, but she is below her assumed potential, since she lacks the better traits some other

embryo bore. Are the parents responsible for the misfortune of their child?

Certainly not; and a good reason for such is that the one embryo is completely different than the other. If the couple had chosen *that* embryo, the child would be another person, a different individual. But if this is the correct response, then the parents had at least the Gattaca-obligation of changing the genes of the embryo, perhaps by some safe and reliable transgenic method. Suppose now that a method of changing or treating embryos' genes became feasible. If the parents had decided not to use it, could their future child accuse them of negligence since her misfortunes were genetically preventable? If the answer is yes, then the parents had the duty of genetically improving their children's traits before they are born, provided that some safe biotechnology was available to them (at a reasonable cost). My suspicion is that this is just too much, but I admit I still don't have a good argument against the accusation of *genetic negligence*.⁵

The search for perfection and the value of natural gifts. Thomas Douglas (2008) defines the bioconservative view this way:

Bioconservatism view on enhancements. Even if it were technically possible and legally permissible for people to engage in biomedical enhancement, it would not be morally permissible for them to do so.

The *Transhumanists* are extreme opponents of bioconservatism. One does not need to be a transhumanist to accept human enhancements. One may claim that health care and enhancement are distinct things, as in that this distinction is of practical significance, and accept that enhancements are permissible.

⁵ If parents have a duty to genetically improve their children (if it is possible and within a reasonable cost), then their children have a claim-right against their parents of being genetically improved, a right they have even before they were born. Of course, persons can be responsible for actual harms caused to actual persons by actions or omissions done by them even before the existence of those persons; but nobody can be charged for possible harms caused to potential individuals. For a helpful critical discussion on the principle of procreative beneficence, see Lincoln Frias (2012).

Transhumanists disagree. They think that the treatment-enhancement distinction nourishes bioconservative positions:

Transhumanists view on enhancements. Human enhancement options should be available to human beings in the same way and for the same reasons that options for therapeutic medical treatments are available: in order to protect and expand life, health, cognition, emotional well-being, and other states or attributes that individuals may desire in order to improve their lives.

The philosopher Michael Sandel (2004, 2007) has an insightful argument for the bioconservative position. For Sandel, enhancemist practices may lead to the elimination of some essential traits to our own identity as human beings. Generating voluntary difference between people can result in the elimination of the ground from which the liberal modern concept of responsibility has grown: we are responsible for the consequences of the decisions we make, but not for the differences we have been granted as gifts, which are not resultant from our own actions. We are not responsible for our natural traits and characteristics, for they do not result from our voluntary decisions. Similarly, we are not responsible for deficiencies involuntarily acquired—and the same applies to natural advantages, that is, we do not earn any gain or praise for them. The problem of enhancement is that it can produce a situation of "hyper agency", of an excessive attribution of moral responsibility. Our future as living beings would completely depend on our present decisions. Nothing would remain as a matter of *giftedness*:

The problem with eugenics and genetic engineering [says Sandel] is that they represent the one-sided triumph of willfulness over giftedness, of dominion over reverence, of molding over beholding. But why, we may wonder, should we worry about this triumph? Why not shake off our unease with enhancement as so much superstition? What would be lost if biotechnology dissolved our sense of giftedness? (Sandel 2007: 85)

Religious people would say that the problem is in confusing the power of humans with the power of God. Sandel recognizes that this is not a good objection. The objection seems to be that we cannot go beyond our nature because this would mean to seize

God's authority over us. God creates us and hence we have a duty to obey Him. This is a bad objection. Suppose that God actually created us; why would that imply a right to obedience? Why would that imply that, because God created us, we are not endowed with liberty to change His creation? Were we not created as autonomous beings? In effect, non-religious persons could certainly ask sensibly without any self-contradiction or immorality: why are we prohibited to play God? Believers could say that unconditional obedience to God is simply a matter of faith. This debate always reaches a solid rock: believers and non-believers cannot go forward, because they depart from opposing assumptions.

Objections to eugenic enhancement must be secular, not religious, as Sandel recognizes. His objection is that "genetic erodes our appreciation for the gifted character of human powers and achievements", transforming the "three key features of our moral landscape—humility, responsibility, and solidarity" (Sandel 2007: 86). This seems to be a secular non-theological objection to genetic enhancement. The idea is that genetic enhancement can diminish the human "social basis of humility", since "the awareness that our talents and abilities are not wholly our own doings restrains our tendency toward hubris". Great parts of what constitute our individual talents are not accomplishments for which we are responsible, but gifts for which we are indebted. If it were possible to change this natural circumstance by means of voluntary actions, there would not be any place for humility anymore, and its serious consequence would be what Sandel calls "not an erosion, but an explosion of responsibility". Since humility is related to solidarity, the consequence would be an even more individualistic world than the one we live in today. The fact that there are several human differences that are resultant of circumstances we are not individually responsible for is a fact that claims for our solidarity. If we were to live in a world where all people were able to change themselves by voluntary decisions, there would not be any reasons for empathetic solidarity.

If widespread enhancements can really put human solidarity at a risk of total extinction, this is something we should worry about; but this argument clearly depends on contingent facts and evidence. Would the enlargement of our actual scope of

responsibility really become our problem? Would human solidarity depend solely on the recognition of human frailty over nature? It is more plausible than the discovering of new technologies that permits us to surpass our actual limits will give rise to new limits and to the need for new and incessant search for newer technologies, and so on.

Some thinkers believe that enhancements can have favorable political consequences. See, for example, Norman Daniels's approach on enhancements and the political issue of equality of opportunities (Daniels 1981, 2001, 2007; Buchanan et al 2000: 109). Equality of opportunity requires eliminating all disadvantages deficits in capabilities for which an individual is not responsible, whether or not they are the result of diseases or injuries, or merely of bad luck resultant from natural lottery (Buchanan et al 2000: 108). The idea is that contingency in natural lottery, as well as any other contingency resultant from disease or disability, is also morally arbitrary. This view runs like this: since social distribution of goods cannot be arbitrary (people should deserve what they have, otherwise the distribution is unjust), morally arbitrary unequal distributions should be corrected. If the argument is good, this includes not also diseases and disabilities, but natural endowments. Unequal natural endowments can be compensated by social policies (for example, by positive discriminations, or by accessibility conditions for persons with congenital disabilities); but if we could eliminate those inequalities by genetic interventions, it would be even better. In this case, the same rationale that requires treatment for diseases and disabilities would be used to support the argument that genetic enhancement for all is required for the sake of equality. Now, the argument can be advanced to sustain a more "positive" idea that, if a genetic enhancement in human capabilities would be available and safe, it would be of interest of all human beings, since this would imply that our natural endowments, being what they are, are less capable than they could artificially be. Equality would require an equal universal change in human capabilities, including genetic interventions.⁶

⁶ One problem in this argument is how it faces the "leveling-down objection" (Parfit 2000; Crisp 2003). If equality (as such) is what matters, would we have permission

But, cautiously, those liberal philosophers also argue that human enhancements can present possible threats to equality (Buchanan et al, 2000; Habermas, 2001, 2010). This is a different kind of bioconservative stance. Here the complaint is on issues of distributive justice. The privilege to enhance could draw attention to human inequalities, especially in opportunities and power. The new inequalities would not give to the worst of any advantages neither a better position regarding their previous situation, and this would not satisfy one of the requirements of Rawls's difference principle. But this is not an objection of principle, because, if it were possible to adjust those new inequalities by means of redistributive policies, enhancements should be welcomed and even required. It is hard, then, to see this objection from mere inequalities as a reason to forbid enhancements. It seems that only a strict egalitarian view based on the legitimacy of envy in redistributive justice could afford arguments against the non-obligatory permissibility of genetic enhancements. But this cannot be the Rawlsian view as such. Envy is not a legitimate principle in Rawlsian contractualist approach (Rawls 1971, 464ss). As Aristotle remarked (in *Rhetoric*), envy is "pain at the good fortune of others" (Aristotle 1386b 20; 1386b 21-25). If the good fortune is undeserved, the emotion felt is not properly called envy, but *indignation*. So, inequalities in capabilities generated by eugenic enhancements are only contrary to human dignity if they can be rightly considered as *unjust*, that is, if they resulted from *injustices*.

Moral Enhancement. Thomas Douglas claims that if, in the near future, there were to exist moral enhancements (as, say, moral enhancer pills that can alter some person's emotions, bringing it about that the person will expectably have better motives than she would otherwise have had if she had not taken the pill), assuming

to use genetic biotechnologies to change the well-off individuals reducing their capabilities for the sake of attaining strict equality regarding the worst-off ones? Suppose we do not have means to change the worst-off for the best; but we do have means to level down the capabilities of better-off persons, making them equal to the worst-off. Wouldn't it be weird to think that equality would still require an equal universal change in human capabilities?

also that she could freely choose whether or not to morally enhance herself, her decision would be made for the best possible reasons (whatever they might have been). Hence, with these restrictions applied, moral enhancement would certainly be morally permissible (Douglas 2008: 233-234). In fact, this is exactly what happens with some medical treatments for some psychiatric disorders as, for instance, depression. A person that takes medication for depression plausibly expects to have better motives she would otherwise have had (if she didn't take the medication). Those motives are not usually thought as "moral" motives, but they certainly can be. A depressive person may not want to be negligent with her children or with her duties. Since there are other reasons for not being depressed besides her subjective unhappiness, a person can have reasons to take an antidepressant also for those other reasons too; and those reasons can certainly be *moral* reasons as well.

Douglas considers a version of Sandel's argument against enhancement as a possible objection against moral enhancement. Engaging in moral enhancements would express an insufficient acceptance of "the given", and this would constitute a reason from not enhancing oneself. Douglas recognizes that entertaining the desire to moral enhance implies a kind of deception, a non-acceptance of one's traits, including those that are not resultant of one's voluntary decisions (for example, one can conclude that one's temper is outside one's own control, as a result of one's natural endowments). He thinks nonetheless that this is not a reason to exclude moral enhancements as possible options. Douglas is right: why would this recognition preclude one to believe that he has good reasons to morally enhance oneself if possible, desirable and safe? That is, why would one not desire to change those undesirable traits? It is implausible to think, thus, that the mere fact that our traits are given can constitute good reasons for not enhancing them, notably if these traits are bad or even simply undesirable. Since moral enhancement is essentially non-prejudicial to other persons, it is permissible (if it were harmful to others, it would not be called "moral" enhancement). Hence, if moral enhancements are feasible (and there are evidences that they will be feasible soon), most people will find them reasonable and desirable, since moral enhancements will be likely good or even better options for them

without compromising others' best interests.

Ingmar Persson and Julian Savulescu (2012) extended the argument for moral enhancement arguing in turn that moral enhancement is not only permissible, but also morally *imperative*. They think that moral enhancement is urgent, and that all other kinds of enhancements, notably cognitive enhancements, are perilous without the moral. The reason is that, since it is easier to cause harm than benefit by a single act in the same proportion, and since cognitive and physical enhancements can facilitate the use of instrumental means for the sake of bad or harmful ends without moral enhancement, humanity can worsen their present serious predicaments, including the menace of terrorism and the environmental crisis.

Persson and Savulescu think that human emotional capabilities are unfit for the problems faced by humanity today. Humans are endowed by altruistic motivations, but they are, as David Hume described, parochial and limited. We have a bias in empathy directed to our nearer and dearer; the consequence is an insensibility to non-human animals and distant persons. Future persons are also outside the scope of our empathy, and since they are future, they are not actual individuals with real claims against us. Our sense of justice is also limited. It is mainly egoistically driven. Our notions about responsibility are causally-based; we overemphasize agent's responsibility for their actions, but not for their omissions. The result is a huge negligence with the well-being of future generations. Persson and Savulescu conclude that a moral biotechnological radical reform in our moral endowments is our best, if not our only, sensible alternative. Otherwise, the consequence will be violence and severe restrictions to freedom and present human facilities.

Persson & Savulescu's feelings are pessimistic, and their advice is radical: moral enhancement is urgent and morally imperative. It must be considered not only permissible, but also obligatory. One conclusion is that moral enhancement, when available, should be implemented by public policies, even compulsorily. But this implies to oblige and even to force people to be submitted to enhancements even against their consent. Nonetheless, Persson and Savulescu think we do not have other

better alternative. Without moral enhancement, human societies will eventually become even less liberal, for there would not be any more alternatives to prevent the progress of environmental deterioration or the risk of total human extinction.

Are their arguments sound and good? I'm not sure. For example, cognitive enhancement would be an ultimate weapon in the hands of the morally bad only if we were to fear the small probability that even perverse people would likely prefer to destroy humanity instead of causing a little damage to their pinkies. Nevertheless, terrorists are perverse idealists, but not psychotic lunatics. In the case of the actual environmental crisis, the argument is only valid if it is true that cognitive enhancement without moral enhancement will almost likely accentuate our egocentric tendencies of neglecting the welfare of others. In this case, forbidding cognitive enhancement would be an imperative option. Nevertheless, in the case of environment, there are several alternatives that depend on our actual restricted sympathies and sensibilities. If Hume is right that "reason is" (at least in some sense) "a slave of our passions", why should we think that cognitive improvements were dangerous to us? And, in the case of the risk of cognitive enhancement, as Cinara Nahra remarks, even if it were true that some cognitive enhancement could offer political risks without previous moral enhancement, this is not a reason to stop researching and even implementing cognitive enhancements, since it would be plainly possible to regulate both uses at the same time (Nahra 2012: 69). Precautionary measures can be taken as means for the sake of improving the best likelihood of social benefits of both forms of enhancements, reducing the likelihood of such risks and improving the safety of new technologies (Azevedo 2012). And certainly those measures can (and must) be implemented without forcing people to do things against their will.

Enhancement, priority and public policies. We still don't have efficient means of human enhancement—and by that I mean a drug or technology that has been proved to be efficacious, effective and also cost-effective, that is, efficient. Cost-effectiveness implies evidence of effectiveness, a very low rate of non-serious side effects

at an acceptable cost. In the case of enhancements, the threshold for cost-effectiveness is even less plausible than in the case of medical treatments. As Chatterjee remarked, in diseases, we weight risks of treatments against potential benefits (Chatterjee 2013). A person with a serious disease (with a high rate of morbimortality) is reasonably prone to accept treatments of higher risks of side effects than a person with a mild disease. Since it is healthy people who employ enhancements, there must be strong evidences that the cost-benefit is great and the risks, very slow.

Let us suppose that scientists become successful in producing safe drugs or safe technologies for cognitive, physical and moral enhancements widely. Would we take those new advanced techniques objects of social policies and rights? Would all people have a right to those actions and new services?

Transhumanists usually think that we should consider enhancements with the same status we consider health care and other social benefits. Nick Bostrom and Rebecca Roache think that we should seek to develop and make available human enhancement options for the same reasons we develop and make available medical treatments, that is, "in order to protect and expand life, health, cognition, emotional well-being, and other states or attributes that individuals may desire in order to improve their lives" (Bostrom & Roache 2008). Savulescu defines human enhancement as "any change in the biology or psychology of a person which increases the chances of leading a good life in the relevant set of circumstances" (Savulescu et al 2011: 6; Savulescu 2006: 324). It's a comprehensive welfarist view, and by this definition health is also an enhancement (actually a sub-class of enhancement).

One consequence here is that health care as such does not deserve any kind of priority within public policies. But this view has some problems. People have different views on what constitutes a good life. Suppose a person, let's say, a young woman called Amanda, who believes that health is not characterized by any objective parameter, but by the presence of a state of spiritual self-satisfaction. Following her belief, she claims a drug that enhances her feelings of pleasure and enjoyments arguing that the drug will make her healthier. Suppose that her physician disagrees. The

physician's expert opinion is that the drug will likely cause a serious disease (let us suppose, in some important organ, like the liver). The physician then argues that he cannot prescribe the drug, since it will cause a serious liver disease, in spite of its benefits for the mind. Amanda interjects, saying that the physician is wrong, for health is a state of spiritual wholeness and not something that occurs in her liver. The physician disagrees, saying that her health is a state that promotes the best likelihood of resisting premature death, serious diseases and disabilities. But Amanda objects on the grounds that death does not constitute harm (since it is the complete extinction of any sensation or mind), so death is not what matters; even disease does not matter, she adds, for if it were possible to have a life constituted 100% of enjoyment, diseases do not matter. According to her, health is a complete state of satisfaction and pleasure in life that not depends of the lifespan and of any other possible hazards, since all of them can be handled with resiliency.

If the disagreement is about what constitutes subjective well-being for this individual person, it is difficult to agree that the physician is an authority on this matter. But if the disagreement is about *objective* well-being, then perhaps the patient is wrong (even if Amanda is right about what constitutes well-being in the subjective sense, in her case). The problem now follows like this: would her subjective interests constitute sufficient ground for a claim-right, specially if she lives in a country whose government has a duty to provide basic or even complete well-being for all its citizens? If the answer is "no", then welfarist policies on well-being (or in the promotion of a good life for all citizens) must be grounded in some objective standards.

Now, if there has to be an objective standard, since all societies have limited resources to invest in their public policies, what are society's priorities? If health is a sub-class of well-being and healthcare is a sub-class of enhancements, would it be sensible to give healthcare policies priority, or should, all forms of well-being, including enhancements beyond health, be promoted by public resources? If it makes sense that healthcare is the priority, then there should be a relevant distinction between the aims of promoting health and the aims of promoting enhancement.

A plausible welfarist explanation can be referred to Derek Parfit's arguments for what he calls the *Priority View* (Parfit 2000), to Harry Frankfurt's view on claims for *sufficient* resources (Frankfurt 1988), or to Roger Crisp's *compassion-based sufficiency* principle (Crisp 2003). Healthcare needs are not homogeneous between people. Hence, it is difficult to sustain that people have an equal right to healthcare, since its equal distribution is always less or above the necessary for each patient or individual case. Some people claim that this suggests that a just offer of healthcare requires not exactly "equality", but "fairness". But what is the difference between these two? It is argued that "fairness" means to give each and all persons what is necessary; rights are viewed as response to social needs (Negri Filho 2006). But individual needs are not always on a par with the supposed social or *common* needs. Preventive medicine is a common or social need, but the treatment of chronic non-transmissible diseases is not a need shared by all citizens. And why society should have a duty to supply each person with what they need? Should they provide for all of their needs, or only for *basic* ones? Are basic needs *sufficient*? And, if there is conflict between social and individual needs, even basic needs, which one should prevail?

Why not think that what is socially desirable is to supply each one the *sufficient* amount for a good life (Frankfurt 1988)? It is plausible that those rights to healthcare are, in fact, specifications of rights to *sufficient* resources to warrant a decent minimal form of a salutary well-being. Those rights represent *heterogeneous interests*, and are not necessarily "common" (hence, they cannot be equally distributed). They are non-comparative special interests (Feinberg 1974) grounded in the value of preventing states below an absolute minimal level of well-being. This is the essence of Derek Parfit's *Priority View*. Health is plausibly a kind of absolute minimal-level of well-being: it is a state of lesser likelihood of mortality, morbidity and disability for individuals of a same reference class of individuals or population group (Azevedo 2002). If this is reasonable, then there is a justifiable difference in importance between health and enhancements. Enhancements are not politically claimable interests; they are not things we owe to each other. Why? Because it is not reasonable to claim that our fellow

citizens should sacrifice their interests for the sake of our own advantage, if this advantage is beyond a basic threshold, that is, beyond what is enough for having a decent good life (in other words, only advantages below this threshold are socially or politically required). So, even if *mere* enhancements are desirable and permissible, they are not warranted by the same political justifications that ground public policies; they are not then, at least not *prima facie*, issues of rights (that is, fundamental rights) against governments or public institutions.

Enhancement and Medical Ethics. Several physicians see enhancement technologies as highly problematical. The contrast between enhancement and treatment is used to highlight this concern. In medicine, it is customary to think that, if a treatment does not protect, promote or rehabilitate health, then it is either innocuous or may have negative effects on patients. In this circumstance, the old principle of *primum non nocere* goes hand in hand with the Precautionary Principle: it is better to be safe than sorry. The idea seems to be that if one does not have proof that the enhancement technology is safe, it should be forbidden. In this pretense, mere enhancements should be forbidden and medically nonadvisable, since they are iatrogenic in the physicians hands, at least potentially so. But, what if therapy does not have any significant side effect? In this case, are physicians compelled to recommend it? The problem is that if there is evidence that a medication is beneficial, not prescribing it in the course of care implies negligence. Suppose that medicine comes to include enhancement objectives within its aims; in this case, should the same rationales that are applied in the context of treatments be extended also to new enhancement therapies?

Physicians have duties to prescribe their patients the best alternatives of treatment available to each individual case. Patients also have rights to informed consent and they also plausibly have rights against "losing opportunities". Imagine that eugenic techniques become available in the future. Or suppose that we will have therapies that, without significant harms, can enhance our hearing abilities beyond the normal. If a physician does not

recommend them, would we say that the patient has lost an opportunity? Would it be an instance of negligence, hence, a kind of medical malpractice?

Suppose that drugs for attention enhancing and sleep reducing become available and safe, and that there is evidence that health professionals who use such drugs enhance their work performances during duties, especially in situations of emergency. In this case, if a physician or nurse did not take her pill, and if their patient died in the course of some emergency care (surgery, for example), should we say that those professionals were responsible and are hence liable to ethical, administrative or penal faults (Maslen 2013)?

As remarked above, there is also the problem of the magnitude of risks that is acceptable in enhancement therapies. Physicians usually face simple dilemmas when treating diseases with drugs or procedures with acknowledged side effects. Consider the case of a mild cold. Since the disease is mild, as the name says, and the prognosis of recovering is almost a hundred percent in healthy subjects, the prescription of symptomatic drugs represent a difficult decision. Some drugs can relieve symptoms, but they improve the risk of fatalities or emergencies in a higher ratio than the conservative method. Vasoconstrictors can cause cardiac arrhythmias. Is it safe to take a symptomatic pill for a benign disease even if the pill has possible, however rare serious side effects? The same question can be posed in the case of enhancements. Physicians usually think that medications are not indicated, and they can be sometimes unadvisable if they present more risks to health than the very disease. Some think that, if a physician prescribes a drug without indication, he or she is completely responsible for all kinds of unintentional predictable harmful consequences (even if the likelihood of harm was predictably low). It could be argued in the case of enhancement prescriptions that physicians have strict liability in the case of harm.

Other physicians think that this is wrong. Medical prescriptions of enhancer drugs are like justified symptomatic prescriptions. Now, symptomatic reliefs are also one goal of medicine. Pain justifies the use of analgesics, and painkillers also have possible and predictable side effects. Neuroenhancers could be

seen under the same light. A patient who claims to be less mentally productive would, in this case, be manifesting a symptom that causes suffering and that consequentially deserves medical attention. James Gordon, clinical associate professor of neurology at the University of Washington, agrees that physicians do not have obligations to prescribe treatments that are not medically indicated; he amends that prescription "depends on the identification of a disorder and on the existence of a treatment sufficiently safe and effective to counterbalance any risks that such treatment might entail" (Larriviere 2009: 12). Gordon thinks that a patient who disclaims low productivity is experiencing a mental disorder; but what if the patient is not actually experiencing such suffering? What about if the patient's goal is solely to become more productive?

Some short-term realist perspectives. Sometimes, philosophical appraisals (or criticisms) on the use of enhancement drugs or therapies go beyond what is actually available. We should not overestimate the efficiency of enhancement therapies (Repantis et al 2010). We are in need of more studies, specially randomized clinical trials or comparative cohorts about the efficiency of these therapies.

Bostrom and Sandberg suggest some realist convergent perspectives on the safe use of enhancement technologies. They think that cognitive convergent "enhancement is already in widespread use, but not recognized as such", like "the morning coffee, the crossword, the e-mail program, and the cell phone are all part of our cognitive enhancement infrastructure" (Bostrom & Sandberg 2006: 216). They suggest that extending our minds (Clark & Chalmers 1998) by means of such substances and devices is a widespread practice of cognitive enhancement. Softwares are becoming "less an external tool and more of a mediating 'exoself'" (Clark & Chalmers 1998: 211). In this more realist fashion, enhancement is a real possibility.

Bostrom and Sandberg also remark that the actual cognitive enhancing effects of medical drugs like Methylphenidate and Modafinil in healthy subjects constitute a serendipitous unintended benefit. Progress in this area might accelerate if pharmaceutical

companies were able to focus directly on developing nootropics to be used in non-diseased populations rather than having to work indirectly by demonstrating that the drugs are also efficacious in treating some recognized disease (2009: 331).

But cognitive expansion by means of smart pills has "gains and losses". Some researchers advise that the cognitive gain can be illusory (Dommett, Devonshire, Plateau, Westwell & Greenfield 2010).⁷ And there is some evidence that layman and philosophers overestimate the cognitive benefits of some drugs, like methylphenidate, in healthy persons (Repantis et al 2010). In fact, we still do not have uncontroversial evidences favoring the idea that human cognition is widespread or universally enhanced by those chemical or environmental means; nonetheless, it is plausible to say that enhancing-cognition means can have some convergent effect on our general cognitive capabilities (Bostrom & Sandberg 2006).

Other means of cognitive enhancement are more controversial. The invasive use of devices to improve cerebral activity needs much more time of research to warrant safety. Miguel Nicolelis and his research team (2013) have shown that it is possible to make two different individuals's brains interact by means of direct stimulation. But it is not clear at all how this could represent enhancements for human beings.

In the case of moral enhancement, studies on the

⁷ Baroness Susan Greenfield, a leading neuroscientist, created a new term, "Mind Change", that represents her worry that something similar to the "Climate Change" is happening as a consequence of the widespread use of some information technologies by people at large, but specially by children. She remarks on the difference between information and understanding (which involves not only information, but "cocking up" them), and argues that evidences show that those huge access to information, screen and fast information, are stimulating brain adaptations, but those adaptations are associated with distraction, loss of attention, and, sometimes, increases in forms of autistic behavior (see: <http://www.guardian.co.uk/commentisfree/video/2011/aug/15/susan-greenfield-video>). But the reactions against her are also strong, saying that her warnings are grounded not in evidences but in only a speculative hypothesis. Dorothy Bishop, a professor of neuropsychology at Oxford, in an open letter to Greenfield, replies that there is strong evidence that the rise in autism was down to a widening of the diagnostic criteria and better understanding of the condition by medical practitioners. But this possibility of course does not exclude Lady Greenfield's hypothesis. So, there it remains an open issue to new researches.

neurochemical role of oxytocin in the modulation of moral emotions seem to offer interesting and feasible perspectives (Zak, Kurzban & Matzner 2004; Barraza & Zak 2009; Zak 2011, 2012). Oxytocin is widely used in Obstetrics to stimulate uterine contractions before and after childbirth.⁸ It is used also as a galactagogue (substance used to increase breast milk) by means of a nasal spray drug product (Syntocinon spray nasal). In this case, oxytocin is absorbed first by the nasal mucosa, and then goes to the Central Nervous System through the blood system; but the brain effect lasts for less than an hour. There are still insufficient evidences that galactagogue's supposed effect is clinically effective (Anderson & Valdés 2007). Behavioral studies on empathy have shown that oxytocin enhances trust and compassion, but those studies did not evaluate the efficacy and efficiency of the available preparations of the intranasal administration of oxytocin in the production of stable and sustained behavioral dispositions. It seems that exogenous oxytocin is only useful in researches. Paul Zak, one of the most enthusiastic scientists studying about the positive role of oxytocin in the promotion of trust and compassion, thinks that, at least nowadays, the best way to promote oxytocin-induced altruistic behavior is by means of hugs, not drugs (Zak 2012).

Transhumanists think nonetheless that even the scientific findings on the role of oxytocin in empathy are not exciting, since some researches have shown that people with higher levels of oxytocin are more prone to sacrifice individuals of different groups from theirs, showing that human oxytocin-induced empathy is biased (as expected) regarding our nearest and dearest. So, we should not expect exogenous oxytocin-induced empathy to have an effect much beyond the circles of our friends and fellows (Persson & Savulescu 2012). An experiment conducted by Carsten de Dreu and collaborators (2010) put individuals in two different groups playing an economic game. One group received oxytocin, while the other was given a placebo. The study showed that the oxytocin group behaved more altruistically towards members of their own group,

⁸ Oxytocin exerts a selective action on the smooth musculature of the uterus, particularly toward the end of pregnancy, during labor, and immediately following delivery. Following parenteral administration, uterine response usually occurs within 3 to 5 minutes and persists for 2 to 3 hours.

but they also displayed more defensive aggression toward outsiders, preemptively punishing members of a competing group whenever their own group was in danger of suffering a financial loss. Thus, there is a "prickly" side in oxytocin's role on human behavior (Miller 2010). Oxytocin effects are more nuanced than was previously thought, besides varying from person to person and depending on circumstances and even culture (Kim 2010); it is not, hence, "an all-purpose attachment panacea" (Bartz 2010). It is a neurohormone related, on the one hand, to the stimulation of cooperation and trust, thus promoting bonds between human beings; but the same hormone, as was shown by De Dreu and Bartz independent studies, seems to be related to a "tend and defend" response, promoting in-group trust and cooperation, but also stimulating a defensive attitude towards outsiders. Moreover, there are evidences that this defensive attitude is complemented by the proneness to punish misdemeanor behaviors, a moral attitude pushed by another neurohormone, testosterone (Zak 2012). So, compassion and justice are social virtues physiologically modulated by a *tag team*: oxytocin commands our proneness to compassion; testosterone, our proneness to punish violations of fairness and justice.⁹

These studies on the interaction of hormones like oxytocin and testosterone in the (*allostatic*) modulation of human emotions represent a progress in the knowledge of the neurophysiology of human emotions.¹⁰ They are a valuable step towards the understanding of our moral brain. Following these theories about the neurochemistry of moral emotions, it is plausible to say that human morality is, in fact, a social expression of different systems combined in the long run of human (biological and social) evolution. Taking this into account, to enhance morality might mean, in one

⁹ Paul Zak suggests that our brains react to two different systems; one of them is HOME (Human Oxytocin Mediated Empathy), with oxytocin in the apex commanding the deliverance of dopamine and the anti-depressive hormone, serotonin. The other system is TOP (Testosterone Ordained Punishment), with Testosterone in the apex (delivering dopamine as a reward in the act of enforcements of "justice") (see Zak 2012). Note that, if this is true (and there are sound evidences that it is), then even the "cautious jealous virtue" of justice that Hume thought was (in a sense) "artificial" is also biologically *natural*.

¹⁰ On the concept of *allostasis*, see McEwan (2012). On the application of this concept in Psychiatry, see Grande et al (2012).

sense, artificially enhancing some branch of this whole mechanism in order to appropriately react to circumstances that require more or less empathy; in another sense, it means to change completely their actual balance and functioning. If we are not satisfied or proud of this peculiar natural fusion of traits we've inherit (in its general fashion) from evolution (a parochial altruism combined with a cautious sense of fairness), perhaps the best alternative is to go beyond and attempt in a *complete* change (Persson and Savulescu 2012), by changing our genetics or at least its phenotypical expression. This is the transhumanist suggestion. But if we are proud of our moral endowments and sufficiently optimistic on the powers of our actual neurophysiologic frame, then to enhance morality means nothing more than to improve ourselves (by means of pills, education and so on); in this case, enhancement does not imply to change our nature, but only to enhance its expression (that is, its *actualization*).

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