Human Presence and Robotic Mediations: An Alternative Framework for Explicating Human Enhancement[*]

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ABSTRACT

In this essay I propose an alternative theoretical framework for explicating human enhancement. The framework is based on the concepts of reciprocity, which I consider a fundamental aspect of human presence, and of mediation, which I consider a fundamental aspect of the relation between human beings and science and technology. I argue that enhancement is given by the way in which technological and scientific mediation alters the structure of the network of reciprocity characterising human presence. As a matter of fact, technological mediation may turn the reciprocity of presence into a unilateral relation, which prevents any form of response. The lack of responsibility, here understood as the possibility to respond back, is determinant for the generation of a situation of power and for eliciting moral disengagement. The framework will be applied and discussed with reference to robotics technologies.

> In my opinion, there cannot be progress in the field of technology unless by means of criticism. We cannot be interested in a technological product unless we are interested in its negativity
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> (Virilio, 1995).

1. Introduction

Is technological and scientific evolution an unavoidable aspect of human nature? With respect to all animal species, human beings are paradoxically the less fitted for surviving in the natural environment, since they lack a specific instinctual baggage. Nevertheless, the lack of instinctual capabilities is compensated by technological and scientific actions, which are a distinctive feature of the human species, turning human beings into the most adaptable and powerful of all living animals (Gehlen, 1988 [1940]).

From stones to computers and now robotics, the primary and original function of technological and scientific development has been to provide human beings with the tools and knowledge necessary to tame and exploit the natural environment as well as to protect and improve the frail nature of the physical body. As a matter of fact, while science is usually described as concerned with understanding the natural world, technology is usually described as 'the innovation, change or modification of the natural environment, in order to satisfy perceived human wants and needs' (ITEA, 2000/2002).[1] However, even if the contrary were true, it would have been impossible to prove it today.

Whatever it is the relationship between human beings and technological and scientific development, with respect to the time in which the wheel was invented and the fire discovered, it is unquestionable that the natural environment has now become increasingly artificial, that is, pervaded by cultural artefacts. Moreover, technological and scientific advancements have started to produce negative consequences on human beings and on the natural environment (e.g. pollution). Some of these negative effects are even independent on how well or bad we use technology (e.g. internet addiction). To say it with John Culkin 'we shape our tools and thereafter they shape us' (Culkin, 1968). In other words, it seems that there has been a reversal between goals and means: science and technology are no more needed only for mastering the natural environment and protecting (and extending the limits of) our human body, but they have become indispensable to master the complexity of scientific and technological development itself and repair to the problems it causes (Galimberti, 1999).

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[1] Taking into account current scientific research trends, in particular in the field of biotechnologies, I would update this definition by including "the human body" among the targets of technological innovation, change and modification.

Due to the above and several other reasons, such as the almost unlimited possibilities offered by science and technology and the relevant role played by economic interests in steering scientific and technological objectives,[2] the need to find a limit and a meaning to technological and scientific evolution is becoming increasingly urgent.

There exist many theoretical frameworks for defining and evaluating the ethical implications of scientific and technological enhancement (Sadler, 2010; Allhoff et al., 2009; Chadwick, 2009; Savulescu, 2006). It will be too ambitious for this essay to discuss the ethical frameworks proposed in the literature. Very shortly, the author's position is that the limit should not be between development and enhancement, since development is, actually, enhancement. Neither should the limit be sought in the difference between therapy and non-therapy, since clothes or automobiles are not therapeutic devices, but, nevertheless, can be legitimately considered as forms of human enhancements. It is the author's contention that every technology, whether material or immaterial (such as language) and all scientific discoveries that heal or improve the condition of human beings should be considered as a form of human enhancement.

In this essay, I argue that enhancement is characterised by a constant and, in many cases, necessary escape from the natural order of things caused by the mediation brought about by science and technology. Quoting from the call of paper of this special issue, human enhancement consists in 'the replacement of the order imposed by nature with the human order'. With technological devices and scientific knowledge human beings can alter the relationship with the natural environment and can modify the nature of their biological bodies. On the one hand, altering the relations with the natural environment and modifying the human body is necessary, since it allows human beings to survive and, on the other, problematic, since it reduces human presence in the world and bring about power relations among living beings and between human beings and the environment. On the contrary, I argue, presence always implies a moral dimension given by the reciprocal structure of the relation.

The purpose of this article is to provide an alternative theoretical framework for explaining and evaluating the ethical implications of technological and scientific forms of human enhancement. While most of the

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[2] Today, the interaction among genetics, neuroscience, ICTs, and robotic technologies, is making possible even to think of "building" human beings.

discussions on human enhancement focuses on biotechnologies (e.g. Ritalin), this article is concerned with robotics technologies.

The article is organized as follows: in the next section, I shall outline the main features of the theoretical framework proposed and explain the concepts of presence and mediation. In Section 3, I shall apply the framework to robotics technologies and discuss its main effects.

2. The Theoretical Framework – Presence and Mediation

In my opinion, enhancement cannot be discussed without firstly analysing its two main components: on the one hand, the human being and, on the other, science and technology. In other words, without taking into account both human presence – that is, the way of being in the world – and technological mediation - that is, the way in which science and technology mediate human beings' actions and perception of the world, namely presence.[3]

The theoretical framework I propose in this essay is based on the concept of presence, which I understand as fundamentally connected to that of reciprocity, and on the concept of mediation, which I see characterised by two apparently opposite but complementary effects: *extension* and *detachment*. In the next section, I will explain in more details both concepts.

2.1. Presence as reciprocity

Presence is a concept used in many different fields, from philosophy and religion, to business, media, and art. In order to describe what I mean by presence, I will use some insights from the art world, in particular from the field of theatre.[4]

In theatre practice, the word presence can have different meanings. It can refer to the actor's "charisma" (i.e. authenticity or possession), or to the simple fact of "being in the presence of somebody", that is, sharing a space and a certain amount of time with somebody else.[5] However, there is an explication

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[3] With the word technology I refer also to science, which is the 'underpinning of technology' (ITEA, 2000/2002).

[4] Is it not the theatre the mirror of the world, the metaphor – *par excellence* – of the human life? Calderon de la Barca's 'el gran teatro del mundo' and Shakespeare's 'all the words is a stage' are just two of the most popular statements confirming the strong relationship linking the art of theatre and that of life together.

[5] For a more detailed discussion of theatrical presence see Roger Copeland's already cited study (Copeland, 1999).

of presence which I consider illuminating both for describing theatrical presence as well as for explaining human presence in the world. I refer to the definition given by Roger Copeland who links the phenomenon of presence to the principle of reciprocity: 'presence in the theatre has [...] to do with [...] the way in which the architectural and technological components of the performance space either promote or inhibit a sense of "reciprocity" between actors and spectators' (Copeland, 1990).

Such a conceptualization of theatrical presence shows a fundamental difference with respect to all the explanations mentioned above, since presence is no more considered as a subjective property possessed by either actors (i.e. charisma or authenticity) or spectators (being in the presence of the actors), but it becomes a "relational and mutual experience", which is given by objective circumstances.[6]

Drawing on such a conceptualization of theatrical presence, I propose to understand the more general phenomenon of human presence as *the way in which natural (physical as well as cognitive) and/or artificial (i.e. deriving from culture, including science and technology) factors/conditions either promote or inhibit a sense of reciprocity between two or more people or between a person and the environment* (Salvini, 2006).

Reciprocity is the condition which allows a mutual exchange, immediate or deferred, between a subject and a part of his/her body, between a subject and another subject (i.e. human or animal) and between a subject and the natural environment. For instance, when I touch something or somebody, since I am part of the tangible world, I am also touched by that something or that somebody. Likewise, when I see something or somebody, since I am part of the visible world, I am also "seen" by that something or that somebody.[7] I refer to such a mutual condition as presence.

To conceive of presence as characterised by reciprocity, is to question the explications of presence based on subjective perceptions and unilateral activities.[8] I argue that being in the world is not a univocal act of mind or body,

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[6] In addition to the architectural and technological components of the theatrical space, I consider determinant for the production of presence in the theatre also the subjective circumstances of both actors and spectators, for instance an actor's bad mood may inhibit the sense of reciprocity with the spectator.

[7] I refer to Maurice Merleau Ponty's notions of "intertwining" and the "flash" (Merleau Ponty 1968[1964]).

[8] Explications of presence based on subjective perception and unilateral activities are widespread in media studies, where presence is understood as the experience of perceiving the environment through either first order or second order mediated perceptions, that is, by the human senses and perceptual processes as well as by human-made technology (Lombard and Ditton, 1997). On the contrary, my contention is that presence is

but is a relational act, which involves both the mind and the body simultaneously in a reciprocal exchange with others and the world: 'our being in the world is far more than just "being". It is a "presence", a "presence" that is relational to the world and to others (Freire, 2001).

Although up until now no study on presence has postulated the relevance of reciprocity in the working and experiencing of presence, I argue that such link can be inferred by taking into account many different disciplines. In philosophy, Maurice Merleau-Ponty (1968 [1964]), Edgard de Vries (1968), Mikhail Bakhtin (1981), Jacques Derrida (1982), Martin Bauber (1987); in cybernetics Norbert Wiener (1954),[9] media studies Jean Baudrillard (1981); in evolutionary and biological studies Humberto Maturana and Francisco Varela (1980); Gregory Bateson (1972); in cognitivist sciences James Gibson (1966), etc.[10] In a study on evolutionary biology, the principle of reciprocity has been described as the mechanism operating in natural selection and explaining the existence of biological systems, such as human society, which, contrary to current assumptions which favour strong and selfish attitudes, are based on altruistic and cooperative interactions (Nowak & Sigmund, 2005). However, as pointed out by Tom Lombardo:

> Not only has reciprocity served as a primary mechanism for the creation of biological and social complexity, but it provides a universal principle upon which human values and ethics are defined. Reciprocity is the foundation of the concepts of justice, equity, and perhaps even human care and kindness (Lombardo, 1987).

Indeed, the condition of presence implies always an ethical dimension – one of responsibility – which arises from the awareness of being in a relation of reciprocity with others and the environment (of course, moral responsibility is also culturally and socially conditioned). As a matter of fact, reciprocity implies

to accept something and to return something). However, to return something

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a relational experience (Salvini 2006). Indeed, there are artists in the field of "telepresence art", such as Roy Ascott, Paul Sermon, and Eduardo Kac, whose intention is to replicate presence at a distance not by providing "users" with immersive or interactive experiences, but by recreating reciprocal relations (Salvini, 2005).

[9] In particular, I found interesting the debate between "vitalist" and "reductionists" and the prominence given by both schools of thought to the feed-back loop, or self-regulation capability, that is, to the ability to adapt to the environment, which is given by reciprocal connections (Cordeschi, 1998).

[10] This is not an exhaustive list.

implies to possess something to give back but also, and most importantly, the possibility to have access to the receiver. As pointed out by Jean Buadrillard:

> The totality of the existing architecture of the media founds itself on this pattern definition: they are what always prevent response, making all processes of exchange impossible [...]. This is the real abstraction of the media. And the system of social control and power is rooted in it (Baudrillard, 1981: 170).

According to Baudrillard, the lack of responsibility corresponds to an impossibility to reciprocate:

> Power belongs to the one who can give and cannot be repaid. To give, and to do it in such a way that one is unable to repay, is to disrupt the exchange to your profit and to institute a monopoly' (Ibid., 170).

Therefore, besides an ontological condition, presence implies also an inherently political condition, characterised by an equal balance of powers and by a moral attitude among the subjects of the relation.

As I shall point out in the next sub-section, technologies affect the condition of reciprocity typical of presence and can alter the power relations.

In order to understand how science and technology destabilize presence and bring about power relations, it is necessary to focus on their effects of mediation.

2.2. Technology as Mediation

'Technology extends our abilities to change the world: to cut, shape or put together materials; to move things to one place to another; to reach further with our hands, voices and senses' (AAAS, 1993). Technology and science can be analysed by taking into account their double function: as instruments to achieve a goal, but also as forms of mediation of human actions and perceptions of the world. As a matter of fact, by mediating human actions, science and technology may also affect the way we relate and experience the world.

According to the framework proposed in this essay, the act of mediation performed by technology neither is considered for its instrumental function, nor for its epistemological or hermeneutic effects. On the contrary, the focus is on human presence, that is, on how technology affects the structure of the relations of reciprocity that exist among human beings, the human body, and the natural environment. My contention is that changes in the structure of reciprocity may alter or determine power relations, moral disengagement,

abstraction and loss of values. Before turning to these issues, I need to explain in more details the act of mediation.

There seem to me to be two important aspects, apparently opposite but complementary, characterising any form of mediation, which I define the "double logic of mediation".[11] First, there is the *act of extension*, which consists in extending a physical or cognitive capability (or creating a new one!). Second, there is *detachment*, which consists in creating a distance between a human being and his/her own body, others or the outside world.

In his well-known analyses of media, Marshall McLhuan pointed out that 'the content of a medium is always another medium' (McLhuan, 1994 [1964]). According to the act of extension, for instance, a car is an extension of a carriage, which on its turn is an extension of a horse, which is ultimately an extension of our legs; likewise, the house can be considered as an extension of a dress, and a dress an extension of our skin. However, as I have mentioned before, besides the act of extension, a medium is also and always characterised by the act of separation or detachment. Indeed, by definition, any medium is characterised by the fact of staying in between something.[12] Therefore, by extending human beings' capabilities and perceptions, technology is also performing an act of separation (or detachment) between a person's action and his/her body.

The live screen can be considered as the archetype of the "double logic of mediation", as well as of its main negative effects, namely empowerment, abstraction and moral disengagement. The camera and the screen can be considered as an extension of the eye, but while bringing "things" closer and "at hands", at the same time, they keep them apart. The screen can be a window and at the same time a shield. It allows someone to see, but at the same time it screens out the visible. According to Kevin Robins, the screen is a space of visibility and invisibility:

> [t]he nature and functioning of the screen are crucial. The screen has allowed us to witness the world's events while, at the same time, protecting us – keeping us separate and insulated – from the reality of the events we are seeing. [...] The force of the screen works to make moral response more difficult

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[11] The "double logic of remediation" is a concept originally devised by Jay David Bolter and Richard Grusin in their study *Remediation: understanding new media* (Bolter and Grusin, 1999). According to their theory, the double logic refers to the desire for immediacy and, at the same time, for hypermediacy characterising new media. I have adapted their concept to my arguments.

[12] A "medium" is defined as: 'a state that is intermediate between extremes; a middle position' (WordNet, 2014).

(Robins, 1996).

With regards human presence, the double logic of mediation can either promote or impede the structure of reciprocal relations. To promote reciprocity means to replicate, multiply (also by adding new bi-directional channels) or extend the existing channels of reciprocity given by our biological body, which I consider the natural enabler and carrier of presence. For instance, while extending visual and audio capabilities a telephone or a teleconference system allow to bridge the physical distance between two or more interlocutors. However, to conceive of both of them as fully based on a reciprocal structure is to overlook the fact that the world of the tangible, that is, the possibility to touch one-another typical of an in presence situation, is completely missing. Therefore, whatever the motivations (e.g. technological limitation, functional restriction, or deliberate choice),[13] technological mediation always disrupts presence.

3. Discussion: Robotics, Presence, Mediation and Human enhancement

In the remaining part of this section, I shall apply the theoretical framework based on presence and mediation to tele-operation systems (aka tele-robotics) and discuss its relevance for the ethical evaluation of human enhancement. For the reader's convenience, I shall start by briefly describing the main features of a tele-operation system.

While it is easy to recognise a robot, to say what a robot is can be very difficult.[14] I consider programmability,[15] that is, the possibility to inscribe a certain behaviour or a set of future actions in an artefact, what defines and distinguishes a robot from another object.[16] Very simply, a robot can be

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[13] According to Langdon Winner 'in many instances, to say that some technologies are inherently political is to say that certain widely accepted reasons of practical necessity [...] have tended to eclipse other sorts of moral and political reasoning (Winner, 1980).

[14] In Joseph Engelberger's words: 'I can't define a robot, but I know one when I see one' (Engelberger, 1989).

[15] It is worth noting that according to this definition, the possibility to re-program human genetic code by means of genetic engineering (as advocated by many trans-humanists) would be more appropriate to define a human as a robot, rather than the replacement of human organs with artificial (robotic) ones.

[16] According to the International Standard Organisation (ISO), a robot can be defined as an 'actuated mechanism programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks' (ISO 8373, 2012).

programmed to be autonomous or tele-operated.[17] The level of autonomy is directly related to the concepts of presence and mediation, since it concerns the degree of human involvement in the tasks or actions carried out by the robot. As a matter of fact, in robotics engineering, autonomy is defined as the robot ability 'to operate in the real-world environment without any form of external control, once the machine is activated and at least in some areas of operation, for extended periods of time' (Lin, Keith, & Beckey, 2011).[18]

A tele-operation system consists of four main components: the human operator, the interface at the local site (i.e. the master) – usually a contact device which allows the user to send commands and receive sensor signals – the communication link (in tethered tele-operation systems, information is exchanged by cable, whereas in untethered systems by wireless connections), and, finally, the robotic artefact at the remote location (the slave) – provided with actuators, controllers, a power system, and various kinds of sensors, which vary depending on the remote task (Goradia & Elhaj, 2005). Nowadays, notwithstanding the great advances in computation and perception, tele-operation systems are still used in many fields of application, among the most popular are: search and rescue operations, surgery, space and underwater explorations, and warfare.

Robotic prostheses for upper or lower limbs and exoskeletons are a special type of tele-operation system. With respect to conventional tele-operation systems, they have a different ontology. As a matter of fact, during operation the robotic device is always in contact with the human body.

A tele-robotic system extends the human operator's range of actions (by extension I mean that it can enhance motor and perceptual capabilities) in an otherwise inaccessible environment (due to distance, scale, danger, etc.). Therefore, the human being's actions are no more bounded to the *hic et nunc* of the physical body, but they can take place *there and now*. In the case of a robotic hand prostheses or an exoskeleton there is no physical distance between the human operator and the robot, since the robot is in contact with the human body. As far as the control interface is concerned, robotic prostheses and exoskeletons are usually controlled by decoding muscular (electromyographic) or neural (from peripheral or central nervous system)

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[17] There are also intermediate levels of autonomy, such as semi or shared autonomy, which, for simplicity, I will not take into account.

[18] Elsewhere, I have argued that an autonomous robot is the utmost kind of human enhancement, since it completely detaches a human being from the presence in the world (Salvini, 2012).

signals via dedicated invasive or non invasive electrodes. With respect to a joystick or another contact interface, muscular and neural interfaces allow a more natural and intuitive control of the robot and increase the sense of ownership between the device and the human body.

For instance, a tele-operated robot designed for the inspection of a nuclear power plant allows a human being to accomplish tasks from a safe location (i.e. the control station) and even from a different time-zone. An exoskeleton designed to assist people in walking activities can support or increase the physical capabilities of a person, while a prosthetic hand may restore some of the amputee's lost capabilities.

These and many other applications are usually considered as the typical ways in which robotics brings about forms of human enhancement. As a matter of fact, they can be understood as attempts to overcome the current limitation of human body through natural or artificial means.

However, in my opinion, there is a more profound sense in which robots can contribute to the enhancement of human beings, which I will illustrate by applying the theoretical framework proposed in this article. As pointed out in Section 1, it is necessary to consider how technological mediation affects the structure of reciprocal relations. In other words, how technological mediation changes human presence, that is, the way of being in the world.

In applying the framework, I will point out the relevance of the issue of power, which is usually under evaluated in the discourses surrounding human enhancement, which are mainly focused on issues of freedom and autonomy, health and safety, fairness and equity, societal disruption and human dignity (Lin & Allhoff, 2008).

Drawing on the double logic of mediation, in a tele-operation system, on the one hand, the robot extends the human operator's action in the remote environment. By extension, I mean not only overcoming spatial distance, but also going beyond human capabilities, such as to increase human strength or sensory perception (e.g. night vision, echolocation, etc.) or to overcome physical limitations, as in the case of an amputee. However, on the other hand, the robot keeps the human being at distance from the world, by detaching him/her from what is happening in the remote environment (e.g. from the effects of his/her action). In other words, the system disentangles the human user from the world of the visible and that of the tangible, by turning the structure of the relation of contact and vision from one of reciprocity into one of unilaterality.

For instance, the handling of hazardous material via a tele-robotic system or the possibility to lift heavy loads by means of a robotic exoskeleton are all based on the inhibition of the channels of reciprocity usually active in a situation of presence. The technological mediation prevents the person wearing the exoskeleton to feel the weight of a load – and being squashed by it – or, in a tele-operation system, to undergo the effects of the radiations present in the working environment. Finally, in the case of a robotic prosthesis, the technological mediation allows the subject to restore a lost functionality (e.g. grasping or manipulating objects), but, at the same time, it reiterates the distance between the amputee's body and the external world. For instance, the lack of sensory feed-back or the design of sensory feed-back system not based on biological models can determine distance.

Parenthetically, the quest for designing reciprocity into artefacts is illustrated by current researches in developing sensory feed-back in robotic prostheses for delivering real-time sensory information to upper limbs amputees (Raspopovic et al., 2014). The link between a person's intentions and his/her actions is given by an artificial system capable of decoding and coding the signals coming from the human. The feed-back system is based on a decoding subsystem for detecting the user's intentions via efferent nerves and a delivery sub-system which uses afferent nerves.

At present, the main obstacles to the development of a full sensory feed-back system are due to technological and scientific limitations. However, it is very likely that in the future, such a limitation could be exploited and turned into a form of empowerment for the person wearing the device. As a matter of fact, a robotic hand prosthesis could be designed to allow a person to accomplish tasks beyond the biological properties of a fleshy hand in order to, for instance, resist extreme hot or cold temperatures, pain and fatigue. Therefore, once it will be possible to design an almost natural prosthesis, it is questionable whether there will be the need of laws for regulating the types of threshold, i.e. biological or artificial, to be implemented in the robotic prostheses.

In conclusion, if the possibilities offered by real-time communication technologies (i.e. the digital screen), have disrupted the way of seeing the world and altered the moral response of human beings, mechatronics and A.I. (i.e. robotics) have disrupted the way of being in touch the world. In almost all the tele-robotic systems discussed above, the sense of "touch", the most intimate among human senses, is no more characterized by a relation of reciprocity (i.e. to touch always implies being touched), but it is artificially

configured in a relation of distribution, in which the "afferent" property has been "severed" from the "efferent" property. In handling a thing by means of a robotic avatar, an exoskeleton or a robotic prosthesis, the technological mediation stays in between our own bodies and the object of the action. Moreover, the mediation may be designed so as to prevent any form of response. Therefore, the reciprocity of human touch is lost in the mechanically reproduced forms of touch (i.e. tele-touch).

Far from being a neutral replacement of bodily touch, "tele-touch" allows human beings to advance on the ladder of progress by keeping the world at a distance. It has already been pointed out that search and rescue operations, surgery, space and underwater explorations and many more tasks are now possible or have been improved thanks to tele-robotics systems. However, tele-touch can also become a dangerous instrument of power, since, as pointed out by Francis Baudrillard, it prevents the possibility to respond back and make the process of exchange impossible. Because they exploit such a possibility, warfare technologies can be considered as a case in point.

The loss of reciprocal relations generates a situation of power, which may be determinant for the accomplishment of a task, but it is detrimental for the sense of presence. Furthermore, as pointed out in section 1.1, presence always implies a moral dimension, which is the result of being in a reciprocal relation with the other or the environment. However, by staying in between, technological mediations may weaken moral response. According to Kevin Robins, 'our technologies keep the world at a distance. They provide the means to insulate ourselves from the disturbing immediacy of the world of contact' (Robins, 1996).

Finally, technological mediation allows to modulate the channels of reciprocities according to new thresholds and filters, which are not based on the default biological settings (i.e. those of the human body), but are given by the properties of the technological components. The result is a new artificial capability that may alter the system of human and physical values, since it allows a person to do things without experiencing the corresponding consequences.

4. Conclusion

To sum up, in this essay I have argued that human enhancement, which I consider the result of technological and scientific progress, is part of

humankind's nature. By protecting the frail condition of the human body and increasing its limited capabilities, science and technology keep the world at a distance, thus reducing human presence. To reduce human presence means to change the structure of the relations of reciprocity that exist among and within living organisms and between them and the natural environment. The result is a relation in which only one side is able to act and feel while responses from the other side are negated. The new structure may alter the power relations and bring about moral disengagement, abstraction, solipsism, in one word absence from our own selves, our body, other living beings and the natural environment.

The framework proposed for making sense of human enhancement and for evaluating its ethical consequences is based on two concepts: presence, which I have explicated as consisting in a network of reciprocal relations determined by natural as well as artificial conditions, and mediation, which consists of two complementary, but opposite aspects: on the one hand extension, which tends towards unification and on the other detachment which tends towards separation.

According to the workings of the double logic of mediation, even in the case of a medium like the telephone, in which the dialogic structure of a face to face conversation is replicated, there is, nevertheless, always a loss of reciprocal relations, that is, the impossibility of achieving a full presence. In fact, while bringing together the two voices, the telephone prevents any form of contact or visibility.

Among the many plausible objections to the theoretical framework I proposed in this essay is that it replicates a logocentric pattern. The natural body and the immediate (i.e. non-mediated) presence being the normative starting point. However, according to my argument, the starting point should not be confused with the normal functioning of human beings. The concept of presence I have proposed in this essay is based on a reciprocal relation. Therefore, it is the relation the central feature of the framework rather than the natural body. Nevertheless, it seems to me impossible to avoid considering the human body as the enabler and carrier of human presence.

Furthermore, one could argue that it is questionable whether the framework would be applicable also to non-technological forms of human enhancement, such as Ritalin. My contention is that all forms of progress, whether technologically or scientifically enabled, can be considered as mediations and therefore are under the spell of the "double logic", which

extends and at the same time reduces human presence. In the case of chemical forms of enhancement, such as Ritalin, the drug provides a subject with more energy and memory and allows him/her to perform better. However, the drug affects also the subject's ability to respond to the physical and psychological effects triggered by high cognitive or physical performances. For instance, Ritalin prevents the subject from experiencing the sense of fatigue, which in "normal physical conditions" is connected to the awareness that high performances need training, perseverance and determination. The structure of the relations of reciprocity within the body has changed: the capabilities of the human body are increased (extension), but at the same time the physiology of the human body has been inhibited (detachment). Likewise, a robotic exoskeleton can allow someone to raise heavy loads, but the user, while using the robot, will lose the sense of heaviness of things, since the capabilities of the robot are not set in accordance with the physical and psychological properties of the human body but, on the contrary, the thresholds of the possible and impossible will be given by the properties of the machine.

In more general terms, a chemical drug or a robotic exoskeleton, by diminishing physiological responses, such as the feeling of fatigue or the sense of weight, may produce serious consequences on the power relations, the health of an organism, as well as change the value of things. As pointed out by Francis Fukuyama, human nature 'is fundamental to our notions of justice, morality and the good life' (Fukuyama, 2002).

Robotics technology has allowed human beings to accomplish incredible things and to advance human knowledge. However, the double logic of mediation subtends all kinds of science and technology. It will be our choice to decide whether technological mediation should bring humankind towards presence or towards absence. It will be a matter of education, design, and politics.

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