

BEHIND AND BEYOND OF THE *CYBORGS* AND ROBOTS IDEAS AND REALITIES: SOME TECHNO-SCIENTIFIC AND PHILOSOPHICAL HINTS

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Astract

We are progressively immersed in technology to such extent that in our everyday life we are and we do what technology allows us to be and to do. In this process, *cyborgs* and robots constitute elements that we analyze from a number of techno scientific and philosophical approaches. Additionally, we propose that a new concept: GEH (Genetic Engineered Human) as a new potential social imaginary element, which would be the human being improved by the broad-sense genetics engineer (that is, changing many genes by genetics engineer, modifications in the genome, cloning, and so on). If our aspirations as humans pass through technology and in particular for *cyborgs*, robots and GEH, the bidirectional links between these theoretical or real entities and our personal identities will be the more and more substantial in our society.

Key words: *cyborg*, augmentation, robot, genetic engineered human

Resumen

Progresivamente nos hemos ido sumergiendo en la tecnología, de manera que en nuestra vida cotidiana somos y actuamos en función de lo que ella nos permite ser y hacer. En este proceso, los *cyborgs* y los robots constituyen unos elementos que pretendemos analizar desde diferentes aproximaciones tecnocientíficas y filosóficas. Además,

proponemos un nuevo concepto, el de GEH (*Genetics Engineered Human*, o ser humano construido por ingeniería), el cual sería un ser humano mejorado mediante ingeniería genética en su sentido más amplio (esto es, mediante sustitución de genes, modificaciones genómicas, clonación, etc.). Si nuestra aspiración como humanos pasa a través de la tecnología y en particular por los *cyborgs*, los robots y los GEH, los lazos bidireccionales entre estas entidades teóricas o reales y nuestra identidad personal serán cada vez más y más consubstanciales en nuestra sociedad.

Palabras clave: *cyborg*, aumentación, robot, humano construido por ingeniería genética

1. Preamble

In response to the article of Coca and Valero (2010), entitled “(BIO) Technological images about humans self-construction and Spain context: a preliminary study”, we would like to contribute with a number of comments and precisions that stem from recent philosophical and biological developments. In terms of the methodologies of future studies, the analysis of metaphors, myths and archetypes (basic components of the social imaginaries) is one of the four current methods¹. In our understanding, the social imaginaries analysis constitutes an universal, popular and consciously element today present in all type of societies. Therefore, we want acknowledge the insightful and crucial contributions of the Coca and Valero paper, hoping that these set of topics will attract more attention in the future studies of sociology and philosophy.

2. Introduction

We are progressively immersed in technology to such extent that in our everyday life we are and we do what technology allows us to be and to do. Most if not all our aspirations as humans pass through technology and the bidirectional links between technology and human's aspects are the more and more substantial in our personal identity and social achievements. From the origin of man up today, its

¹ For a schematic description of the four methods to analyze future see B. Dahlin, (2012).

anthropological link with technology has been constant and increasing. One of the recent advances has been the combination of bionic elements with biotechnology products that finally became integrated in the today's human bodies (Mestres 2011; Mestres y Vives-Rego 2011, 2012a, 2012b; Service 2013).

We have not born with technological augmentations² and we need to incorporate them after birth. This is a cultural evolution process. However, such cultural evolution relies on a potent and advanced biological evolution of brain and other body features. In humans it is assumed that cultural evolution is based on a previous biological evolution. Vallender et al. (2008) described how alterations in size, wiring, and physiology of the human brain yielded advanced cognition, and hence a transformation of behavioral repertoires that encompassed everything from language and tool use to science and art.

Computer and telematics means provide increasingly powerful capacities of the human communication, information, organization and analysis, especially when integrated to the human brain. Maybe in a next future, all members of the society will be permanently in contact via a computer implants in the human nervous system, as is presented in the Borg society of Star Trek, the New Generation (Okuda et al. 1994). This could be considered as an alienation form of the human society, since it could evolve to a social insect system (like bees or ants). However, it is not true that all computers have the final fate to be linked together; other options already exist or may be developed. For instance, during the First Gulf War (1990-1991) military orders where not transmitted via e-mail using computer webs, but by individual diskettes dropped from airplanes without landing on the aircraft carrier deck (Meisner 1991).

3. The *cyborg* metaphor: current evolution and techno-scientific facts

From Berlin Dadaists to the Fritz Lang films or Ernst Jünger and Martin Heidegger writings, *cyborg* played a central role in many of the Weimar culture's productions (M. Biro, 1961). However, a more general look at science, art, literature,

² In this paper, we use the terms *cyborg*, robot and augmentations, as previously described in Mestres and Vives (2011 and 2012 a,b). *Cyborg* is, in the broad sense of the term, a human being that has incorporated or internalized a number of technological elements in its body and in its everyday way of leaving. These elements are designated as "augmentations" according Benford and Malartre (2007). A robot is a whole machine which is based on advanced hardware and software. Even, it can incorporate artificial intelligence and emotions. In this paper, we will refer to them as "humanoid robots".

philosophy and culture in general, proves that *cyborgs* and other forms of fantastic creatures as precursors of *cyborgs* were already present since the Renaissance in Western countries. The philosopher and cognitive scientist Andy Clark (A. Clark, 2003) has argued that humans have always been ‘natural-born *cyborgs*,’ that is, they have always used and merged with biological and non-biological aids (or augmentations) in order to better survive in adverse environments. Moreover, these external aids do not remain external to our minds; they interact with them to effect profound changes in their internal architecture. According to Evans (2010), these ‘mindware’ upgrades (using the notation of Clark, 2001) extend beyond the fusions of the organic and technological that posthumanist theory imagines as our future. Medieval artificial memory systems provide evidence for just this kind of cognitive interaction. What cultural history adds to our understanding of embedded cognition is not only recognition of our *cyborg* past but a historicized understanding of human reality. In other simple words, all these verbose sentences can be simplified to, the *cyborg* represents "a notion of human-machine merging". This concept, dear to science fiction writers, is all about humans becoming stronger, faster, and more powerful through the use of integrated technology. One example of this is the cochlear implants used to help deaf people hear again; these implants are more than hearing aids, since they interface directly with nerve endings. Another example is prosthetics, which allow people who have lost limbs in accidents to function almost as before.

4. Comparing humans, *cyborgs* and robots

When we people face *cyborgs* or humanoid robots we are stroke because they behave and are like us. We fairly may say that in general we feel and we find ourselves strange from them, although the opposite may also be said: we feel and we find them strange to us. Although some efforts from contemporary philosophy and science are coming up to understand and elucidate these feelings and affinities between humans, *cyborgs* and robots, more public and open debate is needed, since human augmentations and robots will be the more and more present in our societies.

We know today that our anatomy, physiology and mind are products of an evolutionary process. Human being is a biological organism that has reached a degree of complexity by means of natural selection (Ayala and Cela-Conde 2001; Ayala, 2011). This selection is still acting on humans (Ayala, 2011). In the same way, we have to

admit that *cyborgs* and robots already are a further evolution step from humans. However, a crucial difference is that we humans come from ancestor animals after a biological evolution process, meanwhile *cyborgs* and robots come from humans after a cultural evolution process (the technological evolution process). Today, we easily could imagine (through the social imaginary) a human mind “uploaded” or “downloaded” into a robot or even into a *cyborg* (Mestres y Vives-Rego, 2012b). For instance, this situation was presented by TV character Sheldon Cooper in an episode of the series “The Big Bang Theory”. Such possibilities pose a number of challenging and new questions, as for instance: which are the relations between mind and the biological or physical structure that lodge it? A brief revision of the recent philosophical work done on biotechnology (Durbin, 2010) concludes that not much progress has been done on the topic up today. However, if biotechnology is going to be the wave or tsunami of the XXI century, we don’t have to forget what XX century has taught us: technoscientific developments require open and public debate and thinking in order to avoid harmful or undesirable social consequences.

The globalization technology and its commerce and business (especially through internet) makes possible to foresee the more and more humans that are conceptually *cyborgs* (according to the augmentation criteria (see note 2)). On the other hand, humans are the more and more incorporating robots to the everyday life, to act as helpers or servants. The humans or human-*cyborgs* (or amplified humans) that coexist with intelligent robots, exert an unknown potential on individuals and society that need to be explored. The *cyborg* metaphor is used by social imaginaries, but since many humans in the advanced society are already *cyborgs* according to a number of technoscientific criteria (Mestres 2011; Mestres y Vives-Rego 2011, 2012a, 2012b), in the measure that *cyborg* metaphor becomes a reality, the social imaginaries scale-up to a series of new metaphors that finally clash with the concept and existence of robots.

5. Some philosophical aspects

The mind can be described as a set of unconscious and conscious states that emerge from the brain and its interaction with the body and environment. These include beliefs, desires, emotions, feelings, and intentions. The mind emerges from a higher level of brain function in order to promote the adaptability and survival of the organism. However, this cannot be done by neurons alone. Neurons cannot fully represent the

interaction of our bodies and the environment because they lack the property of intentionality, or directedness toward states of affairs in the external world.

Consider as an equivalent example the sails of a ship. It goes nowhere without sails, but would be foolish to assume that sails on their own make the ship to go. Sails are useless without masts, yards and booms to hold them and without a hull to float them, and without the wind that blows on them and with an expert sailor that conducts the ship. As sails, mind cannot go anywhere without a physical vat, the brain in the human case or a chip in *cyborgs* or robots.

We want to point out that when we philosophically or scientifically analyze the relation between mind and its support (its vat) in *cyborgs* and robots, what we are doing is a task of “naturalizing” a phenomenological account of mind besides and beyond the reductive concept of thinking as an exclusive human process. From the mind-body dualism postulated by Descartes, a number of prejudices still exist specially when comparing the mind and body in humans and of course the same happen when thinking about the dichotomy of mind and its support in *cyborgs* and robots. When we compare humans, *cyborgs* and robots, we need suspend the prejudices we have about body and mind and their relations. In addition, we typically undergo an additional prejudice motivated by our human-social experience: we only consider a single *cyborg* or robot as the unit of comparison with humans. However as *cyborgs* and robots are technological devices designed by humans, their collective or group behavior is a matter that just depends on the *cyborgs* and robots designers. We may imagine a brain in a non-biological vat for instance a computer chip, or a brain in a *cyborg* which it is partially a physical vat and in the same way the mind in a biological or physical vat. How we might reconceive our bodies and mind as akin to *cyborgs* and robots? If mind and body are one, then thinking is a property of any biological (or why not physical) structure that generates thinking in the broad sense.

If we abandon the mind-body dualism and we hypothesize that human thinking is a product or an activity of our body as proposed by Damasio³, we may easily admit that thinking and mind (any) may happen in *cyborgs* and robots. Having in mind that we are biological-engineer machines, it is easy to imagine that an engineer’s mind could be

³ A. Damasio (2005) sustains that from the basic human functions to the more complex cognitive activities are performed by the brain as a part of our body.

uploaded or downloaded in the engineered structure (biological or physical). In other words instead of beginning with our prejudices, we may try to admit a way of thinking that do not take place in the animal-human brain. Or, in the same way that body and mind are inseparable, mind may also be inseparable from *cyborgs* or humanoid robots. One of the problems of this statement is that philosophical or scientific comparison between humans and *cyborgs* and robots already presupposes a pre-philosophical and a pre-scientific distinction between them, which completely separates humans from *cyborgs* and robots. Any time we rise the question about the difference between humans and *cyborgs* and robots we already have to preclude a philosophical sense of this distinction. However, without this assumption it is difficult to pose the question incurring then in an avoidable circular argumentation.

6. Future prospective

Technology is the driving force of the human self-transformation that may achieve complexity levels of the whole human instances of paramount importance. To some extent human augmentations and humanoid robots constitute non-genetic mutations that takes place before the cultural changes which trace new ways of the human evolution in societies, irrespective of their values and ideologies. It seems that our society will evolve to a world where humans or human-*cyborgs* will coexist with humanoid robots. In social imaginaries, this relationship ends usually with a war between human and computers/robots. As presented in romans and films, the latter group wants to be free from human tutorial and to have its own freedom. In this scenario, even robots take human tissues to resemble humans as much as possible in order to be not detected. For instance, this situation is presented in the movies of Terminator series. In this particular case, it is an example of transformation process from robot to *cyborg* (Mestres y Vives-Rego 2012a).

Quite interesting is the question about the common or universal myths of the social imaginaries that underline the *cyborg* and robot evolution. The three metaphors the man of Turing, the network paradigm and Dedalus paradigm recently developed by Garrido (2007) and recovered by Coca and Valero (2010), need to be re-analyzed assuming that amplified humans and robots will probably qualitatively and quantitatively important in the immediate future society. According the precedent

statements, new relationships between robots and humans (*cyborgs* or not) in coming decades will emerge and a new society also will.

6.1. The reproduction or replication: a realistic cornerstone

Another interesting point is that social imaginaries does not consider in depth the philosophical and technological problems associated to the reproduction aspects. Haraway (1991) presented the *cyborg* metaphor as a way to overcome the sex limitations. However, this is a cornerstone in the cyboryzation process. Human being reproduces using a biological system, that it is extremely efficient from the energetic point of view. Furthermore, it means that natural selection can act in each generation, and this is a useful adaptive system. To be a *cyborg*, all new implants have to be added after birth, and probably, not all individuals would react biologically in the same way. Probably, some individuals will accept biologically better the artificial implants than other ones. Even, some individuals could present rejection due to its immunological system or other types of incompatibility. This specific point is a substrate where natural selection could have an effect if the reproductive capacity can be altered. On the contrary, to produce or replicate a new robot (or a *cyborg* from a robot) implies a great expenditure of energy and the use of complex raw materials.

6.2. Eugenetics and the Genetic Engineered Human

However, social imaginaries can imagine another way to reach the over-man status. This conception is not based in a *cyborg* transformation using advanced bionic or bio-mechanic (including computer elements), but having only organic components. This way to improve human capabilities will be supported by Genetics and Genomics. Knowing the role of genes and the structure of human genome, it would be possible to eliminate a large number of diseases and improve human capabilities (physical and intellectual). Biotechnology associated to Genetics and Genomics are present in social imaginaries from the first decades of XX century. Some were based in the early eugenics ideas. In 1883, Galton introduced for the first time the idea of improving human being using genetics, and he called this methodology eugenetics (Galton, 1883). Galton and Pearson founded a laboratory, a society and a newspaper dealing with this topic. The Eugenetics movement expanded mainly in U.S.A. and became an ideology, where some ethnic or racial individuals were better than others (for a historical revision

see Rose, 1976; Barahona and Ayala, 2009). Probably, the worse impact of eugenic doctrines was in Germany during the Nazi regime. All these historical situations led to consider eugenetics as a terrible and perverse theory. These ideas were reflected in the social imaginary by different ways, for instance Aldous Huxley (1932) in his “Brave New World”. Other developed later, for instance “The boys from Brazil” a movie by Franklin J. Schaffner (1978), based in the possibility of human cloning, that in the present days it is almost a fact (Tachibana et al., 2013). With the new scientific knowledge and biotechnological advances, new aspects appear in the social imaginary, like the possibility to obtain new own organs for transplantations (Bueno, 2007).

However, it is possible that the social imaginary advances further and we propose the term GEH (Genetic Engineered Human) and its definition. The human being improved by the broad-sense genetics engineer (that is, changing many genes by genetics engineer, modifications in the genome, cloning, and so on) will be called by us GEH. He (or she) would be 100% organic and of human constitution. The most important characteristic is that his/her reproduction will be the standard human one or by cloning. Thus, the possibility of evolution by means of natural selection could be possible in these organisms. In this sense, they would be superior to *cyborgs*, because the latter always need the implants after birth. *Cyborg* is not and will not be a stable evolutionary lineage. Being a *cyborg* is only a way to improve a particular individual, because prosthesis and other cybernetic and mechanical complements cannot be inherited. Thus, this is an expensive and not stable evolutionary way to improve human beings. Obviously, ethical considerations and debates are needed on GEH.

6.3. The driving forces of the cyborization process

The basic reason for the which one humans develop social imaginaries and technologies is simply because we want better survive, live longer and do more and fascinating things. In this sense, social imaginary is a seminal driving force that subsequently triggers the continuous progress based on technology thanks to the human creativity. As a point of fact, our paper is a reflection on the ideas about human nature and how their evolution may mean for the future of man. Today, we are confronted to a crucial existential choice: whether to consider humans as essentially spiritual beings or as highly complex bio-machines. An additional crucial question is to what extend we humans have the right to remediate, extend and create new capacities, senses and

perceptions by applying technology to the human body, or in other words if we have the right to become *cyborgs*. However, it is worth to point out that in broad sense, human beings can be considered *cyborgs* when compared with his remote ancestral human origins (Mestres y Vives-Rego, 2012a).

When posing the question about to what extent the driving forces are social imaginaries or the progress of the technoscientific knowledge, we must answer that both coexist. When applying technological answers to our problems or our emerging necessities, they mostly do for better not for worse, at least initially, however we should be always on guard for their nefarious effects. For this reason, when technology became life saver, provide happiness, generates cognitive values and improve freedom, we must say that very probably we are in the right track.

When in a certain moment of our lives we became or we are *cyborgs* (with any implant or amplification) we are still going to ask ourselves in the next future if we want “as humans” (although augmented or cyborized), to take-up more augmentations if available. To those that argue that we have to only decide when fully aware, we have to say that awareness is achieved at two different levels: i) the “experiential” or by using the augmentations and ii) the “cognitive” or the knowledge (more or less complete) of the context of the augmentation. In most of the cases (if not all), both levels are never accomplished before the decision, for example the creation of new social patterns as consequence of the use of cellphones or internet was not immediately perceived. It seems evident that the experiential level of technology appears before in the time and in the space to the substantial cognitive awareness of it.

Finally, if we agree that the social imaginary is the creative and symbolic dimension of the social world, the dimension through which human beings create their ways of living together and their ways of representing their collective life, then we have to admit that humans have already chosen to be *cyborgs* and co-exist with robots (whatever type). In such evolutionary process, the only coherent strategy is to become aware of the experimental consequences of the *cyborgs* and robots reality and once our cognitive level was considered sufficient, then decide to persist or not in the this track. For all the reasons previously exposed in this paper, we consider that amplified humans, *cyborgs* (or GEH or a mixt of both) and robots will probably be important in the immediate future of our societies.

References:

Ayala, F. J. (2011). Tres preguntas clave sobre la evolución del hombre. Madrid: Unión Editorial.

Ayala, F. J. y Cela-Conde, C. J. (2001). Senderos de la evolución humana. Madrid: Alianza Editorial.

Barahona, A. and Ayala, F. J. (2009). El siglo de los genes. Madrid: Alianza editorial.

Benford, G. and Malartre, E. (2007). Beyond human. New York: Tom Doherty Associates.

Biro, M. (1961). The dada *cyborg*: visions of the new human in Weimar Berlin. Minneapolis, USA: University of Minnesota Press.

Bueno, D. (2007). Órganos a la carta. Barcelona: Publicacions i Edicions Universitat de Barcelona.

Clark, A. (2001). Mindware: an introduction to the philosophy of cognitive science. Oxford University Press. New York, USA.

Clark, A. (2003). Natural-born cyborgs. New York: Oxford University Press.

Coca, J. R. and Valero, J. E. (2010). (BIO)Technological images about human self-construction on Spain context: a preliminary study. *Studies in Sociology of Science*, 1, 58-66.

Dahlin, B. (2012). Our posthuman futures and education: Homo Zappiens, *Cyborgs*, and the New Adam. *Futures*, 44, 55-63.

- Damasio, A. (2005). *Descartes' Error: Emotion, Reason and the Human Brain*. New York: Penguin Group.
- Durbin, P. T. (2010). Toward a philosophy of biotechnology: an essay. *Ludus Vitalis*, 18, 173-186.
- Evans, R. (2010). Our *cyborg* past: Medieval artificial memory as mindware upgrade. *Postmedieval: a journal of medieval cultural studies*, 1, 64-71.
- Galton, F. (1883). *Inquires into human faculty and its development*. London: Macmillan.
- Garrido, M. (2007). La explosión de la tecnología: tres metáforas para el siglo XXI. In: Garrido, M., Valdés, L. M. and Arenas, L. (eds.), *El legado filosófico y científico del siglo XX*. (867-886). Madrid: Cátedra.
- Haraway, D. J. (1991). A *Cyborg* Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century. In Haraway, Donna J., *Simians, Cyborgs and Women: The Reinvention of Nature*. (149-181). N. Y.: Routledge.
- Huxley, A. (1932). *A Brave New World*. London: Chatto and Widus.
- Mestres, F. (2011). Evolución: de la especie humana al *cyborg*. *Sociología y Tecnociencia*, 1, 37-46.
- Mestres, F. y Vives-Rego, J. (2011). Precisiones interdisciplinares y conceptuales de los términos: *cyborg*, clon humano y robot. *Ludus Vitalis*, 19, 235-238.
- Mestres, F. y Vives-Rego, J. (2012a), Reflexiones sobre los *cyborgs* y los robots: evolución humana y aumentación. *Ludus Vitalis*, 37, 225-252.
- Mestres, F. y Vives-Rego, J. (2012b). La convivencia con los *cyborgs* y los robots: consideraciones filosóficas, ético-morales y sociopolíticas. *Ludus Vitalis*, 38, 215-243.

Okuda, M., Okuda, D., and Mirek, D. (1994). *The Star Trek Encyclopedia. A reference guide to the future.* N.Y.: Pocket Books. Simon & Schuster Inc.

Meisner, A. (1991). *Desert Storm sea war.* Osceola WI: Motorbooks International Pub.

Rose, S. (1976). *The history and social relations of genetics.* Walton Hall: The Open University.

Service, R. F. (2013). The Cyborg era begins. *Science*, 340, 1162-1165.

Tachibana, M, Amato, P., Sparman, M., Marti Gutierrez, N., Tippner-Hedges, R., Ma, H., Kang, E., Fulani, A., Lee, H.-S., Sritanaudomchai, H., Masterson, K., Larson, J., Eaton, D., Sader-Fress, K., Battaglia, D., Lee, D., Wu, D., Jensen, J., Patton, P., Gokhale, R. L., Stouffer, R. L., Wolf, D. and Mitalipov, S. (2013). Human embryonic stem cells derived by somatic cell nuclear transfer. *Cell*, 153, 1228-1238.

Vallender, E. J., Mekel-Bobrov, N. and Lahn, B. T. (2008). Genetic basis of human brain evolution. *Trends Neurosci.*, 31, 637-644.