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ORIGINAL PAPER

Entangled Agencies: New Individual Practices of Human-Technology Hybridism Through Body Hacking

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Abstract This essay develops its idiosyncrasy by concentrating primarily on the trend of body hacking. The practitioners, self-defined as body hackers, self-made cyborgs or grinders, work in different ways to develop functional and physiological modifications through the contributions of technology. Their goal is to develop by themselves an empirically man-technique fusion. These dynamic "scientific" subcultures are producing astonishing innovations. From pocket-sized kits that sample human DNA, microchip implants that keep tabs on our internal organs, blood sugar levels or moods, and even 3D printers that produce tailored hip replacements, the technical innovations of the body hacking trend are beginning to filter into mainstream use, and the repertoire increases every day. These physical transformations with intersecting techniques actively challenge long-held normative beliefs about what bodies do, what they should look like and how they should behave. They provide an alternative discourse on man's correlation with the world and its biocenosis. Sculpting oneself has become an existential data. Medical technoscience crystallizes the effectiveness of new powers over the organism. Scientific temptation to recreate and enhance the human according to its normative principles has brought up experimental practices that have become the edge of a radical activism operating in the core of western societies, which will be the theme of this paper.

Keywords Body hacking · Do-it-yourself culture · Enhancement · Hacktivism · Implants · Modification · Subcultures

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Introduction

The rise of science and technology in our environment has dramatically changed Western vision of the body [23]. It is illustrated by the emergence of a rational organic model which is increasingly being extended socially. Rooted in the information age, a new technological era, the enhancement of the "rational body" grows with artificial materials. The development of these modifications, described in a playful and exploratory perspective, aims to increase personal capabilities. Made in a voluntary and experimental approach, these modifications allow practitioners to develop an unprecedented "corporality." It is explained by the contribution of new functionalities related to the use and experimentation of innovative techniques and practices. But the originality of these transformations consists of the emergence of a trend: body and technology fusion performed by individuals without any disability willing to augment their "natural" and corporeal possibilities. These new embodiments are based on the deployment of new highly advanced technologies, including bio-technology, which model a futuristic vision of the technologically transformed body. This vision is already at the heart of

contemporary cyberpunk cultural production. This new perspective about the emergence of practices dealing with underground physical reappropriation characterized as "body hacking" will be discussed throughout this article.

This research field focuses on extreme body modification practices, assembling experimentations performed by body hackers,[1] self-made cyborgs[2] or grinders,[3] who are hobbyists and scientifically inclined individuals[4] taking on techniques and knowledge from a variety of disciplines − including the medical field − to break themselves free from their natural body, enhancing its possibilities. Subsequently, it will be shown how the integration of these new modifications is performed by these actors and the innovative physiological transformations which result from them. The aforementioned work describes the development of a neo-organism in body hacking. It accentuates the relationship between the body and the technology, highlighting the consequences for the individuals who accomplish them. This investigation demonstrates how modern techniques are privately used to transform the body's "original nature" by "enhancing"[5] it through the addition of functional artifacts.[6] We shall see that these techniques favor body framing and administration. Their activism supports the modern belief in the will and science. The designation of what is human in technique is a misnomer, for man has been technical since the beginning of time [27], and has been providing assistance along human existence, equipping us with something beyond our natural abilities [24]. The borderline needed to be traced by these disciplines does not consist in only human/technique disjointing, but rather the technique that enhances humanity and the one which denaturalizes them [5, 7, 27]

The pioneering character of this subject is emphasized by its theme. There are several researches on the use of technological objects, permitting one to expand the boundaries and limits of the human body. The addition of technological components in the human body is not a novelty in itself. For instance, in the medical field, we have witnessed the emergence of contact lenses, pacemakers, breast implants, and cochlear implants. In biomedical engineering, there is tissue, genetic, neural and pharmaceutical engineering. More recently, biomechanics research have been culminating in high-tech prosthetic prototypes for upper and lower limbs. In front of us we glimpse a breathtaking set of advances in human-machine interfaces, control technology, and implantation techniques, intended for military and therapeutic purpose. On the other hand, this paper's novelty resides in the emergence of another trend,[7] the one moving toward the body and electronic components' fusion self-developed by health individuals for recreation and with functional aspiration. We will not discuss the question of the establishment of prostheses or implants in the body with the aim of restoring functions damaged by injury or illness, such as the amputation of a limb or joint, which are indeed fractures in the original configuration of the human body. To a certain extent, those prosthetic materials are representation of a body-technology interface [28]. To help the individual who is disabled by his body's injuries to overcome this difficult phase identity, the prosthesis must repair the damaged functions, and give (as much as possible) to the body and to the

[1] Cf.http://www.slate.com/articles/technology/superman/2013/03/cyborgs_grinders_and_body_hackers_diy_tools_for_adding_sensory_perceptions.html

[2] http://www.slate.com/articles/technology/superman/2013/03/cyborgs_grinders_and_body_hackers_diy_tools_for_adding_sensory_perceptions.html

[3] http://www.theguardian.com/technology/shortcuts/2012/aug/19/grinders-cult-of-man–machine

[4] Fiévet [12] has written the first book on this underground trend and he advocates that body hacking consists of a voluntary initiative carried out by individuals who are willing to alter their bodies by linking artificial components to them, as well as new technological devices that can be applicable to the body. A hacker, regarding cybernetics, makes use of technological tools and adapts their operations after extensive research. Once the hacker discovers the functioning of these tools, he or she does not hesitate to make modifications in accordance to his or her needs. The hackers' behavior would be transposable conceptually to body hacking, except that it is suitable to the human body.

[5] "Enhanced man" constitutes the intersection of digital technology and nanotechnology, allowing humans to go beyond the current limit of the body as well as the mind [5].

[6] Mankind has always invented tools to enhance its capacity. Today the use of machinery, prostheses and implants have inspired scientists and artists ([1, 2]; [5]).

[7] Unfortunately we lack quantitative data related to body hackers and grinders in western world. Still, we deny any claim disqualifying or reducing their significance. An attentive observation all through forums, websites, blogs and tutorial videos provided by these enthusiasts (including those which are mentioned along this paper) announce the growing interest moving into this flow, although there are lesser adaptations when compared to mainstream body modification (such as plastic surgery, tattoos and piercings). Just as it is almost impossible to establish borders between scientific knowledge that cures and the one which enhances (whereas the later is a continuation of the former), it is hardly possible to monitor individual willingness to use these improved technologies on their fashion.

individual its original integrity.[8] Instead, the current focal point of this paper is the "recreational" apparatus developed by non-specialists, integrating artistic and technophile circles. The previous mentioned aspects each constitute a universe on its own, with rules and practices that are inherent, often coming into conflict with each other. They should not be confused, however, even if at times it is difficult to dissociate them.

The specific field of body hacking has seen practitioners' numbers growing and encompassing people outside of the cyberculture circle (Fiévet [12]). Accordingly, this study provides a contribution to "corporality" debates in contemporary society. Centralizing on the emergence of innovative self-made physiological alterations binding the body to prosthetic components, this brief study underscores to what degree the scientific temptation to recreate and enhance humans according to their normative principles has crossed a fine line inspiring experimental practices that have became the edge of a radical activism operating in the core of western societies. We propose to identify the treatment that grinders devote to the body and artifacts: Which reading do they make? What are the limits of self-made enhancement by these techniques? These questions seem even more essential in a context like ours, where scientific and technical progress allows a symbiotic relationship with the body, rather than to compensate for a physical failure, but to provide additional functions.[9]

The argument will be structured in three parts. The first discusses entangled agencies between organic and inorganic entities that are in a relation, mutually influencing one another, allowing individuals to register differences to which they were not articulated previously. The second consists of major modifications executed by body performers in which there are combinations of organic hybridization with prosthetic components. The second approach exemplifies, and the third analyses, connecting a theoretical discussion on the association of man and technology. Our contemporaries have become profoundly technical in their ways of imagining and acting, thus an examination of the current body revolution cannot overlook subjective and environmental influences. The final considerations assert the mutability of human organisms. Individuals are not in the world in a definitive body. It changes in the extent that they live and experience other entities that are able to affect them and create a new body. Technology contributes to its affectation [20]; therefore, in face of the same reality, they are essential agents that direct the body in unexpected ways [11].

1. Body and technology: a carrefour of entangled agencies

   Two fundamental dimensions need to be considered when reflecting on technical growth. First and foremost, it concerns the aptitude technology possesses to extend human action, contributing to the creation of an entire new world where nature's metamorphosis is privileged in favor of a recreated world (or "non-natural" reality). Second, technology is presented as a response to a perceived individual and social perception of incompleteness. Thus, it takes the form of a protective bubble, or an isolating envelope, whose objects become a technological *alter ego* [26]. Together, these influences introduce the potentiality of a powerful hi-tech improvement followed by the reproduction and multiplication of artificial beings capable of influencing human identity, for example, through the development of avatars, robots and cyborgs.

> "To add techniques to the body is always to add more images to it, precisely to 'embody' the technical utopias. The challenge is to remove man/machine boundaries, and to create the dream of their hybridization and naturalize techniques by embodying them. While the body is compared to an automaton and the robot will be his 'sensitive' companion or an *alter ego* avatar, in turn it offers the possibility to naturalize techniques."[10] ([26]:124)

The *technocorps*[11] (or technical-body) is an analytical locus of the world being remade by technoscientific innovation. At this sphere there are no *a priori* borders

[8] In these cases, they can be used for therapeutic or even esthetic purposes ([3]; [6]; [13, 14]; [14]; [25]).

[9] These new functions are allowed thanks to the latest technological advances. Made in the field of robotics, bionics, or biotechnology, their results have enabled the design of prostheses and implants which are brain controlled and also the development of exoskeleton interfaces.

[10] Author's self-translation.

[11] The formula "technocorps" from Pierre Musso [26] means the project of an enhanced man who is the symbol of the social, a man who has had his parts changed, who was manufactured by men themselves with the certainty of rational machines.

which are settled involving man and technology. New interactions, resulting from individual and collective praxis, hold representational variations about humanity's circumscription, which in turn fasten to the principles and values used for its social regulation. By modifying one's body, either via "legitimate" technoscientific improvement or alternative physical reappropriation, the body is instituted *a priori* as a borderless entity, finding diverse possibilities of recreation, reconstruction, and remodeling. In such a way individuals can experience the world and its sensations in a new way, at the same time erecting their identity [1].

Along with definite activities carried out by body hackers which will be generally described, it will be noticed how living beings are inscribed in mechanical and inorganic processes leading them to participate in a virtual space, whereupon inanimate and living matter are deliberately associated and treated likewise. This survey develops its idiosyncrasy by concentrating primarily on the trend of body hacking [12]. The practitioners, who are enthusiasts, work in different ways to develop functional and physiological modifications through the contributions of technology. Their goal is to develop empirically a man-technique fusion. In this case, their goal is to "work experimentally and conceptually around the notion of a technologically modified body using prospective modifications" [29]. Their approach also has an activist dimension claiming the right of every individual to freely do whatever he wishes with his own body – a concept that can be both a legal and philosophical problem about body-person liaison. The most recurring issue, when dealing with the body, often comes from voices raised by individuals who wish all of the privileges of modification. The various conceptions of the body have pointed out a straight relation with the legal personhood, whereas a clear articulation of the meaning and content of the term "person" as well as the legal status for the "body" is absent (Marzano 2002). The last is considered an object among others; conversely it constitutes a very different one. It is through the body that individuals are in the world, living as beings and establishing interactions. They learn to register "world counter-parts" insofar as new elements are progressively introduced into the embodiment equation. Similar movements, meetings, their intra and interactions by way of the mutual constitution of entangled agencies [16–18, 20] produce a broader sense and a more sensible world, turning individuals sensitive to interferences which previously did not generate any sensory response [11, 20].

2. Body hacking: from *homo sapiens* to *homo faber*

Taking a broad view of technological improvement, we will go through a provoking and discomfiting demonstration of individual projects exploring human enhancement and scrutinizing grinder's reading of technology and body constitution. Illustrations consist of a series of performances containing the idea that humans can transcend their bodies' right through technology mediation. We will touch on but not thoroughly examine the multiple aspects of these enhanced practices. Very likely they are the product of a confluence of events, including both a more nuanced understanding of human biology and a heightening level of comfort with body modification.

There is a considerable number of body artists, practitioners, whose posture vis-à-vis external technological components seems particularly compelling in the liaison between body and technology.[12] The first illustration involves the use of subcutaneous RFID[13] chips. These implants allow integrated interaction with the environment providing the possibility of storing data and controlling it remotely. Lukas Zpira claims to be the first artist who has been implanted with this microchip,[14] and is aware of the political issues related to monitoring and surveillance that can be employed to control individual

[12] We could also mention the artist Stelarc, for example, based in Australia, who incorporates themes related to man–machine interfaces in his works. One of his most representative works, entitled « *Ear on Arm* », involves engineering a soft prosthesis constituted partly of his own skin, having the form of an ear, in which he has installed a miniature microphone before attaching surgically on his forearm, in order to « listen through the arm ». One of his other projects related to body enhancement was the creation of a mechanical - and functional - human hand which was attached to his right arm (project named « *Third Hand* »). The characteristic of most of his projects is the design of prosthesis, not as a sign of something lacking, but as body augmentation.

[13] Radio-Frequency Identification.

[14] Another important case involves Dr Kevin Warwick, professor of cybernetics at the University of Reading, England, and creator of the "Project Cyborg." He proclaimed himself to be the first cyborg in history, after having implanted an RFID chip on his forearm. This implant has allowed him to be recognized in some environments and control equipment in his workplace. Other phases of the project consist of the installation of a grid of thumbnails with one hundred electrodes connected to the median nerve in his arm, allowing him to manage remote devices.

actions. In addition he works on the "Titanium Skin Multi Application Interface" - MATSI project.[15] It consists of the implementation of titanium plates designed to replace part of the epidermis. The purpose of this device is to serve as a receptacle for assorted electronic components, e.g. the iPod.

Similar cases of human mating with techniques within body hacking are not uncommon. The other body hacker in the United States, originally a medical technician, is the performer Steve Haworth.[16] He defines himself in the character of a "3D artist and human evolutionist."[17] He became famous for popularizing subdermal and transdermal implants. In the middle of nineties he began to insert small Teflon balls under his customers' skin. Curiously, the operation brings less post-operative problems than traditional piercing, in which the wound is kept open by the "classic" jewelry, whereas here it is immediately closed in the case of a steel or polytetrafluoroethylene implant. Successive months after the placing, a scar in the form of a cocoon is created. Around the object, an extremely dense amount of dermal cells is formed, helping to keep it in place and prevent further shifting. It should be noted that this object placement is tricky. Initially, it is a non-medical "professional" executing an unprecedented work. Additionally, the implant can block a vein or be set uncomfortably in a muscle or a near a gland. Other examples of Haworth's expertise are the synthetic horns and the coral applied in the forehead, whose practice is taken directly from conventional surgery.

Nonetheless, despite making jewelry and tools for body modification with his own design, subcutaneous magnetic implants have become one of the most popular and recurrent practices[18] requested by his customers. Magnetic implants were developed in 2004 by Steve Haworth and Jesse Jarrell and have become very popular in the media. The implant is made of neodymium, a rare earth metal that is used in industry. It takes the form of a metal disc whose main function is the response to electromagnetic fields and waves. The larger and stronger the magnetic field is, the wider its interaction with electromagnetic field will be. It recommended that it be placed at the sides of the fingertips, in order not to limit usual activities with the hands. Beyond that, it is intended to avoid sensitivity interference as well as magnetic fragmentation due recurrent friction with other objects, therefore losing its purpose and efficacy, and involving a very complicated removal. Before implanting these magnets, many precautions must be taken. For instance, magnets need to have a biocompatible coating, otherwise there is the risk of generating serious infections (even necessitating an amputation) and rejection by the organism.[19] These are quickly inserted under the skin through a minor surgical procedure which can be done in tattoo shops and, more surprisingly, even at home.[20] Supporters of these "self-performed surgeries" state that if sanitary conditions and proper techniques and placement methods are observed, these implants will not present later complications, but they are still a risky procedure.[21] Finally, the purpose of these magnetic implants is to create unusual sensations in the bearer's body, and for this reason Steve Haworth termed this sensory enhancement[22] as the "Sixth Sense."[23]

In the United States, we also find the researcher and body hacker Lissette Olivares. She explores the body's future potentialities, and relies on other body hackers' help to put her projects into operation. Her newest, and speculative, one is "*Ten Thousand Generations Later*: *A Subdermal Co-Evolutionary Archive*,"[24] which consists of a subcutaneous catalog composed of DNA from all sorts of creatures

[15] Retrieved April 1st, 2014, from http://www.hackingthefuture.org/

[16] He first followed the path of his parents who were owners of a company located in Phoenix which specialized in the manufacture of implants and surgical steel tools.

[17] Retrieved 1st April 2014, from http://www.stevehaworth.com/

[18] See the website « *Body modification e-zine* », BME, an online magazine about the current world of body modification, such as magnetic implants.

[19] Retrieved 1st April 2014, from http://augmentationlimitless.blogspot.com.br/2013/04/implanting-magnet-1-prosthesis-implants.html

[20] It is possible to buy magnetic implants online, and to perform the operation at home.

[21] Retrieved 1st April 2014, from http://archive.wired.com/gadgets/mods/news/2006/06/71087?currentPage=all

[22] There are other uses of these magnetic implants, for instance, holding an iPod or a watch.

[23] These additional sensory abilities are defined as "magnetic vision".

[24] This project was first shared during an interview part of the author's ethnographic research. The readers will be able to understand the goals of Olivares through this project in her own piece arranged in this Special Number.

that she would co-evolve with. The process involves the voluntary donation of genetic material from different people and creatures. This will then be stored inside silicone capsules produced by Steve Haworth, and implanted under her skin *a posteriori* by the body hacker Brian Decker. She speculates that once this inventory saved it could be explored in the future by other extra-human creatures and could recreate another humanity.

The self-made invisible earphone implant of the body hacker Rich Lee is a new fashion that allows the user to listen to music and record conversation through imperceptible headphones.[25] Made of magnets and directly implanted in the ears, it transmits sound by bone conduction. Still, he can synchronize it with his smartphone GPS to navigate city streets or, as he is planning, to hook it up to a directional microphone of some sort so the user will be able to hear conversations across a room. These earphones may have many other diverse practical and recreational uses, and could evidently be used to violate citizens' basic rights such as privacy.

Moreover, there is the project of the Finnish body hacker Samppa Von Cyborg, an influential figure in the development of advanced techniques for various extreme bodily interventions.[26] Among his most popular implants, there is the "Flesh Stapling"[27] and two other innovative prototypes: LED implant and vibrant genital implant. Still, there are so many other cases perfectly suitable to exemplify and enlarge our points, for instance, the various performances and procedures executed by body hackers such as Lepth Anonym, Amal Graafstra, Eric Boyd, Nathan Roseborrough, and Jonathan Oxer.

By enhancing sensory capacity, original emotions appear and collaborate to develop a new connection with the organism. Far from symbolizing the body disappearance, this re-appropriateness affects its entanglement, though sensations continue at the heart of these reports. Currently, every week there appears within American, French or German online publications, new experiments that advance the boundaries of what was thought possible and acceptable to the body. Tim Cannon personifies it. Steve Haworth implanted a computer chip in him that can record and transmit his biometrical data. It is contained in a sealed box whose battery is wirelessly charged. This implant was name Circadia 1.0, and the data transferred from it goes to any android-powered device.[28] Considering that Haworth is not a board-certified surgeon, he was not allowed to use anesthetics. Beyond that, no regular American surgeon would be allowed to embed in the body a device that is unapproved by medical authorities. Not ignoring future device development, the first version of this implant measures body temperature and transmits it in real time via Bluetooth. Cannon is willing to make the environment more sensible and intuitive to what happens to his body, achievable by his organism's integration to a connected universe. His passion does not consist of simply inserting gadgets into the body for better performance; he envisages transcending the confines of biology to be capable of hacking evolution itself. He affirms that "human enhancement is a right!" [4]. For the body hackers, humankind has stopped biological evolution, and has already passed to the bionic stage, an evolution controlled by ourselves.[29]

Small but dynamic, these "scientific" subcultures are producing astonishing innovations. From pocket-sized kits that sample human DNA, microchip implants that keep tabs on our internal organs, blood sugar levels, or moods, and even 3D printers that produce tailored hip replacements, the technical innovations of the body hacking movement are beginning to filter into mainstream use, and the repertoire increases every day. And the Internet (blogs, websites, discussion forums, tutorial photos and videos, etc.), plays an important role in this

[0] There are other uses of these magnetic implants, for instance, holding an iPod or a watch.

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[0] This project was first shared during an interview part of the author's ethnographic research. The readers will be able to understand the goals of Olivares through this project in her own piece arranged in this Special Number.

[25] Retrieved 2 April 2014, from http://www.news.com.au/technology/us-bodyhacker-rich-lee-has-magnets-that-act-as-invisible-headphones-implanted-in-ears/story-e6frfro0-1226672890483

[26] Retrieved 2 April 2014, from http://www.voncyb.org/

[27] It is a jewel piercing wherein the central bar is exposed to the outside of the skin, the shape of which is similar to a clip.

[28] Retrieved 2 April 2014, from http://motherboard.vice.com/blog/the-diy-cyborg

[29] The objective of Manfred Clynes and Nathan Kline, who worked for NASA in 1960, when they invented the "cybernetic organism" where cyborg, that is to say the amplification of human, was to allow survival in space and conquer the planet Mars.

emulation process by offering an unthinkable exhibition to all "cyborg" apprentices, proposing to them the opportunity to make their own experiments by themselves.[30] Although some implants' design still remain "simple," these body hackers dream of functional and secure ones. These explorers of the amplified body also claim total freedom for their initiatives. Having a taste for risk, most of them refuse to conceive of the body as a "sacred" entity from which any modification would be prohibited. Cannon assumes the risk of the eventual "spontaneous combustion" in case of a leak of sulfuric acid of his Cincardia implant, as is possible with other types of electronic device batteries. As a consequence, it would cause a dramatic change in the bearer's blood pH. To avoid further problems, he has been working toward a double system of security to protect the user. As with the other body hackers, he knows that "Injuries are inevitable. This is not a reason to do nothing." [4].

Extreme body modification takes many forms, hacking being one among others. Its depiction as potentially addictive, harmful, and an escalating mental health problem reveals a serious issue related to the disposal of the body. The apprehension is that these radical experiences are usually considered dangerous activities for the individual's health. Diverse posts on the internet exposing tongue bifurcation, transdermal skin implant, corset piercing, scarification, branding, eye tattooing, and others, especially worry doctors who are convinced that these activities are risky to the perfect functioning of the body.[31] Besides, out of the body modification scenario, people who have decided to have their bodies modified and professionals who perform these modifications are extremely stigmatized,[32] and are rendered as discredited people (Goffman 1995). Diversely, many accounts on extreme body modification suggest that the body modifiers interpret their practices as assertion of bodily self-ownership and their body as a vehicle for staging cultural identity. Throughout an assemblage of websites, the most recurrent issue is self-control over the body. This is seen by the performers as any other property, therefore they could dispose of all rights in relation to it. Taking up the maxim that legitimizes the body hackers to experiment with their bodies, one must be aware that legally, ethically and morally it engenders diverse polemics. Given contemporary developments in science and medicine, it has been learned to consider the human body as a set of parts; still the body is at the core of human identity. From this, a number of problems arise relating to its use, accentuating the need of specific regulation of its appropriation.

3. Object, human, nature, culture, entities ontologically inseparable

Over the past thirty years, there has been a major effort of reflection on the articulation of social practices and symbolic anthropology whose objective is to examine the ontological border based on the opposition between nature and culture. Philippe Descola,[33] a French anthropologist and ethnologist, points out the way to liberation from Western dichotomies based on the classical distinction between nature and culture. Descola exposes diverse ontologies and relationships by taking the main anthropological theories regarding heterogeneous relations between humans and non-humans. A wide range of scholars have recognized that the division between what is widely perceived as cultural and natural is constructed and largely arbitrary. Human experience must be understood as the result of two distinct fields, but coexistent despite the fact that it is governed by different principles. This theoretical

[30] You can buy online kits to construct RFID toys, the invisible earphone, implant the magnetic and even the Cincardia 1.0. A quick search at the internet presents many ways to accomplish this fusion and instructions in order to avoid recurrent mistakes.

[31] Retrieved 1 April 2014, from http://www.emaxhealth.com/1506/dangers-extreme-body-modifications

[32] Modified people usually have fewer job opportunities. Employers, in general, are not willing to offer the same opportunities due the physical transformation. It can be seen that the body modification community is fighting for less discrimination and equal employment possibilities. Beyond that, the new media, the powerful mediator of social understanding of events, also contribute to present and "frame" this cultural experience. Issues are problematized and definitions of situations are advanced. The typification of events and social phenomena may impede group's ability to secure their legitimacy. Official and professional claim-makers state that body modification is a pathological and mental health problem (Pitts 1999), or as dangerous and harmful activities. And their claim is accepted because of their authoritative discourse operating in the public sphere.

[33] His theoretical approaches can be found especially in the following works: *Par-delà nature et culture* (*Beyond nature and culture*), *L'écologie des autres*: *l'anthropologie et la question de la nature* (The ecology of others: anthropology and questions about nature) and *Diversité des natures*, *diversité des cultures* (*Diversity of natures*, *diversity of cultures*).

shift affects our traditional conception of the human being, its components, individual and collective identity, because dualism has generated concrete consequences for how anthropology and sociology had been practiced, notably: 1) in the characterization of its object, 2) in the definition of its methods and finally 3) in the principles produced. Therefore, when we use words "body" and "modification" we put into operation a variety of *a priori* meanings. One of them is that the body belongs to nature while the term modification refers to culture; thus, despite the cultural diversity, the body is usually seen as a natural material because of its pre-conceived universality. This paper makes use of the previous words because we lack more appropriate terms to define the triptych correlation among the body, the technique, and society. However, the terms "body" and "modification" that are used here do not carry this exhaustive dichotomy and its meanings into the body hacking trend.

The rise of technology has been accompanied by uncertainties specially related to its applications and the individual/social intersections. Without the intention of providing a global assessment of such a complex and wide subject, this study examines humankind's personal reappropriation of advanced techniques. The uncertainty that characterizes the scientific and technological sphere, as well as its social emanations, is loaded with ambivalence. The investment in technologies and nanotechnologies is a priority for technoscientific development, and there are many expectations concerning the positive impact on the environment and life enrichment. Conversely, preoccupations increase regarding its use in the private sphere by non-specialized people. Any research on the attitudes of body hackers reveals new possibilities for technology reappropriation; new body intra/interactions [18] and meanings are developed and transform corporal uses and the subjective relation to objects. These experimentations reinforce the argument that the organic body remains central to human identity proceeding over that of its disappearance [5, 15, 27], and it is continually engaged in a learning process that turns individuals' sensibilities to the world's elements. Throughout the body's material and social existence, it develops its sensitivity to the world and more rich in meanings [11, 19]. According to arrangements put in place by diverse societies, the ways to "body's becoming" can take many forms and directions depending on how it learns to be affected [19]. When facing the same reality, the body, affected by singular cultures, habits, and behaviors, will not decode the same stimuli and will not experience the same sensations [11]. On the other hand, the body is the means that teaches us to be sensitive to the extent it is affected by them.[34]

Bringing a discussion on the association of man and technology, Queval observes that man has become "profoundly *technical* in his ways of living and imagining" ([27]: 321). A reflection on the body of our contemporaries cannot ignore Western influences that have been contributing to the body's creation and affectation.

Three founding events can be reported. First, the ancient Greek world brings us the body and the concern with the self as aesthetic and moral value. Afterwards, with Christianity, the body − part of the community − is kept at distance by the radicalization of the Cartesian distinction soul/body. Along with Humanism, the rupture process between man and community is opened and the first signs of individualism arise. The individualism progress and the separation of religious positions placed man as responsible for himself and his destiny. Taking these factors into account and combining them with features and instrumental rationality, body creation today can be appropriately reviewed ([21], 2012; [27]). Faced with the growing knowledge inherited from various scientific fields that appropriates nature to recreate it, individuals are confronted with more elements today. Insofar as looking at the past, it is noticeable the progress that has been made by science. The rational-based body production places it in a world of technique, that is to say, its constitution is at the same time "natural" and "cultural" [27]. Thus, the integration of functional objects within the body can question its limits and, beyond that, undermines the dichotomous conceptions of nature and culture [9, 10].

The body hackers are projecting themselves to a physical future whose central axis is individual choice; their power comes from will. Their bodies,

[34] The works of David Le Breton, Philippe Descola and Bruno Latour are the source of this critical finding ([19]; [21, 22], 2008 ; [9, 10]).

more than an economic issue, are constantly invited to be controlled by personal desire. It is misguiding to believe that everyone does what he wants, since there is a bio-medical and techno-scientific nourished body imagination with its own values and discourses. Paradoxically, there are legal and moral matters touching the right to dispose of the body unconditionally. On the one hand, normative biomedicine suggests a healthy and perfect body, ahead of death and degeneration. On the other, technoscience pushes and turns the limits of "nature," making each one its architects and masters. It is not necessary to go too far with the view to notice that our contemporaries are immersed in a system that confuses the "being" and "having", articulating them around "doing." Physical tinkering is proposed as existential data. Thus, individuals try to recreate the human body and enhance it for distinctive and peculiar finalities.

Interpreting body modification practices as desocialization or disembodiment implies doubting human capacity of inventiveness and adaptation. The human body is likewise an unimaginable locus of social and collective investment. As Queval [27] succinctly notes concerning all modification of the "natural" body:

> "The body changes, surely, but it does not disappear. The body is worked, but is not hidden. The body is fantasized, but not forgotten. New meanings are revealed, new body languages increase and transform corporeal uses. Thus, the thesis of contemporary identity centralization on the body, according to us, excels over its disappearance"[35]— ([27]:16).

The body is investigated by scholars, it is fantasized by body hackers, grinders, activists, and it turns out that it is capable of an unprecedented flexibility. Gradually, the dichotomy of nature/culture is scrapped, as the interior/exterior boundaries fall away. The body hackers demonstrate to us that body production is a long process of experimentation. It is sometimes real and fantasized. It finds in the technical and scientific sphere the probability of fructifying. However, along with the rational body production, it is not only corporality and the individual which matter. It is, however, the subject and the subjectivation of ideologies. Technique promotes and frames body administration. Its activism supports the modern belief in the will and science, the later carries a moral value in itself.

Final Considerations

It would be counterintuitive to search for that which is human in technique, for man is technical since the beginning of time. The fabrication of tools has always assisted the *homo sapiens*, equipping and giving him something beyond his natural legacy. What needs to be remarked, apropos all these transformations, that touches individuals in different ways consists in the close regard that disciples must take in the matter of the boundaries which ought to be traced: the technique that extends the human and the one that denaturalizes him. Bodily construction is established upon a fine line between liberty and alienation. Culture's reappropriation of nature brings certainties on one hand and many uncertainties at the other. Which man and which body are the body hackers planning for the future through individual technology reappropriation? Rationality is able to produce new bodies that carry knowledge and direct it towards new powers that are still ignored. Science courses the body and reinvents it. But what is the limit of man–machine symbiosis? What has been previewed for humankind in face of the transformations we have briefly seen along certain illustrations? Doubtlessly, in the beginning of the 21st century, individuals are invited to enjoy their own bodies as a fetishist object. Yet, this enjoyment is individualized and singularized. It is totally compatible with the ideology that each one does what one wants, the individual liberalism dogma. And the comprehension of body plasticity nourishes the imagination and encourages personal practices to its fulfillment, as the body hackers have been showing currently.

The body is not a predefined and unchanging territory. It changes and transforms constantly in a variety of ways. First of all, this happens over time and through one's own existence, experience, and practice. Individuals tinker with their bodies at the same time that they are in the world. They are taking it into surprising directions as they shape it according to the image of their dreams, imaginary, and expectations, alternating between control and loss of control. Alongside body's

[35] Author's self-translation.

evolution in the middle of this learning there are various tools able to modulate its capabilities. Its borders move especially when it has involved an undetermined number of apparatuses in the bodily equation. There is noticeably a tripartite relationship between individual, body, and technology, which are constantly in association and hybridization, sometimes posing a difficulty in dissociating them. But the latter is not an object like any other because of the special relationship it has with the body. It modulates its borders by "entering" and "enhancing" it in a reversible (or irreversible) manner, while adding new features and/or sensations. These boundaries between the prosthetic and organic can then be questioned by the presence of surprising tools created by the body hackers. In other words, these borderlines can be considered as intermediary zones that defies body dichotomies (organic/inorganic, subject/object, inside/outside).

Finally, body hackers adopt a posture based on "do it yourself," "everything is possible," and "why not?" They define themselves as activists who go against contemporary body standards of appearance in society. Notwithstanding, they encourage the development of new physiological possibilities. They question body normativity through multiple transformations whose inspiration comes partly from their imagination and also from scientific and technological advances.[36] Still, what impresses and disrupts the social conscience is the use of technology and its applications outside the boundaries of medical education where these types of transformations are seen as harmful and even as a way of mutilation; while for the practitioners it is presented as a subversive form of self-emancipation and a response to unequal access to technological development. Beyond identifying opportunities to escape the social determinism, not succumbing to social norms, actually these modifiers become part of neoliberal ideology where rational choice is overemphasized. They believe they have collapsed with conformity and became architects of their own bodies and capabilities, notwithstanding the hazard [8].

[36] It is undeniable that science progress has legitimized human body enhancement ([23]; Marzano-Parisoli 2002) as it can be noted in the latest findings in computer science and medical bionics researches. These have led to the exploration of new promising ways to address serious functional disorders, correct disabilities or improve the life of people who were severely affected in their physical integrity.

Other features of these novelties are related to their non-institutionalization, their implementation par bias of new "body experts", flesh *bricoleurs*. Occasionally these bodily artisans have different reasons for engaging in their *démarche*, yet they share the same quest: to work in the functional character of their body through experiences related to technology. The organism becomes the object of production and within this process new powers, brought by technoscience, are introduced and crystallized. As Queval [27] highlights, the body's creation, improvement and enjoyment became deeds of rational activism. By corollary, the attention dedicated to the body also reveals a problem of identity construction. In front of a new structure in contemporary society marked by the collapse of institutional references which has led to an individualistic dissemination, each individual is faced not only with the duty to succeed, but more importantly, to finding a meaning to a precarious existence (Le Breton 2012, [23]).

The body for excellence is the locus of paradox. For this reason, it has been constantly brought to the center of social and ethical discussions. It is not possible to think of the body outside of a morality system, because it too is part of an ontology. Reviewing body and technique association through individual practices of physical transformations puts at stake new relations, convergences, contradictions, and confrontations that are related to greater issues of contemporary western society. Certain currents of technoscience sustain that the reconstruction of the human body by these new biological "engineers" is related to its possible disappearance and its replacement for digital presence. This hypothesis is not admissible, though. Rather, it is pertinent to the development of a physical plasticity and malleability, due to the fact that "any attempt of negation, if we were to formulate like this the effervescence of the 'natural' body changes, points out the importance that it intends to deny, and not its erasure or disappearance" ([27]: 16). We agree that on the one hand, it is not possible to sustain the metaphysical idea of a "natural body" and "human nature," which is still more or less compatible with transhumanist techno-prophecies even though or rather because they embrace the idea of augmentation in general to improve human (and nonhuman) life. On the other hand, we need to critique posthumanism in a cultural and materialistic fashion, as part of an ideology of a technoscientific capitalist society. Body hacking is a logical flow that tries to hack or crash this system by appropriating (or reappropriating) the same knowledge

and using it in its way. The fact is that free market ideology and late capitalist individualism can no longer be separated from the various technological and cultural human technologization processes. The two final questions are: Which social institutions will control technoscientific progress and power to transform humans into more beautiful, capable, faster, intelligent, and profitable individuals? And how will these unpredictable and radical transformations affect our sense of humanity? We cannot present any response so far. However, we know that these physical transformations with intersecting techniques actively challenge long-held normative beliefs about what bodies do, what they should look like, and how they should behave, and pose difficult challenges to an ethically based societal debate (if there will be any).

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