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The Human Body: Natural and Artificial Technology

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Premise

Machines involving communication and information, particularly "mobile" machines (i.e., cellular, personal digital assistants [PDAs], portable laptop computers and, increasingly, microchips under the skin) represent the core of today's technological innovation. (Hereafter, the term machines refer to those involved in communication technologies.) I have analyzed (Fortunati 2000) elsewhere how society has arrived at the point at which information and communication technologies (ICTs) saturate the body and bodily senses. In that article, I singled out two factors that make it possible for ICTs to first approach the body and then penetrate it. These factors are (1) the uncertain boundaries of the body itself and (2) people's tendency from the very origins to imagine archetypal figures of the body as a machine or, vice-versa, of machines as the human body. This second factor is demonstrated by the term's automaton, golem, android, or robot. Not only do we imagine such human-behaving machines, but human beings have also tried to create these machines.

The phenomenon though goes further than mechanical embodiment; society also seeks psychic reproduction by attempting to create artificial intelligence (Al) systems (Collins, 1990). Al involves a separation of mind from body, or more precisely, the development of a mind without a body. Efforts at Al seem to result in developments along three sets of opposites: (l) The mind on a sadistic pole and the body on a masochistic one; (2) the mind in the masculine form and the body in the feminine form; and (3) the mind that reflects Western influences and the body that reflects "Third World" or Eastern aspects. This chapter deals with the core of the problem, which is essentially one of the bodies. My thesis is that machines are inundating our bodies at an increasing rate because the human body is already, in essence, technology. In what sense are we technology? There is already a sense that the body works within the organization of everyday life as a machine. The post-modern body, which still moves on the axis of containing/contained (Durand 1963), operates especially on many different levels. The post-modern body is a physical and psychic entity; it is our first extension in space; it is a powerful and natural means of communication; it is an instrument of seduction; it is the first barrier between our subjective world and the objective world; it is the seat of our capacity to work and of our inner dimension (L 'universo del corpo [trans. The Universe of the Human Body]) 1999; Marx 1953, 1957; Volli 1999). It is also a social and cultural construct (Polhemus 1999). But the body is above all a natural "machine" of the domestic sphere, of that great and fragmented social laboratory where the capacity to work is reconstructed each day (Katz 1999).

The Body as a Natural Machine

From a rhetorical point of view, the definition of the human body as a natural machine is an oxymoron that may intrigue or perturb. But from a sociological point of view, it is a perfect reflection of the double character of the domestic work process (Fortunati 1981)—in terms of a capitalist society, the body seems to represent the non-capitalist (natural) sphere while actually entirely participating in the creation of value. In the same way, the body is represented as a natural (and therefore valueless) product in the domestic labor domain. However, in reality, the body functions as a machine to produce society's most

precious commodities: the newly born, the labor force of tomorrow. Furthermore, the body becomes a natural machine for restoring the work capacity every day. It is a special machine, supplied by nature, but which works as an extremely sophisticated technology of the reproductive sphere.

The body, while being the real, great domestic technology, is represented as the emblem of naturalness. The body has always represented the maximum of naturalness; not in itself, but rather represents a historically determined naturalness that has the potential to be recreated at any given moment. This has not obviously excluded the body from the necessity of coming to terms with culture and artifice (e.g., make-up, clothing, social formation of the image of the body). In reality, the body, as every other intermediate product or moment of our daily lives, is artifice to the maximum degree. Not only the body, but also the entire domestic sphere is actually an extreme form of artifice, despite being represented to the contrary.

From the kitchen recipe, which may be considered the queen of the pragmatics of communication, to the heating technology that we use in our houses, every element of the domestic sphere contains millions of bits of information, elaboration, experimentation, debates, practical experiences, and enormous quantities of dead labor. Every day presents an immense store of culture. But culture means artifice, which is not yet defined as technology. (The term artifice here is based on the Latin meaning of artificium, that is, the art to improve a thing.) Even if technology were made up of artifices, the artificial does not coincide with the technological. When we say that the body is not only artificial but also technological in nature, we actually resort to a metonym; that is, we transfer a meaning from a function to a thing. In other words, the body works as a natural machine, it works as a technology, but it is neither machine nor technology: it is much more. And we, human beings, are still much more than our bodies.

The reader may find this clarification of terms pedantic. But it helps us to explain one of the most powerful mechanisms that create the ideology of technology the last great ideology in which, as Baudrillard so acutely observes, "all transcendent values have been absorbed" (1999, It. tr. 2000, p. 93). The way in which scholars frequently resort to rhetorical statements to make their ideas more striking often leads to the conceptual bases of the analysis being changed. This is the case in which, for instance, communicative technologies are anthropomorphized by personifying them in terms of responsibility and decision-making, actions that conventionally pertain to human beings (Latour 1998; Maldonado 1998). As a result, we describe human beings as helpless and easy to subordinate, completely passive in front of so much power and Al. However, this is not to say that this metaphoric concept is the reality of human beings vs. machines and technology. To defend the right to the use of metaphor, we must make clear that we do not apply the meaning of technology tout court to the body. The reality is that the machine is inferior to the body, and the body should not be assimilated to the machine, but rather, the body carries out an important function as a machine, as natural technology. As such, the body cannot resist the subjection to therapeutic and communicative technologies, because these concepts represent its most frequently used metaphors. (In fact, the body is often referred to as a machine. See Léroi-Gouhan 1943, 1945.)

The Recovery of the Inorganic, or the Technology of the Body

During the whole modern age there has been limited technological development in the everyday sphere as the "real machines" of reproduction have been the body of the woman and her almost limitless capacity for work. The technological weakness of capital in the reproductive sphere was able to exist because domestic organization rested women's inventions of artificial technologies connected with cooking, preservation of food, caring for people.

Paradoxically, it was this very primary technological function of everyone's body, and especially women 's, that gives pause to the development of artificial machines in the sphere of everyday life. With the great industrialization which began in Europe (Great Britain) in the

last quarter of the eighteenth century, the development of factory technology was created first out of the claims for the reduction of hours required for manual labor, while there was no need for a corresponding development in the domestic sphere; the increase in productivity here was still pursued, creating more work, especially for women.
In heavily industrialized society, an initial stage of increasingly strong pressure came about from the decrease in women's domestic work time following their ever-more massive entry into the labor market. This decrease in some way stimulated the development of household technology, even if household appliances are all considered "secondary fallout of the noble evolution of the great industrial sectors" (Gras 1997, p. 172). Not by chance, underlines Gras (1997, p. 171), the graph of the development of technology in daily life is correlated to that of the increase in external female labor, as well as mass reduction of domestic work on the part of women (with an involvement of men in the division of domestic labor). The first main protagonists of household technological development were therefore household appliances. They represent a technology that has liberated women from the fatigue of some of the household chores. And women cannot be accused, as sometimes they are, of the fact that the time saved from work has been swallowed up by other jobs and functions. The problem, in that case, of this "swallowing up" must be attributed to the loss of power and control that woman have over their workday as a whole. The negative effects of household appliances, if any, is the fact that they end up becoming fixed elements of re-ordering the workday, constituting a further possibility of control and command over daily life.
In a second, more recent stage, there has been the surprising entry of ICTs into the everyday (with important machines this time). The genealogy of these "machines of the mind" (i.e., computers) poses much more complex problems than mechanical and electrical-mechanical machines (Longo 1999— 2000, 2000). If the latter serve to reduce physical effort and compress the time necessary for producing goods, the former serve to reduce the mental and nervous energy necessary to produce communication, information, entertainment, and enjoyment. But ICTs are so complex, ambiguous, and elusive that the time dedicated to communication and entertainment in the domestic sphere has been lengthened.
ICTs have actually increased their penetration of everyday life as women drastically reduced their housework and negotiated their interests more forcefully in marriage and in general, personal relations with men, and inside the extra-domestic labor market. In this context, electronic media have had on the one hand, a social role that increasingly had to deal with the progressive isolation of the individual, and on the other, has functioned as a palliative for natural communication, serving as an excellent way of avoiding the confrontation of familiar relations, with no way out (Fortunati 1998).

The Hybridization of the Body and Machine

In highly industrialized countries, we are entering a third stage, distinguished by the fact that we are investing technologically in the human body. The effect is obviously an enhancement of the technological aspect of the body, which is trying even harder to retreat from the intermingling and confusion of the natural and artificial. The symbiont, the individual-machine that lives both a human and un-human life, is the symbol of the new structure of social relations. But why this technological investment in the body?
To answer this question, we need to evaluate the phenomenon in the 1980s and 1990s, where new generations of women, on their relentless quest for self-determination, questioned many of their "natural" roles: from female roles associated with housework, to sexuality, from affectation to the psychological implications of care and support. In other words, they left the everyday to itself.
By leaving the everyday to itself, the great opportunities of meeting and clashing, of solidarity and mediation between genders and generations, has been abandoned, as the various social subjects (adult males, the young, women, children, the elderly) have not been able to find a strong enough common point of organization and mediation. In addition, it appears as if men and women, for one reason or another, are fleeing from the

everyday (Fortunati 1998). There is a strong impression that the flight from the real is growing because the real is too contradictory, difficult, and complex to negotiate and live. Refusal or the impossibility (given the present-day obstacle of work) of taking care of others, of working to reproduce them, recreating them or recreating ourselves with them, is the real social problem of the Third Millennium. After the very noisy and radical struggles and demonstrations of the 1960s and 1970s, the 1980s were the years of the silence of the masses. But the important game of voluntary servitude, understood as a fatal strategy, in which we observed the impotence of power and the end of politics, as Baudrillard (1987) writes, ended in the 1990s. Today, disenchantment with domestic work and the weakening of social consensus passes silently, flees from reality, from natural communication, and from contraction and mediation, making interpersonal relations more difficult. Although they have managed to win greater power from men, women have not been able to put it to great use for two reasons: (l) men have reacted, escaping from natural communication and seeking refuge in machines to avoid communication and involvement, and to increase their sense of power (TV or the computer become the ideal wife/mother, because they are obedient and can be controlled by pressing a button); (2) the intensification of rhythms of labor and life have eroded social roles and communication. The departure from natural communication mostly by men, but also women, through the incapacity to resolve conflicts and to reach mediation is the most salient social consequence of the 1990s. The growing use of ICTs, especially the computer and television, conceals this situation of stalemate, a situation that has now hardened. At the same time, it is an extension of our expressed attitude toward all other goods. Perhaps because we are distancing ourselves, we feel an anxious greediness, a voracity for the real, which we want to consume in ever-larger quantities, even if only on a virtual level, even if second hand. The result is that, beyond the remaining old poverty, which exists even in the industrialized nations, the new poverty that affects everybody is a poverty of first-hand reality.

Virtual reality was born during a time when women had already liquidated the everyday the sphere of domestic work—because no concrete recognition of the social value of their reproductive labor had been forthcoming. Virtual reality also was born out of a response to the inevitability of the choices and attitudes that politics continues to exert over their societal role. But it was born also from what Virilio calls "the defeat of facts and events" (1993). More or less authentic, sensitization to the problems of the "global" world obscures the growing desensitization to local problems, to the problems of those who live next to us. For not having recognized the value of domestic work, the economic system is paying an enormous cost for the subsequent neglect of the everyday. And while the concept and utilization of social power can convey only indifference and helplessness, entire slices of reality are being liquidated.

The only terrain on which social politics can gain ground regarding matters of the value of reproduction and communication is the technological hybridization of the body. But why have we come to the point of mechanizing the human body and not the domestic work process? Because the body is the formal connecting link to the production and reproduction spheres. It is not only a product of the domestic sphere but is also the condition of the existence of the productive system. As the product of the natural force of social labor in the domestic sphere, the human body has actually no value in itself: it has value only inasmuch as it is the container of its capacity to work. It’s becoming a machine presents the great advantage of not compromising the double character of domestic production and in general, of the whole system. Furthermore, the decrease in births (because for women, and in general for couples, it is less convenient to have children), and the great caution of migration policies which always try to control the immigrant's number for social and political reasons, have created a situation in which bodies, or the

population in highly industrialized nations, are beginning to diminish. This is the reason why we have come to put machines inside the human body, even if this opens up a series of inconsistencies. On the part of the living, technologies impose the rights of the dead labor incorporated in them. So, the more technologies penetrate the body, the more they limit the quantity of living labor necessary for the production of the body itself and its capacity for labor, and therefore, further devalue us. It is the usual old story: technology makes labor, in this case housework, superfluous. In conclusion, it is the body that has been technologized and not the reproductive process. Not only does technology influence the logic of our organized working system, but also it can be considered to be the trigger that activates the devaluation of the body and the individual. This process is likely to be persistent.

The body, a natural machine, attracts and envelops artificial machines at a diagnostic level (e.g., probes), a therapeutic level (pacemakers, radiation, hormonal therapies), and at other technological levels: from reproductive ones (in vitro fertilization) to those of identity (plastic surgery, genetic engineering, sex change), to communicative ones (cellular, laptop, pager) (Katz and Aakhus 2002). In other words, the body attracts a series of machines; however, the machines are not those that would serve most to transform the organization of domestic work. The body, even if technologized, is left to its difficult domestic activity with little help from technology and everyday life remains in its substratum of pre-industrialization. The mind, on the other hand, is nourished electronically in various ways. Sometimes for reasons of social control, as in post-industrial countries, the nature of labor is expanded to include more communication, organization, management, and becomes increasingly intellectual. But also, predetermination of homogeneous standards in the immaterial reproduction of individuals is necessary to attain these mentioned labor domains. Standardization is very important because the immaterial part of domestic labor (e.g., affectivity, sexuality, psychological support, communication) is the most difficult to control and manage, and is the part that has been abandoned by women.

Capital, which is a system of production that is deeply rooted in the material nature of goods, cannot apply its set of strategies to the measurement of the quality and quantity of immaterial work (organization, strategy, communication, research). This difficulty can be felt clearly in firms that are exposed to these immaterial spheres. In fact, much behavior of firms in this area is marked strongly by its endeavors of experimentation and risk. Machines of the mind, apart from the advantages that they provide for economy, also guaranteed the considerable lengthening of the domestic workday—but at least this technology has diluted its density by multitasking (we watch TV while preparing or eating food). It is ironic that the result of a technology is lengthening of a workday, namely domestic labor, since it was created to do just the opposite. This resulting increase in time spent on domestic labor, which is unusual for a technology, clearly plays a role in controlling territories of daily life that have been freed from work or left unmanned by the refusal of domestic labor.

Until the 1970s, the sphere of the everyday was marked by a great presence of immaterial work (think of feelings, sexuality, affectivity). But a kind of "bug" spread throughout society that accelerated transformation of material labor into immaterial work. De-industrialization caused the transference of manual labor to develop countries of the "third world," thereby greatly decreasing manual labor in industrial society. Factories, therefore, faced an exponential increase in immaterial labor (e.g., organizational work, planning, ideation, research, financial management, logistics). In the last decades, the body in the West has always been used less as a producer of physical and material energy, and more as the producer of immaterial energy, and of communication, organization, and management spheres. Therefore, in the "first world," intellectual work

has become progressively predominant. But it is in a certain sense de-cerebrated because it is forced to adapt to the rigid, tight, and limited straitjacket of informational operations. It is obvious that machines of the mind, together with the mechanization of the body, are the typical technologies of the post-modern era. But the cyborg remains a poor caricature if we do not understand its origins along with its diachronic significance.

The capacities most pursued and desired in the workforce today refer increasingly, at least in highly industrialized nations, to the elaborative capacities of the mind. Among the various electronic means, the computer is the machine that best manages to ensure and impose a standard in the supply of immaterial work. Obviously, many problems and dimensions of material labor have remained unresolved or cannot be formalized at the information technology (IT) level, while many others are produced by the computer (Maldonado 1992, 1997). It is also for this reason that the economic system currently shows very strong signs of suffering, apart from the fact that the paths for the management of immaterial work for the capitalistic system are impervious. Baudrillard (1999) has, in the age of the digital, grasped the aporia of money (which is the simultaneous display of both wealth itself and the sign of wealth). But this uncertain conceptualization can also regard immaterial work related to the capitalistic system, seeing that immaterial work is valuable in itself. There is a great difficulty in reducing all intellectual work that is not purely executive to a tangible measure. But isn't this the same kind of difficulty that prevents us from measuring the value of domestic labor, which contains so much immaterial work?

Given that the capacity for work is the most precious commodity for a society, but also the most complex, are we justified in thinking that the labor necessary for reproducing human beings can be made mechanical, or can be substituted by machines? Can we reasonably think that a household, the place where this work is done, can be subjected to a process of technological transformation such as to drastically reduce the fatigue and time of domestic labor? There are three elements that make us think in the contrary: (1) the domestic process, even if it is represented as the simple supply of work, more than that, "unskilled labor par excellence" (as, in Marxian terms, we could say), is far more complex than its technological equivalent, at least in respect to the level that technology, from robotics to domotics, has so far arrived (think only of dusting furniture and objects in a flat or cleaning a sofa); (2) the domestic work process is still represented as the natural sphere, so there is no political authority or institution that finds it necessary or has the power to elaborate a strategy to support this process; (3) as long as women (and to a certain extent men) go on doing this work without compensation (even if the quantity of work is less), inside a negotiation that doesn't have a norm or an official place in society, there is no incentive to replace domestic labor with technology because there are no costs to lower.

Let us remember that technological development becomes appetizing when it saves time and money, not when it becomes an extra cost. In fact, if technology does not serve to reduce labor as a whole, that is not the fault of technology, but of class-power relations. If technology does not respond to the problems posed by domestic work, it is due partly to the fact that, as long as people, and above all women, continue to provide the labor free, it will not attract any attention from the forces of production. Something does not become appetizing for the lords of technology if it does not present them with an incentive of doing business. To add to the problem, there are few women in central positions of ideation and creation in the new technologies.

We Who are Becoming Machines in Post-Modern Society: Conquests or Defeats?

In post-modern society, the social system of differences developed in the modern age is being completely restructured. Many differences, even between men and women, or more specifically, between the world of production and reproduction, have disappeared, or are at least less clear-cut. There is a tendency at the social level to fusion, to the formation of hybrids, to the development of similarity. Many of these differences are artificial constructions, the result of historical, social, and cultural determinations. Just as artificially they are demolished, (Meyrowitz 1985) possibly in the name of another form of artificiality.

Unfortunately, while we still dedicate much time and energy in empirical research to grasp and understand the meaning of differences (men/women, adults/ children), we still dedicate little attention to understanding the social significance of the new equalities that are taking shape in post-modern society. From a political, social, and psychological point of view, what meaning have indices of personality, attitude, and behavior, which are becoming more similar between men and women? Which processes affect more strongly our society— masculinization or feminization? It would be important to understand the signs of much new equality or, better, forms of commonalties, because that way we would be able to understand whether, on an evolutionary level, these are conquests or defeats on the part of humankind.

Traditionally, the nerve center of the capitalist system—the place of technological innovation and organizational complexity—has been the factory, the production of goods. The domestic cycle, even if fundamental, represents a natural sphere that has always been treated as a peripheral area. Radical changes have seemed to be connected only with the working class. But the incursion of women into the labor market and consequent presence in both domestic and labor spheres has opened a breach that has become bigger with time. In fact, production has developed inside reproduction (see telework, the family, or individual concern), and reproduction has increasingly taken on certain formal characteristics of a firm's work. The domestic sphere has assumed more importance as the new frontier of expansion in new industrialization production, often seen as the small, medium, or individual firm. The borders between production and reproduction have become increasingly blurred because of antieconomic and the hybridization of behavior and attitude.

However, the process of decreasing separation between production and reproduction spheres swung off course and turned over on itself. The domestic, which welcomed this massive incursion of production, has become the standard model that has pervaded all society. The household has become what the factory was once the emblem, the symbol of what is called globalization. Spaces have become occupied with a multitude of households comprised of many families, perhaps ubiquitous over society itself as one great household, much like the parameters of a firm. Also, the energies of innovation and competence in using technologies have begun to target the home market and have since migrated towards enterprises and firms. In fact, the big technological markets are increasingly tied to the domestic sphere. Once again, Hegel (1807, It. tr. 1960, pp. 158 and following) and his followers are correct in saying that at a certain point, those who end up by having more power are not those who have dominion, but those who are dominated.

In this context, the function of the individual as a "natural machine," typical of the reproductive sphere, and the hybrid of natural and artificial technology, affects all social aspects. In industrial society, alienation depended on whether work with machines existed in such a way that estranged workers from each other. Our post-industrial society creates a further alienation that depends on the invasion of the inorganic into the organic and on a further separation between the mind and the body. In highly industrialized countries, the intellect is the primary center of value production, making the brain the only utensil of post-modern production (Hardt and Negri 1994; Negri 2000, p. 150).

The Reduction of Oppositions on the ùOntological Plane, or Machines that Become Us

A process that has made body/machine hybridization possible has been the attenuation of differences on the ontological plane. The way in which human beings face the world and the relations they establish between the body and technology, between technology and objects, and between the objects and self, is on increasingly less disparate terms. In other words, that which up to yesterday appeared as opposing divisions emerges now as a gradual change, and the reason for the differences between the two terms in these oppositions are become increasingly hazy. Baudrillard (1995), in different terms, speaks of the end of differences, of undifferentiated concepts.

Given that from the anthropological point of view humanity is such because it produces and lives out these differences, the attenuation of these differences (which can go as far as creating similarity) could cause us to reproach the change as an anthropological catastrophe. But at the same time, it expresses both a strong structural tendency of the productive system and a strong force of attraction over humankind. In our environment, things that are similar to ourselves attract us most. The force of this attraction has led human beings to discuss the meaning of similarity and to try to reproduce it. The concept of similarity is recorded in philosophical reflections from the beginnings of Greek thought. Empedocles, for instance, conceives knowledge as a process of adaptation of the similar to the similar. Psychologists today do not go much further when they speak of attributing the unknown to the known. In addition, there is a power in similarity in the Latin phrase, similia similibus curentur (similar is cured by similar), a phrase that contains the origin of homeopathic medicine (as opposed to the other, contrariis curentur [cured by the contrary], which is the principle of the allopathic school).

Even if an important stage of establishing similarity is the beginning of confusion and grappling with the indistinct, it still remains a positive fact that similarities, when they appear, compensate for differences (Aron 1987).

If difference means separation, similarity takes us back to the opposite phenomenon, that is, reunification: the body is assimilated to the machine, objects become technological, technologies become "intelligent. " The tendencies to mechanize human beings and anthropomorphize objects intermingle with one another. It was the coming of serial production of goods that pushed similarity to the extreme, to identicalness, because every piece had to respond to precise standards. And it was this event that attenuated the uniqueness of human beings and their behavior, setting into motion powerful processes of uniformity, standardization, and homogeneity of the labor force both at a domestic and social level. Now, post-industrialism, through the development of technology, takes similarities between objects to their furthest stage. This does not mean the disappearance tout court of differences, but that the basis of sharing common conditions of human beings widens. On this basis, slighter and slighter differences establish themselves, which take place on a higher level and which are produced in a less hierarchical and more diversified way than before. Production of the similar, furthermore, is reinforced almost automatically socially in that it sets into motion at the same time psychosocial processes of simulation of the similar. That is, there is a tendency established to dissimulate differences between objects, and subjects, which makes possible and necessary, cooperation on the part of the public, consumers, and people.

In what way is this cooperation managed? In the way that the forces that create similarity or identicalness at a social level are aided and supported by the unwitting willingness of users. These users, in fact, cooperate with these forces, accepting to live out this fiction as if it were not one. This cooperation can be given also because human beings as spectators, consumers, or the like, tend to convince themselves that what appears similar

is actually the same as the object or subject that it claims to be, or the object/subject purports to be similar to the claimed object/subject. This is in virtue of the psychological tendency innate in human beings to stress similarities between objects that belong to the same category (Tajel 1981). This tendency of the development of similarity, and therefore, of reunification, just because it has "worked" both for objects and human beings, has gone and modified the ontology of post-modern human beings, the very structures and fundamental modalities for their being in the world. Therefore, the path of the becoming of the body supports the potent forces at work not only of separation, but also of integration and union. Separations are weakening also under the blows of biotechnologies such as genetic engineering. A new order is being born, a new system, where the hybrid is the key figure that passes from the imaginary to the statute of the real.

Technologies Inside the Body: Humanization of Objects

Another reason ICTs have been enabled to conjoin with the body is due to our attitude and relationship with objects in general. The means of production, distribution, and consumption, and the significance and that we attribute to objects, has greatly changed. We mean objects in general, because technologies not only form part of the family of objects, but also can in a certain sense be considered their more "noble" part. In fact they are able, as opposed to objects that are immobile, to produce movement. In virtue of this precious capacity of theirs, technologies border more closely than objects on the human and animal. Even so, our attitude toward technology is still influenced by our general attitude towards objects, which, in turn, shapes the former.

Ever since matter and energy have been intensely linked with information as an element capable of determining evolution, the characteristics that attract us most in contemporary objects have changed. We analyze only one of these, an object's humanization, because it is a good example to delineate our relation with technologies as forming part of the great family of objects.

Humanization of machines and technologies signals the acquisition of capacities and competence that so far have only belonged to humans. Let's start from technologies: the family of objects is the most similar to human beings because they can produce movement, and thus, the illusion of life. So, technologies becoming "intelligent" could be interpreted as a strengthening of the virtue of movement that machines had stolen from the human. And, as movement is life, producing movement means producing in a certain sense a central modality among those pertinent to human beings. But an object becoming "intelligent" today is a leap in quality, in the sense that all objects are becoming humanized through the development of information and the capacity to disseminate it. While the mechanization of humans is developing rapidly in a direction that has been tried out for centuries, the new event is the exportation of intelligence into things, bestowing objects with a "mind," of a new quality that is, above all, pertinent to the human kingdom. Making and constructing "intelligent" objects like technological textures, means that we are domesticating these objects, as we have done with animals. We make them similar to us, attenuating the differences between them and us, while specializing their properties and capacities in a complementary mode to ours; in other words, we make "intelligent" objects do what we are unable to do. Indeed, we have to resort to an "inferior" role to accomplish things that exceed our abilities.

But what is artificial intelligence? It is not an extension of human intelligence— in some ways it is a more powerful form, and in others, artificial intelligence is more limited and distorted than ours since it only manages to activate a small part of human intelligence: the part relative to formal logic without regard to common sense, emotive intelligence, or

linguistic competence. Clearly the entire conceit is a playing out of a social process (Collins 1990). If we look at the everyday, artificial intelligence is not successful in interacting with its complexity. In fact, it only resolves a few marginal problems. "Intelligent" objects are indeed often a parody, a simulacrum of human intelligence. But notice that once they have been incorporated into everyday, they have the power to shape reality inside a new social order in which their basic distortion becomes a new normality, the new tight boundaries inside which normality is forced to pass. For instance, the "smart house," which may offer a lot of things, will not in itself likely be able to offer basic social needs. That is an important limitation, and one that suggests life will continue on them physically mobile dimensions with which we are presently familiar (Katz 1999).
This discussion so far helps us to understand the current developed characteristics of ICTs that approach the body in order to penetrate it. This aspect develops the incorporeity of the technological object and consequently allows technologies to get inside the body, to escape the forces of surveillance and therefore make individuals aware of their technological penetration.

Problems Unresolved

The technology that penetrates our bodies often saves our lives, returns us to health, broadens our means of communication, or gives us control—but technology always, paradoxically, results in our devaluation. Technology modifies us radically in ways that inevitably cause some type of suffering or limitation. Technology, while mitigating insufficiencies that have been produced in the body, also reveals the marvels of the human body and how little we still know about it. We must in fact remember that "the West, lord of machines," as LéviStrauss writes (1952, It. tr. 1967, p. 121), "has very elementary knowledge of the use and resources of that supreme machine that is the human body."
In conclusion, the following list shall identify today's questions and structural problems that remain unresolved in the process of hybridization of the body with the machine. The list is in no way exhaustive, since these problems and questions are complex and still evolving. This list is composed of both the questions and problems with which the epistemological debate has dealt with thus far, and those issues that have not yet been resolved. This attempt to list unresolved problems and questions is important, because we must at least make a start in empirical research around these themes, if only to try and assemble a dual list of the problems that machines help us to resolve, and those that they create afresh.

1. There are various modes of use and of permanence of machines inside our body. For instance, there are machines that stay inside the body permanently (e.g., valves), machines that go in and out (probes, drills), machines to which we connect regularly (dialysis), and machines that we need occasionally (intensive care unit, operating theater). Does our attitude toward machines change according to their mode of use and the duration of our relationship with them?
2. What does the machine inside the body mean in respect to the mind-body unit? We know that there is an interrelation between the mind and the body. A machine can substitute or restart one or more functions of an organ, for example. But how can it interact in a complex way with the mind? Up to what point is it an impairment of the body?
3. What does intimacy mean with a machine at the affective and emotional level, when it enters into our most intimate sphere, that is, inside our body? Very probably our first reaction is a not very intimate one. But, with time, does this

probable initial extraneousness remain, or does it become progressively assimilated into the complexity of our bodily image? That is, does the "coenaesthesis," which is the internal perception of our body, change (Starobinski 1981)?

4. The general and unresolved problem of the responsibility of machines becomes more serious. In fact, when the machine is inside us, up to what point does the way it performs fall under our individual responsibility (Longo 2000)? If the machine makes a mistake, who is responsible for the damage?
5. One of the relevant general problems that must be faced is delegating many duties to machines (computing, archiving). Inevitably, human beings risk losing the competence that the execution of these responsibilities entails, thereby placing themselves in a situation of dependence on machines. When machines, especially machines of communication, are inside us, the problem of delegation and therefore of our dependence on them will be even more relevant (Longo 2000).
6. Like everything, machines wear out or become obsolete. What is the implication of knowing that the machine will need to be changed or replaced? We count on our organs to work efficiently until the onset of illness, when we try to heal the organ with an effective therapy. But the entire body takes part in the healing process —will our body manage to heal a machine inside us without having to replace it? Many problems of restructuring the body/machine present themselves at the moment in which the equilibrium is destroyed.
7. For what kind of problem do we accept machines? For health (diagnosis, therapy), for cosmetic reasons, for communication, as a status symbol, or just because it is fashionable? That is, in what cases are we justified in seeking the aid of a machine?
8. Body and machine can have a different average life span. When the body dies, what does the machine that is inside the body do? Does it die with the body, or can it survive? Can it be reused? That is, do the boundaries of the dead body, the soma, include machines also?
9. The machines that derive from Turing's famous black box are ingenuous technology because they are evident and direct and respond to other invisible technologies—but they are much more pernicious and perhaps more dangerous as well. Today's computers also have become smaller, tending to disappear inside objects, fabrics, walls, and so on. What does miniaturization of machines, this tendency to become "invisible," signify in terms of self-perception and control? Today they make computers as small as a pinhead for microsurgery. What effects will the invisibility of computers, in addition to other technologies, have on our capacity to control the everyday, and us alongside it?
10. The idea is becoming more and more common of the machine as a spare part for the body (Katz 1999). That is, machines potentially becoming capable of granting "immortality," or at least capable of extending the average span of life. What does this mean? And, in addition, up to what point can a person become a machine, or vice versa, at what point does a machine become human?
11. Are there too few or too many machines? Humankind has always negotiated a measure, at a social level, of metabolizing technology with the producers of machines. Are we still able to carry on a negotiation that defends our interests, or is the speed of change in technology and production such that we have difficulty even at a cognitive level to understand what is happening?

12. There is a problem that is becoming more and more urgent: the aesthetics of machines. In order to approach the body or to penetrate it, does the machine have to be beautiful?
13. Should machines embrace a gender? Although we do not wish to go as far as to cogitate on the provocative thesis of Samuel Butler, according to whom the human being might be nothing else but a means for the reproduction of machines, we need to ask ourselves the following question: will machines acquire determination of gender? Will there be female and male machines, or machines, for instance, capable of producing and reproducing other machines? The twentieth century produced bachelor machines with their incapability to procreate (not eroticism) and their paradoxical, improbable nature (Le macchine celibi [trans. Bachelor machines] 1975). The twentieth century also produced the possibility of building a machine that is a universal builder, capable of building other machines (Odifreddi 2000, pp. 209—211). However, machines, writes Baudrillard (1999, p. 110) "do not experience the inebriation of functioning, living, pleasure... they cannot be metaphorical, imaginative, excessive. They do not have that ironic extra of functioning, that suffering, they do not succumb to narcissistic temptations and are not even seduced by their own knowledge. All this explains their profound melancholy, the sadness of the computer. All machines are bachelors"(p. 111).
14. The usability of machines is not always optimal, which creates further problems of loss of time, economic investment, interruption of work, the need to find solutions. In drawing up balances of the pros and cons, we must always include the seconddegree labor and machine downtime (learning, updating, simple maintenance, and repair). To be realistic, we must draw up a balance sheet to see what machines have to offer in terms of performance, costs, and rewards, both at a personal and social level, and also in view of a sustainable development (Poggio 2000).
15. The secret of machines. According to Marx 's nineteenth-century view of the world, the incipient communist society would be able to set up a process of liberation from work by means of the machine and the development of technology. In this century too, the liberating myth and the magic of the object machine has been very powerful; that is, of the object that manages to produce movement (and hence, energy and then information). In the twentieth century, however, machines began to reveal their secret: they did not free society from work tout court, but only from some forms of work. In the meantime, work has turned out to be more complex than expected: even if machines eliminate one part of it, it reappears elsewhere in another form. In addition, machines require continuous maintenance and surveillance.

When the import of these theoretical perspectives, or perhaps more accurately, theoretical snapshots are considered, we see that there are some intriguing questions that remain about the process in which machines increasingly enter us. At the same time, though, they highlight the fact that as machines indeed become us, it remains a socially predicated and inflected process. As machines become us, they also become more social in context and performance.

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