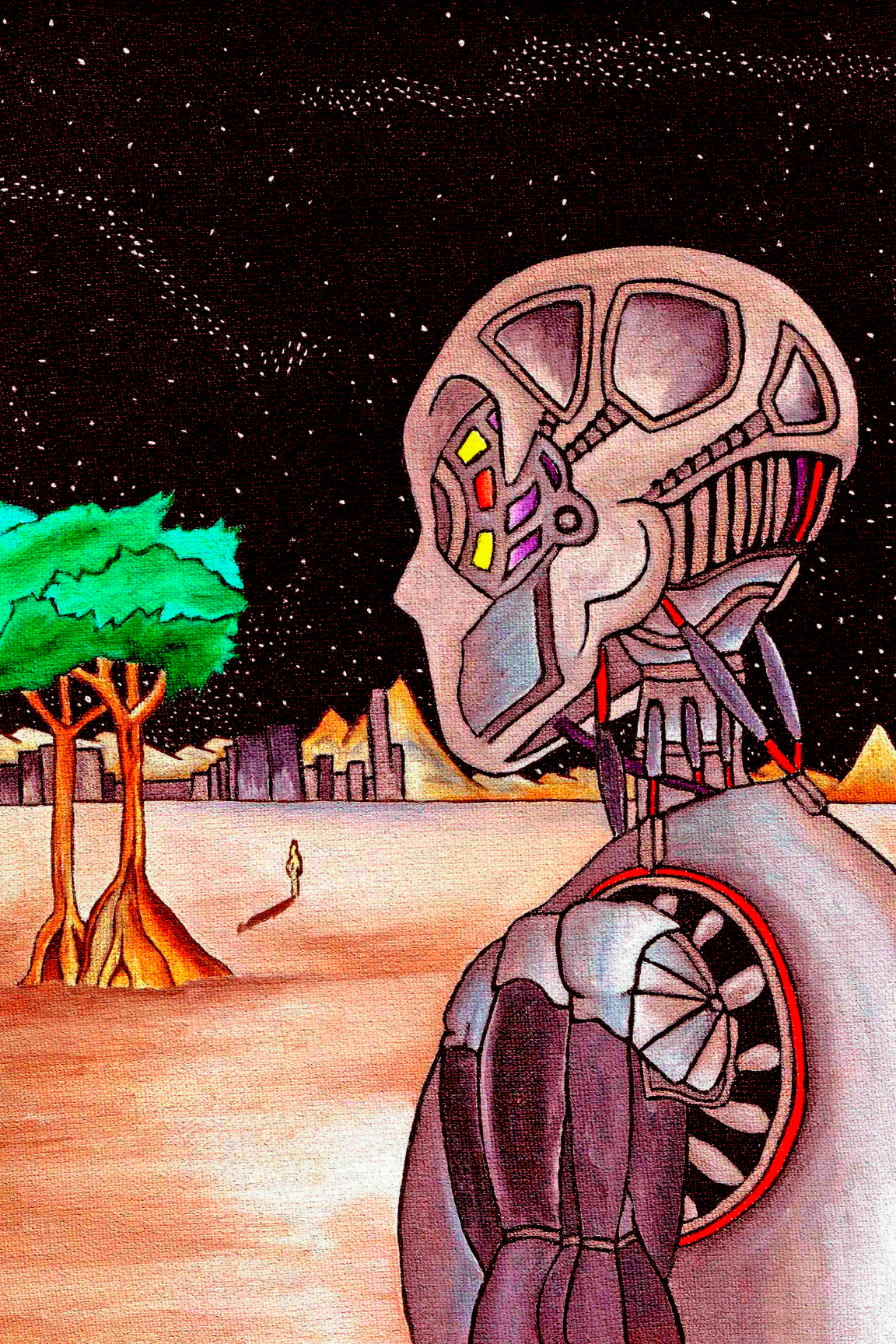
INTELLECTUAL CHALLENGES OF THE NEW CENTURY COLLECTION

Artificial Intelligences:

Essays on inorganic and nonbiological systems

edited by
Alexandre Quaresma

GLOBAL KNOWLEDGE ACADEMICS



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Theories of Cyborg and reading of contemporary capitalism: a necessary meeting

Is it possible to notice in the recent technical-scientific development a structural direction or a systemic trend, a *leitmotiv*, in short? Where have technological advancements in the early twenty-first century originated and where are they bound for?

In consonance with the reception of certain concepts from biology, it would seem reasonable for some to reflect on the technical evolution as an autopoietic process (Maturana, Varela, 1997), without a direction or predetermined way, or differently, as a system of transmission of information, of increasing entropy, although limited in its development (Wiener, 1950). It is hard to deny, however, that, as a human activity, such development is entangled in a vast web of contexts, relationships, and socio-historical disputes that, in an inescapable way, ends up in its countless possibilities by conditioning it. The social content of technology is a postulate supported by lots of studies in different traditions of the sociologies of knowledge, science, and technology, and its opposite idea – the neutrality of technology – could take us into utopians or dystopians teleologies that, in the limit, are always present in the assumption of technology as some kind of *deus ex machina*.

That science and technology must be understood from its environment and socio-historical particularities, keeping thereby the social content, it seems to have become a moot point, difficult to be refuted[1], at least in the context of the above mentioned disciplines. It would be necessary, based on this agreement, to ask ourselves more broadly about how to set up, in general terms, the 'social' that composes and ultimately sets such content. Then, of course, there is a compelling and virtually endless controversy that marks the contemporary sociological debate in its epistemological, methodological, and theoretical dimensions, not being our intention, given

1 If now such an agreement is linked in particular to the profitable development and consolidation of so-called Science and Technology Studies (STS), which deepens and radicalizes in different ways this proposition from different approaches based on the theoretical and epistemological relativism, we must point out that in its origins, marxist authors or directly inspired by marxian framework are among the Sociology of Science precursors, and correlatively, the first thesis on the "social conditioning" of scientific and technological practice, taken in its broadest sense and here read from their socio-historical dynamics of class, in relation to social production. Featured in this particular, among others, to the work of Mannheim (1976), Hesse (2009) and Zilzel (2000). Taken in its generality, this proposition hardly even find opposition in authors located in other positions in this debate as Merton (1970) and Bourdieu (1983).

the limitations of this work, revise and criticize it in depth. In a more limited way, we point the particular understanding that informs our reflections.

Globalized capitalist societies are structured, concerning the reproduction of their material life, over the exploitation of labor as an assumption of capital accumulation in its various forms and expressions. To ignore the materiality of power, control and conditioning relations in production dynamics, circulation and consumption of technical devices could mean to present a partial scenario on what characterizes as such technological development nowadays, as well as their capabilities, developments and limitations.

Under the guise of a careful reflection on the new social forms and possibilities concerning the technologies of the immaterial/cognitive, and embedded in different theoretical and methodological contributions of micro-sociological reach, many authors (Haraway, 1997; Gray, 2002; Clark, 2003; 2011) have established different analysis involving phenomenological and discursive elements, as well as interactions among individuals (inserted or not in the context of extended communities) in order to understand the current dynamics of contemporary societies. This resumption of methodological individualism, and even its radicalization from new epistemological proposals, lets out a set of structural forces that cannot be seen from a micro-relational epistemological topology. It is about the nature of such "forces" or macrosocial tendencies that we aim to present some questions in this work.

Observing the transformations that the capitalist mode of production has gone through on a global scale, especially from the last 40 years, it is possible to notice, in accordance with the rapid advancement and penetration of the market economy on a global scale, an important movement – with different configurations and developments in the centers and peripheries of the world-system – of large expansion of freedom for the accumulation and circulation of financial capital, based on the political, ideological, and economic turn oriented to setting up a new institutional-regulatory scenario, which has been called neoliberalism (Harvey, 2005).

The exhaustion of the postwar welfare capitalism points out to a new era. On the economic aspect, the decline in profitability rates (or even drop in growth expectations on such return rates) in the developed economies, especially from the oil crisis (1973), marks the erosion of Keynesian-Fordist regulation regime. This new reality entails the composition of which has been defined in economic literature as finance-led regime of accumulation (Chesnais, 1996, 1998, 2005) or flexible accumulation regime (Harvey, 1992, 2005, 2008). That is a scenario in which the finance, released of much of its previous constraints and therefore entitled to produce and circulate fictitious capital[2] in previously unimaginable amounts through a plethora of

2 The concept offictitious capitalwas coined by Karl Marx (1988) to designate the forms of "bank capital", also referred by the author as"money capital"as opposed to"real capital"invested in productive and commercial activities. It is represented by property titles on the future wealth (shares of companies, commercial papers / bonds). Marx also includes in this category deposits raised by banks in their lending activities when they are not equivalent to actual

new financial instruments, are now driving a reorganization of the different sectors of the economy, arranging them in relation to financial gain.

Thus, transformations as productive restructuring, linked to the technical-scientific revolution of the last forty years, the flexibilization of supply chains, their despatialization and productive decentralization (ending by pointing to de-industrialization in many countries, and the consequent industrialization of others), changes in the international division of labor and the administrative structure of the company, among other reconfigurations, become trends that find in the connectivity technologies its operative base.

It indicates that there is more than a mere historical coincidence between the accelerated development of information and communication technologies and the structural changes that have happened to the world economy in the last four decades (openness, liberalization and market integration, interconnectivity, expansion on the movement of goods, services and, to a lesser extent, people, among others). Between the development of information and communication technologies – which allow deduct time in space – and the intent of the economic agents to discount the future in the present in search of increased gains in the financial markets there are, it seems, beyond a certain parallelism, an intriguing affinity.

What such affinity suggests concerning human being-machine overlapping technologies? To what extent the understanding of it can help us launch other views and new questions regarding the status of the cyborg in the early twenty-first century?

In the mid-nineteenth century, Karl Marx (2013) described in the *Capital* the tendency of technical development to promote economy of living labor, increase productivity and thereby bring down production costs, guaranteeing their owners/developers advantages in the competitive system (superprofits) and secondarily through this, centralization and concentration of capital in the hands of fewer capitalists. If this tendency, which is correlated to the increasing production of goods and therefore its accelerated consumption (driven by the constant creation of new use and exchange values), deepens and gets more sophisticated, it's also true that it is currently developed in another level of sophistication and complexity.

To cite a typical example of this new reality, much of the trading on currencies, papers, and instruments in the financial markets (which can influence directly, in many dimensions, the destiny of economies around the world) is now performed automatically by "robots" (Mackenzie, Beunza, Millo, Pardo-Guerra, 2012)– mathematical models and trading algorithms, administered with the aid of neural networks and artificial intelligence – at the speed of milliseconds and even microseconds. In the US markets, the penetration rate of so-called Algorithmic Traders and High Frequency Traders already is about 70% of all negotiations (The Government Office for Science, London, 2012). In Brazil, this figure has already reached 40% of everything that is traded on one of the country's stock market (Paraná,

currency reserves in banks but to a multiple of them, which depend, therefore, of a fictitious belief as to future returns of such loans.

2016). Fiber optic cables, high-speed communication networks, and high performance computing make up the operational base without which this system could not function.

The contemporary technical and scientific development, which has its mainstream in the cybernetics and in the micro-robotics network connected, draws a higher plateau of material and ideological sophistication to the dynamics of control and management of social and productive life. The cyber-conflicts and apparatuses of surveillance, spying, and militarization of the World Wide Web, which became public through Wikileaks revelations of Julian Assange and former NSA employee Edward Snowden's information leaks (Goldfarb, 2015), put in perspective the need of reflection on the technical and informational advancement from such developments. From a political viewpoint, what is the horizon of our relationship with such technical artifacts and other human-beings in society? What are the social contents that these objects have as consumer goods and use values?

From what we call the programmer-programmed dialectic as a metaphor to think the structure of technical and political power in contemporary social formations, we discuss the overlapping human-machine in socio-technical systems related to recent changes in the capitalist mode of production aiming, in this way, a new critical view at the issue of cyborg in the early twenty-first century.

Beyond emancipatory and counter-hegemonic potentials on this matter – already widely discussed in many works such as Castells (1999), Shirky (2008), Levy (1995, 1999) –, we intend to speculate on the dilemmas and constraints on political freedom in our conjuncture, questioning, from this point of view, the works that have been produced on the cyborg until now.

Regarding the concept of cyborg

It is necessary for our discussion to previously present and discuss the concept of cyborg. The definition of cyborg according to Haraway (1991) relates to a series of hybridisms. The first and best known concerns the overcoming of the man x machine binomial. The logical extension of this hybridism is the questioning of the concept of human nature[3].

Human nature, according to the conception of the cyborg (Clark, 2003; Haraway, 1991), is not separated from its surroundings. The way in which we relate to the world through technical instruments alters our perception and even our physical structure. More adapted to the environment, it is possible to expand our ability to change the world around us. For some time, anthropological studies have discussed human evolution as a bio-cultural process (Geertz, 2001). Given this, some questions are important:

3 It should be mentioned linking this discussion to the broader context of discussions about humanism v. anti-humanism in its philosophical, theoretical and political dimensions. While this has become an unavoidable debate with regard to the theme of the cyborg and the human-machine interweaving, the feature limitations of this study do not allow us to deepen it with the necessary rigor. For a discussion on the theoretical anti-humanism in Luhmann and Althusser see Silva; Paraná; Pimenta (2017).

is it really possible to say what is inherent in the human and what belongs to its surroundings? And even if it were possible to separate the man from his surroundings, analyzing human action, is this separation productive to understand it?

Admitting the thesis that the elements associated with materiality (concrete world given by objects and tools), social factors (cultures and institutions) and personal/subjective aspects (cognitive and organic dimensions in a broad sense) mold what we are, both together and influenced by each other, it is possible to conclude that we have always been cyborgs. Thus, the concept of "pure humanity" in which the individual is an island in the middle of the world loses its meaning in the search for understanding about our current stage of development.

Obviously, the environment of the individual has not always been the same. To understand the cyborg, it is necessary to understand the history of the individuals and what surrounds them, later contextualizing it.

This form of organization of the individual is only feasible through human plasticity (Clark, 2003, 2011), which is associated with adaptability of our body and brain to the different situations that are placed at our disposal. Under this view, our body is not one but several that can be transmuted simply by external stimuli (Serres, 2004). One can assure this by analyzing any physical activity, such as a martial art, for example. As we begin the activity, we lack muscle tone, stretching, and coordination, which in practice are incorporated and naturalized in the activity, causing a chain of physical changes in the muscles, joints, blood circulation, etc.

In addition, with regard to cognition, we can change the synaptic circuit through interaction with a new object or through the acquisition of new knowledge. Thus, we interact with the world producing changes in the landscape through technology, and this world, conversely, activates changes in our body, in a continuous dialectic between the exterior and interior (Ihde, 2009). Human plasticity – that allows us to be changed through the interaction with the world as we use in such changes to transform it – is what makes us cyborgs (Clark, 2003). Thus, cyborgism is associated even with the construction of the first civilizations.[4]

On the other hand, cyborgism demands another hybridism between imagination and reality (Haraway, 1991): while the imagery is built, this construct can produce transformations in reality itself. In the case of contemporary cyborgism, linked, as discussed ahead, to the pursuit of "efficiency" and enhancement of human capabilities, the imaginary linked to fiction becomes important. Movies like Star Wars, for example, influenced a whole generation that seeks today to develop technology similar to the movie, theme addressed in the documentary "Science of Star Wars"[5].

4 Here it is to bring up Marx, on *Capital* I (2013), when dealing with the metabolic relation of mutual transformation between man and nature: "Acting on external nature and changing it through this movement, he [man] changes at the same time, its very nature" (p. 255).

5 The documentary was produced by the Discovery Channel and composes a number of episodes bringing technologies that had been produced inspired by the movies Star Wars. This debate is directly related to the relationship between fiction and reality production, developed by Heyles (1999).

It is important to highlight that the imaginary is not dissociated from the ideological framework in which we operate, thus composing the general context in which we live. Ultimately, the imaginary is closely related to the senses, practices, and modes of organization of social life in which we are participants.

Under capitalism as a mode of organization of social and productive life, ideological dimensions related to dynamic control, expansion of efficiency and profit are directly related to the cyborg. Technologies such as computers and software are constantly updated making faster the tasks in search for increased efficiency and, consequently, increasing the amount and ability of work (and consumption) carried by individuals.

Questions regarding the cyborg constitution in capitalist post-modernity

Having briefly discussed the concept of cyborg, it is important to place it in the framework of contemporary capitalism, in terms of its social relations of production and, in an intimate correlation with these, in their meanings and ideological ramifications.

When discussing the *Post-Modern Condition*, David Harvey (1992) diagnoses the existence of "some type of necessary relationship between the ascension of post-modern cultural forms, the emergence of more flexible ways of capital accumulation, and a new cycle of 'compression of time-space' in the organization of capitalism" (p. 8). Harvey points out the dispute over working time (socially necessary) between capitalists and workers inside the factory as key to the understanding of surplus value extraction mechanisms in *Capital* I. However, it is propping up in Marx (2011) of the Grundrisse, for whom, the more developed the capital, more tends to "annihilation of space through time" seeking to extend their "special trajectories of movement" (markets), that he argues that the accumulation in the capitalist technological progress, wherein adopted innovations allow the emergence of another, and so on, goes up in the direction of increasing acceleration of productive and destructive processes.

This acceleration, as an overrun of space via the time (and also the time through space, as it is possible to notice in financial markets contemporaneously), can be observed since the end of feudalism and the beginning of the colonial period, with special emphasis from the advent of industrialization and "modernization" of societies. It is, thus, a phenomenon of incorporation of operational cognition, increasingly sophisticated, of the dynamic of capital reproduction itself, always supposed to be accelerated in all its phases, so as to expand its borders. This fact is related, in according to the author, to a set of offsets in the forms of relationship and representation of the world on the part of individuals, since time and space are fundamental categories for the material, cultural, and cognitive organization of societies.

This interpretation may be taken also, to some extent, from the considerations of Marx and Engels (2010) present in *The manifesto of*

the Communist Party. According to Musse (2010), in his digression on the passage of feudalism to capitalism, the authors describe three fundamental expansive trends of capitalism: immanent expansion, defined by constant revolution of the means of production, and labor techniques; an intensive expansion, which encompasses other spheres of society beyond the sphere of production; and, finally, a third one, extensive, responsible for extending the reach of capitalism, to submit the pre-capitalist segments internally and externally. The unfolding of all these trends, in line with the consolidation of the processes of capital accumulation, is precisely an acceleration of the perceptions of time, as well as the "integration" of areas and regions of the Earth, before unexploited.

There is, thus, as argued by Harvey (1992) a constitutive link between the set of transformations that articulate the implementation of new organizational forms and new technologies which accelerated turnaround times, exchange and consumption; growth of the service sector, the predominance of short-term as hegemonic temporality in the taking of decisions on productive, political, and socio-cultural fields; the growing mergers and acquisitions (centralization and concentration of capital); the search for relative advantages of location and the industrial dislocation; the rapid advance of information and communication technologies; and, correlated with that, the growth and gain of prominence of financial markets in terms of the so-called "financialization" of economies.

Such tendency, consubstantiated in the economy of work and in the expansion of the borders for accumulation of capital, is presented in the "short-termism" of the financial dominance and in an increasing flexibility of production in relation to their socio-political (control of human labor), materials (obtaining raw materials), and technical (productive innovations) constraints, intimately linked to contemporary technological practice, such as in a meeting of its structural dimensions with its ideological expressions.

In this respect, it is essential to bring back the formulations of the *Althusserian School* that, in the mid-1960s, became famous for reconfiguring the definition of ideology, by moving it from the meaning of "false conscience" (linked until then to theories of reification and alienation), based on a rereading of Marx and on critical approaches with the psychoanalysis and the linguistics, to an understanding anchored in the way individuals, living in society, represent it in the context of their own relationship with the world.

From this concept of ideology, understood at the same time as material and imaginary, since linked to the practice of daily life, it would be possible to think that all societies – including the pre and/or post-capitalist – are composed by ideologies, understood here in relation to the inescapable need for the representation of the world, such as the reduction of its complexity through mental structures, by individuals situated in objective social relationships. The ideology would not be, therefore, only a negativity, a non-knowing, but specific knowledge, whether imaginary knowledge about the world. On the other hand, such representations acquire material existence through practices, behaviors, and institutions (apparatuses) that, on its turn, reproduce such ideologies.

In this direction, we could readdress here no comma (in a certainly unusual but no less productive encounter) but no less productive, hybridizing between imaginary and reality, in terms of Haraway (1991), compatible, in our view, with this conception of ideology, through which we return to the debate about the characteristic hybridisms of the cyborg.

From this concept of ideology – which binds the representation of the world to the everyday forms of living in accordance with the social relations of production – examples are abounding in towards the problematic that we strive in pointing out, that is, the circumscription of contemporary developments of cyborg in terms of limitations drawn in the framework of capitalism in its advanced stage.

Boltanski and Chiapello (2009), discussing the "new spirit of capitalism", analyse the dissolution of the boundaries between work and consumption, between professional and private time within the framework celebrates "interactive" individuals, constant operators of information and communication technologies. In the same direction, Brennan (2003) points to a "bio-deregulation" of human beings before the attempt of overcoming the incompatibilities between the temporal operation of deregulated markets and the physical limitations of human-beings, forced to deal with such demands and requirements of operation.

Following this line of reasoning, in what is defined as cybertariat, Ursula Huws (2003) points out the intensification of working days upon the blurring of the borders between the public and private dimensions in the exploitation of the flexible "info-workers" (telemarketing operators, software developers, designers, managers of information, among others) that, from information platforms and connectivity, are taken to be available to the demands of their employers at any time. Within this framework, the standard to regulate such relations of work tends to informal labor, subcontracting and other forms of self-labor exploitation that deny or transfer to the worker the cost of charges and labor rights. Thus,

> Despite the significant technological advancement (which might allow, worldwide, a real reduction in working time and schedule), it is feasible to witness in several countries, such as England and Japan, to name the countries of the center of the system, a policy of an extension of the working day. England has the most extent working journey among the countries of the European Union and Japan, despite its extensive working journey, the country has been trying to, through government proposals and entrepreneurs, increase it even more, as a way out of the crisis (Antunes, 2005: 33-34).

Moreover, by exploring the potential of these technological advancements, banks, airlines, and numerous other sectors have encouraged the self-service to their customers– a resource for saving with workforce presented as a process of "individual autonomization" financed by the self-exploitation of the consumer himself.

In the essay 24/7: *late capitalism and the ends of sleep*, Crary (2014) brings together a set of research developments of the American military

industry, performed by means of partnerships of large companies with state agencies, to point the search for the "soldier without sleep", capable of fighting days and nights without interruption in combat missions.

> The sleeplessness research should be understood as one part of a quest for soldiers whose physical capabilities will more closely approximate the functionalities of non-human apparatuses and networks. There are massive ongoing efforts by the scientific-military complex to develop forms of "augmented cognition" that will enhance many kinds of human-machine interaction. Simultaneously, the military is also funding many other areas of brain research, including the development of an anti-fear drug (12-13).

To such developments the author relates other advancements of biochemical and pharmaceutical industries in line with the search for increased performance in terms of a "culture of 24/7", in which the global economy impels the markets to work uninterruptedly. The sleep, argues the author, would be one of the last hurdles to be overcomed by capitalist accumulation. This is due to the fact that in the global economic system, dependent on the uninterrupted production and consumption, idleness and, especially, sleep, taken as economically inactive and unproductive time, represent limits to its necessary expansion; hence the search for, in addition to the soldiers, workers and consumers "without sleep". To such developments would be bound the demand for reconfigurations of life cycles, regeneration and survival of natural ecosystems, productively exploited in a sort of encounter between human and environmental degradation.

In the direction of the theses of Harvey on the acceleration of functioning dynamics of social life in connection with the cycles of expansion of accumulation and capital valorization, Crary (ibid.) argues that the search for a 24/7 operation is present in the systemic logic of capitalism at least since the nineteenth century, when its modern industrial configuration[6] begins.

Among the many conditions cited by the author that would already be part of our society on the context of this new "culture", one deserves special attention: the spread of the internet via mobile devices equipped with constant updating, to which we could list the wireless networks and the so-called "internet of things", with its "uninterrupted temporality" (p. 40). In the midst of many citations of references of art, literature, and cinema present in the essay (corroborating the cyborg hybridism between the real and imaginary of Haraway), the citation of the novel *The circle* by Dave Eggers gains prominence: the fiction is about a gigantic social media company, which objective is to spread of an idea of "sharing" to guide the 24/7 exposure of individual lives, opening the way for the mass surveillance.

6 In this respect, it is important to go through the famous chapter of *Capital I* (Marx, 2013) about the *working journey,* where it is discussed the need of the factories to operate uninterruptedly, producing long working days and the consequent alternation of workers in diurnal and nocturnal shifts.

Around the discussions of what came to be conceptualized as cognitive capitalism, Negri (2003, 2008) points to the erasure of borders between productive labor and unproductive idleness in the context of new forms of reproduction of value, mediated by the immaterial technologies and collective intelligence in networks of global connection. Considering this scenario, the end of privacy is pointed out as a trend toward new forms of capitalist accumulation inside and outside networks of cooperation. Inescapable, here, the reference to the broad set of panoptical practices developed in the last two hundred years.

Mass surveillance and the economic exploitation of content produced on the internet, in particular in terms of an almost celebrating ideological consent, encouraging self-exposure of data and personal information, demand renewed strength to the theses of Foucault (1993, 1997). Disciplining systems, typical of the logic of biopower – geared to the production of more economic and cultural value – point, contemporaneously, for the ideological dimension of cyborg in its multiple hybridisms, especially in relation to injunctions between real and imaginary.

Regardless applying or not such approaches, it is clear from the empirical point of view the advancement of surveillance of public and private life on the internet, including disputes intra and inter corporations and in its relations with the states and their citizens/consumers. Even authors who since the decades of 1990 and 2000 have been emphasizing the integrator and emancipative potential of the network, like Castells (1999), already assume (Castells, 2009) that in parallel to the expansion of global connectivity, it is observed numerous constraints to the collective and individual political freedoms: the commercialization of the internet has pushed forward its counterpart in administration and control of social life, as it is necessary to the economic expansion.

The dialectic programmer - programmed in scientific production

The debate about an antagonism between programmers and programmed ones refers to the criticisms formulated by the first technological democracy movements, heirs of the networks of hackers of the counterculture, formed between the decades of 1960 and 1980 in the United States (Castells, 1999). Contemporaneously, such criticism makes up the core of the interventions of collective of hackers, and with special prominence, movements in defense of the development and use of free software. It is the case of Rushkoff (2010), that come to this discussion so as to criticize passive postures in relation to technology. His book, even not having academic pretensions, poses ideas about the need for technological empowerment by the individuals to "best live" in society. For this reason, it is necessary to understand the way technologies which we interact with really work.

The author does not go into the issues to which we address here, as ideology or even the logic of operation of the capitalist mode of production,

but he identifies a hierarchy typical of our time, drawn around those who program. In his argument, the programmers compose a kind of elite that, holding or not the economic power, has the ability to mold the digital structure, constructing software that meet their aspirations; fleeing, this way, the passivity of most users. Rushkoff (ibid.) does not approach on the merit of the structural-systemic aspects of technology, its implications and possible effects.

When discussing the potential of the "specifically human" evolution compared to other living beings, Serres (2003) produces the concept of exodarwinism. By means of this formulation, it is sustained that the cultural and socio-technical mediations of human collectivities in relation to their environments move the typical laws of natural selection of biological evolution. From this formulation, the "adjustment" is given with the aid of technological resources, enabling the (re)articulation of human socio-cultural demands, opening up possibilities of life in hostile environments and allowing the extension of the period of life of human beings. The targeting of such exodarwinism is given that way by means of the "artificial" administration of forms of life and death.

Haraway (1997) goes the same direction by pointing the search for the code control of human life through the sequencing of DNA. The author reminds us that, in this quest, elements such as the dynamics of control and power, typical of the patriarchal society, are embedded within the models for scientific development.

Thus, it is concluded that the mode of organization of social life we are part of interferes directly in the course of scientific development. By means of the development and use of new technologies – always configured in an intimate relationship with such ways of life and civilization horizons – we are able to reconfigure the ways of interacting with the world.

From this understanding, Borgmann (1995) diagnoses the growing deletion of components, situations and spaces of sociability (called "focal things") considering the new technological developments. Whereas the intricate relations between science, enterprises, and national states discussed by Etzkowitz (2003), it is important to mention that such "deletions" are not arbitrary, but are ultimately related to the horizons and objectives of the holders of power to mobilize and agglutinate resources for technological production, which we denominate here as programmers.

There are many studies that point to the importance of science and technological development for the reproduction of capitalism. The technological advancement, since Marx (2013), can be understood as a fundamental weapon to be mobilized in competition among capitalists: conserving and enhancing the productivity of human labor, increasing its intensity, enabling the exploitation of high profits in the competitive dynamics.

It is essential to reinforce the fact that the technical-scientific development, tributary of the socio-cultural context in which is inserted, is traversed and composed by relations and disputes of power. The increase of labor exploitation (in its absolute and relative dimensions), to cite an

inescapable dimension of this reflection, follows, as we have pointed out, as a tendency in the face of the advancement of the technologies aimed to productive efficiency. Instead of producing a new economy of free time, the new framework has otherwise increased the time and intensity of work, in the direction of the demands for capital valorization towards the weakening of the social and political power of labor.

Thus, away from the idea that programmers are mere "rational" agents fitted with technical knowledge of programming, we aim to make a free appropriation of the contraposition proposed by Rushkoff (2010), that there is a hierarchy between programmers and programmed ones. However, it is posed according to its structural dimensions – both linked to the operational dynamics of the capitalist mode of production and its ideological configurations, but also in relation to its own "digital structure", constituted by constraints drawn from different modes by which they are disposed as networks, programs, infrastructures, and users.

It is not close to a characterization in terms of the development of a simple linear dialectics as disjunctive to point to a growing systemic rationality (with relation to purposes, as a cause/consequence of the process). We call attention, otherwise, to an "unconscious" mechanism in which a "systemic" contradictory irrationality, yet functional, takes place; to put it another way: it is not the actors who activate, by themselves, the movement of contradictions, but this movement that locates and constitutes the actors in different kinds of disputes.

Final Considerations: towards a dialectics programmer-programed

After developing some constituent bonds between globalization and capitalism with dominance of the financial dimension, development of information and communication technologies and the search for socio-technical performance and efficiency, we should conclude by pointing the way and in which dimensions such elements inevitably erupt in the questioning concerning the status of the contemporary cyborg.

Materialized in the high performance of human-machine systems, in the cognitive, hormonal and physiologically managed life through chemical, biological and mechanical technologies, connected in networks of communication and mediatization of information, identities and performances, the human being follows, at the expense of more and more labor explored and less and less free time, as in a punishment of Sisyphus, the search for surpassing himself and the internal and external "limitations" of his modern Western prehistory; to overcome, in short, the limitations of time and space in his own body.

Although countless advancement in relation to medicine, education, politics, and other social practices, the horizon and product of this search, objectified in the physical destruction of the planet, is not exactly encouraging. The productive restructuring, the automation of market systems, the

internalization of social life in information systems and mass surveillance in the context of capitalist globalization present their contradictions: in the 21st century, the social being also exists as a cyborg; imbricated in the machine through exploited work and by the technophile consumption of "magical" goods. The hybridisms between real and imaginary typical of the cyborg, pointed out by Haraway (1991) are not free from their ideological contents.

We hope to have made evident the fact that the trends briefly described in this paper indicate the technological development as a key element of the economy of labor and extension of population contingents considered unnecessary in terms of capital, the intensification of exploitation of natural resources, acceleration of production and consumption cycles, and consequent extension of labor exploitation in relation to the shortening of periods considered "unproductive". This, however, is not enough.

On the other hand, the emancipative dimensions, the new possibilities of political configuration and counter-hegemonic reinvention of daily life are far from being negligible. The use and spread of encryption, the struggles for expansion of the technology penetration and free software and the pugnacity and political dare of hackers movements and cyberactivists are examples of such counter-tendencies.

Here, away from any technophilic or technophobic teleology, we must present the technological development in the disputes, contradictions and social contents inscribed in their technical codes (Feenberg, 2005). If it is true that such emancipative potentialities, widely discussed in innumerous work regarding the cyborg, were not the central object of our discussion, it is a fact that they can not be disregarded: such possibilities of resistance and subversion are at the center of the debate. What is their extent? In what way and by which factors are they constrained?

It is, therefore, in search of a balance that considers its positive and negative dimensions, its constraints and possibilities, that we defend a reading of the socio-technical phenomenon of the cyborg, in the meeting of its social structures and collective or individual agencies, in its macro topologies and micro-social, through a programmer-programmed dialectic.

From this game of contradictions we can understand the cyborg as a configuration in dispute, although asymmetric in terms of power that, in line with the formulation of David Noble (2001), "only one side is armed", or more precisely, one of the sides is better armed than the other one.

The metaphor of programming as an act-power (programmer) to configure the layout of a system/artifact/network, in terms of available resources in relation to the various means and ends, in opposition to their expected uses (programmed), seems to us to be a powerful analytical resource against distorted readings, in its optimistic tone, of such phenomenon. They eventually end up hypertrophying enthusiastically the multiple and endless particular appropriations of use at the expense of their structural constraints which are far from disappearing, as we seek to demonstrate. If it is true that the programmed finds some margin for resistance in their uses and creative appropriations, it seems right that the programmer, while

developing and controlling standards and "protocols" has, yet not almighty, a privileged position to define the limits and constraints to this action in line with their goals-functions (latent or manifested). In what way such contradictions constitute the cyborg in his potentialities and limitations?

Such an analogy, as a metaphor, could be mobilized even for the re-reading of other social contradictions, among which, to cite an example, the classic capital x work: the capital to program the operation of labor that, in its uses and devices, seeks to resist it creatively, leading to multiple disputes and deployments. It is therefore nothing more than articulate, in relation to the present conditions, these readings from the conflict, as well as from the dimensions of material power, even in scenarios that at a first glance would seem the most abstract and open to inventiveness without constraints, as the ones of the technologies of immaterial (the construction of software, networking architecture, simulations and virtual realities, robotics, among others).

If approaching a dialectics programmer-programmed can be productive in a situation in which the organization and administration of life in socio-technical-informational systems seem to be growing, it is fundamental to understand the limitations of this analytical resource: it is evident that the systems in their complexity are far beyond a mere dual contraposition. Again, the set of its multiple and overdeterminated contradictions, in distinct configurations, must be investigated rigorously in their specific arrangements. However, we support the idea that a look towards the dynamics of control and power in its interior has much to offer in qualitative terms, contributing to the setting of more realistic scenarios in their theoretical and political aspects.

It would therefore be appropriate in each case to assess how systems, networks, and artifacts stand in their multiple configurations, counteract or even overlap in terms of the disputes between programmers and programmers, and in addition , how such disputes condition and / or are conditioned by their social contents in terms of their possibilities or limitations of reinvention and social and political creation.

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