Drone-body: Algorithimic governmentality and the imagery-space modulation

Corpo-drone: Governamentalidade algorítmica e a modulação espaço-imagética

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ABSTRACT
This text deals with space-imagery modulation by means of algorithms into four movements. The first presents augmented reality lenses as devices capable of reconnecting two technological lines: the imagery and the locomotive. The second discusses cross-cuttings between cybernetics and artificial intelligence, the unlimited scope of algorithmic action, and the renewal of longings for overtaking *mankind*. The third addresses the algorithms as cognitive traps. Finally, we seek clues in facial biometrics and autonomous car systems to discuss the incorporation of visual space digitization systems. From the sum of these topics, we propose the notion of *body-drone*.
Keywords: Body, drone, algorithms, image, space

RESUMO
Este texto trata da modulação espaço-imagética por meio dos algoritmos. Seguimos em quatro movimentos. O primeiro apresenta as lentes de realidade aumentada como dispositivos capazes de reconectar duas linhagens tecnológicas: a imagética e a locomotiva. O segundo discute transversais entre a cibernética e a inteligência artificial, a abrangência ilimitada da ação algorítmica e a renovação dos anseios por uma ultrapassagem do *homem*. O terceiro aborda os algoritmos como armadilhas cognitivas. Por último, são buscadas pistas em sistemas de biometria facial e carro autônomo para discutir a incorporação dos sistemas visuais de digitalização do espaço. Da somatória desses tópicos é proposta a noção de *corpo-drone*.
Palavras-chave: Corpo, drone, algoritmos, imagem, espaço

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INTRODUCTION

THIS ARTICLE SEEKS to monitor capitalist subjectivation vectors in terms of what the 1970's Michel Foucault called *governmentality*. Deceased in 1984, the French thinker was prodigal in mapping the dynamics of the microphysics of power along with discipline and biopower. In this sense, we must instill such analytical method towards the new sociopolitical paradigms, which Foucault did not experience. In a course lectured at the Vincennes University to honor his newly deceased friend, Gilles Deleuze foresaw the need for such an action, announcing the societies of control. Regarding that, based on and going beyond the Foucauldian analysis, closely investigating the force with which algorithms have formed capitalism and contemporary subjectivity becomes impossible – and it seems that the crossed paths of technology, human sciences, visibility games, and existences management lead us to that which we call a *drone-body*.

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Five years after declaring the abandonment of the *Google Glass* project (Bilton, 2015) in June 2020, Google announced that it had purchased North, pioneer company in the development of augmented reality (AR)[1]. According to Rick Osterloh, responsible for Google's hardware division, the new acquisition will be fundamental for advancing *environmental computing*[2] – distributing computing functions along space while ensuring the constancy and imperceptibility of thir actions. This corporate merger points to a dilution vector[3] in space algorithmic functions and a sophistication of *algorithmic governmentality,* as conceptualized by Antoinette Rouvroy and Thomas Berns (2018).

Algorithmic governmentality refers to the simultaneous operation of four mechanisms: data (1) collection, (2) storage, and (3) automatic and massive processing; and (4) automatic and personal intervention over behaviors. If we consider algorithmic machines strictly by their data collection function, we may assume they are in an already highly-advanced state of spacial dissolution – *smart* cameras, location systems, wearable devices, presence sensors, biometric meters, card systems, sensible surfaces, and vigilant drones are some examples. However, when taking into account immediate, daily, and automatic relational interface over conducts, these machines still seem very much restricted to the on-screen imagery framework[4].

Despite offering endless operational possibilities, despite having acquired autonomy in terms of energy, and despite their mobility being more and more spread throughout spaces, opaque screens preclude visual synchronic activities: they compete with the immediate space surroundings and, therefore, with body displacement. To cancel the surroundings, the screen demands and attentive operation (Crary, 2013); however, with AR lenses, screens cease to be the main eye-image algorithmic interface, fulfilling both algorithmic governmentality edges – captation and answer – in a completely distributed and mobile way different from that arising from smartphones emergence, with the proliferation of screen. This innovation casts a radical inflection in the history of modern technologies – reorganizing it and adjusting its traditional formats to the contemporary vectors.

AR lenses represent a breakthrough because they create conditions for conserving and distributing images and bodies that wave and are more efficient and sophisticated than the traditional domestic, institutional, and urban strategies for confinement and massification. With that, AR casts yet another subjective and stabilization policy – algorithmic, cybernetic, – whose focus is no longer to mold or fix the shape. As they move and mold, these lenses operate in a non-prescriptive way, but rather in simultaneous and predictive sensory and cognitive movement, anticipating the shape, conducing it through a set of possibilities, or even intervening in the immediate character of its manifestation. Based on the issues concerning AR lenses and the resulting development of some algorithmic governmentality aspects, we propose the (still experimental and temporary) notion of *drone-body*.

According to the US military vocabulary, a drone is an unmanned aircraft, a "land, naval or air vehicle, controlled remotely or automatically" (Chamayou, 2015, p. 19). We may think dronization by stages: a certain thing is more or less dronized as the decisions required for its movement become more or less capable to be made at distance, either by humans or – completely removing human agency – by algorithms. Thus, the drone is the object whose dronization process has been entirely fulfilled, and a drone-body is a body whose capacity of deciding on his displacement was lost to algorithms.

Rauer (2016) resorts to the notion of a drone to think the algorithmic movement of objects, the action of algorithms as space ordainers. In contrast, Introna (2016) discusses the performative effects of algorithms in cognition from the telematic sensible organization. According to the author, when the computer ceases to be a mere administrative machine of calculus and become an important personal interface, animated and interactive, at the end of

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1990's, luminous screens starts to play a central role in social organization, offering progressively *impressionable* experiences aimed to capture, imprison, and conduct attention – a massive, personal, an automatic choreography of cognitive functions such as perception, attention, and memory.

Our proposed notion of drone-body quests for an intersection between the two approaches. In that sense, if Rauer discusses algorithmic mobilization of objects and Introna the algorithmic conduction of attention, we wish to think the algorithmic modulation of the trajectory using AR lenses, or, in another way, body conduction from attentive attraction.

The debate unfolds into four topics. First, we think AR lenses as a device that reconnects two technological strains historically separated – the imagery and the locomotive. Second, we discuss how algorithmic governmentality renews the longing for scientific objectivity by means of automation, opacity, divising, and prediction. Third, we interpret the capological turn to approach algorithms as cognitive traps. Finally, we discuss the incorporation of programs focused in space digitalization based on Lidar, a technology commonly used in facial biometrics systems and advanced projects for autonomous vehicle. From the sum of these topics, we propose the notion of drone-body.

THE IMAGERY AND THE LOCOMOTIVE

If we acquiesce Foucault's (1999) understanding that modernity begins in the gap created by Kant between the supposed essences of both the world and the cognizant subject – the birth of *mankind* as a scientific problem, – we must consider that Cartesian naturalism remained functional. In that sense, Kant innovates not so much regarding the method, but regarding the object. Ignoring the Kantian veto, the task of measuring subjectivity will be undertanken by psychology, this strange science born in the end of the 19th century.

In a study conducted by Passos (1992), the author describes the history of attempts (always insufficient) to objectify subjectivity, to which issue the behaviorist model presented the winning solution. According to this model, subjectivity is acknowledged by quantifying the sense and motion peripheries in the biological body on controlled stimuli and responses[5]. Crary (2013) shows that the privileged interface of this process occurs through the face, particularly the eye, both as stimulation zone and representation of attentive activity. In the same way that behaviorist assumptions came to equip the *vision machines* (Virilio, 1994), the prevalence of rules of conduct

[5] Despite acknowledging the accumulated complexity of the behaviorist tradition historical bifurcations, we will not focus on their details. For our aims, considering one of the more generalizable aspects among its variations is already enough, namely: the assumption that subjective variations can be measured, foreseen, and/or conducted by statistic monitoring, and, thus, by algorithms of certain regularities – social, motor, hormonal, cerebral etc.

and visuality caused a series of optical equipments to measure and mobilize visual activity to occupy psychology laboratories. Mainly by equipping and standardly conducing the eyes – and consequently the attention, – modern subjectivity came to be theoretical and technologically stabilized and mobilized (Latour, 1989)[6].

Curiously, Foucault (2004) privileged vigilance in detriment of midiatic devices, suggesting that his greater concern was the *eyes of power* and their effects in body and space rather than general visuality. In the same period and opposed by Foucault, Debord (1997) debates visuality. Still aligned with the Marxist dialectics, Debord questions publicity and television imagery, which he considers as another way of alienating force in capitalism along with labor. When thinking the eye in a genealogical, and not dialectical, perspective, Crary (2011) unites both debates: on the one hand, the author considers the architectural space and immobilization devices[7] guiding the observer – an architectural eye; on the other, he thinks the visual and attentive policies imposed over the disciplined body – the docile eye. While Foucault considered mainly the cleavages of space and time and the *political anatomy of detail*, Crary (2011), in the same genealogical mold, thinks the technological production (institutional and imagery) of the cleavages of eye and body. Instead of an opposition between discipline and spectacle, vigilance and visibility, the author proposes a unique social and technical circuit where visual mobilization, more than a mere conditioning factor, is direct proportionate to corporal immobilization.

In the same way, Ingold (2004) discusses modernity from two body hemispheres: eye and hand (visual machine) and leg and feet (locomotive machine)[8]. Following this path and relying on both Crary (2011) and Ingold (2004), we think of two vectors or technological progress that are complementary and changeable: imagery and locomotive. Whereas the imagery immobilizes the body to intensify visual immersion, the locomotive does so to establish a rapid crossing in space; regardless, both cases comprise stabilizing and distributing (Latour, 1989). Altough the visual and corporal conditions are similar in both visual and corporal immobilization, the objective of the eye in the first is immersion, and in the second it is the crossing.

Modern image devices block the light, occluding part of the luminous flux in the environment and revealing the outline and the colors of digital image: they are opaque devices. In turn, the locomotive demands visual devices for the eye to connect with its surrounding space and decide over the displacement possibilities. Despite the redundancy in the body and visual

[6] The operations to *stabilize and mobilize* discussed by Latour (1989) are fundamental for the notion of body-drone that we propose. The author reads modernity considering three visual technologies: the linear perspective of the renaissance; cartography from the 14th and 15th centuries; and the Gutenberg printer, which allows the proliferation of written knowledge. As stated by Latour, all cases imply the use of technologies visually stabilizing something dynamic to transport it from one point to another in space. The idea of a dronization of the body both continues this thought and proposes an inflection.

[7] When speaking of *immobilization*, we never refer to a total paralysis, but to a simplification of movements; a stabilization in which some movements can occur in a more freely and constant way while others are contained – privileging certain movements – in this case, visual and manual (eye and hand axis) – at the expense of others – wider movements of limbs, torso, neck etc.

[8] The author interestingly argues about the various assumptions – philosophical, biological, social – of this modern cleavage. However, it is not up to us to revisit his valorous study in detail. We wish to highlight mainly the artificial aspect of this division, that is, its historicity, given that we think AR and the idea of body dronization from a technological inflection over such historicity and from the reconciliation equally artificial of both of these hemispheres.

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schema, the imagery experience rivals with the locomotive experience in respect to their connection with space. Maintaining attentive focus over an imagery device, be it a text, a photography, or a screen, requires more than a corporal immobilization, a perceptive disconnection of the immediate surroundings. The eye that looks with attention for an image is, at some degree, alienated to the space circumscribing it, and image immersion will be deeper as larger its disconnection with the space – virtual reality (VR) cabinets with sound and glasses are examples of technologies that take this trend to the limit[9].

In contrast, locomotive machines – especially regarding the conductor's experience – immobilize the body so that the eye can connect with its surroundings, not with the aim to merge into it or contemplate it, but to surpass it, to exit from it as soon as possible. Thus, the schema reuniting glasses and engine for the driver is due to spacial evasion: drivers' crossing will be faster and their contact with the possibly destabilizing intensity of the city will be smaller insofar as the body that drives is stabler – the interior of the vehicle is more comfortable and quieter and the ground and flow in which they move is straighter, more ordained and paved. Imagery and locomotive vectors form a single conservation and mobility technological circuit in which the body is always still and the eyesight varies from superficial slippages in the paved city space to terminals of imagery immersion.

Imagery and locomotive technology bifurcate in this disagreement with immediate surroundings, and Google seems to want to intervene with AR lenses in the zone where these devices intersect. In other words, when multiple imagery possibilities accumulated in the screen narrow perimeter are applied to the translucency of windows in the form of lens, they create a technology capable of offering an imagery experience whereby immersion is by no means directly proportionate to the disconnection with the surrounding involving the senses. Instead of promoting an immersion of the eye in the image, this glasses-engine device promotes a deep immersion of its own image in space, lauching a war where one can no longer determine whether we are before a space image or an imagetic space.

AR lenses allow an eye mobilization without the corresponding body immobilization. In this mode, the body is free to move not outside, but within the image; to release itself not *of*, but *in* the image. Better yet, the AR lenses elimnate the "outside the image," for the limits of imagery platforms start to correspond with space limits itself, so that the exact *incorporeal atopy* of the world wide web loses its margins. If cinema is the platform of image *in* movement, AR lenses are the platforms of movement *in* image.

[9] In this text we are particularly interested in the space and image modulation allowed by the algorithmic devices of AR. Thus, we will not deepen the debate on VR devices, which completely suppress the immediate space experience. If it is of the reader's interest, a good introduction to this subject can be found in some texts by Jaron Lanier, considered one of the most important names in the domain. The book *Down of the New Everything: Encounters with Reality and Virtual Reality* (Lanier, 2017) seems to us specially interesting for an introductory and updated approach.

We understand that a deep radicalism is at stake here, for we are dealing with a technology – a statistic technology – that is interposed at the core of one of the most fundamental frontier zones of modernity: that which separates inside and outside, time and space, extensive and intensive, determinate and indeterminate. If we agree that the 1960s-1970s *war machine* (Deleuze & Guattari, 2010) against discipline unclogged the pores between these frontiers towards enlarging the field of possibility, then algorithmic governmentality is the power-forged means to measure and seal once again the holes, now with flexible, elastic lines, so that the gap between real and virtual seems at the same time unnecessary and non-existent.

CIBERNETICS, CONEXIONISM AND THE UNLIMITED RANGE OF ALGORITHMS

We mentioned above Cartesian naturalism inherited by psychology and the winning solution, which was behaviorism. However, Passos (1992) demonstrate that the arrival of computers at psychology labs, at the end of the 1940's, spurs a new longing within the field: that which is concerned not with finding the extensive nature of the *cogito*, but to artificially replicate cognitive functions – a science of the artificial (Simon, 1981).

Commencing in the 1940s with cybernetics, the artificial impulse understands that organical and mechanical phenomena share a dynamics of informational *feedback*[10], with variations only within information quality: luminous, electric, thermal, sonorous, kinetic. Proposed by Wiener (2017), the Greek root of the word – *kybernetes* – is an analogy to the helmsman's responsibility for reacting to environmental variations and governing movement. In its root, the concept already conveys the idea of a system, organic or mechanic, that alters its movement by adjusting to the surrounding contingencies. From that, cybernetics proposes a quantitative reading of the interactive phenomena whereby everything sensible to variations can be reduced to a simple system of inputs, processing, and outputs. From the total amount of the *feedback* mechanism and the phenomena quantitative generalization, cybernetics is capable of understanding organic and mechanical elements at the same foundation and thus imagine their partial or total interchange.

The cyborg (*cybernetic organism*) is an old scientific and military dream to transcend *man*. Although many projects have been developed since the end of Cold War, such as human exoskeleton, robotic arms and wings, artificial organs and glands (Kunzru, 2009), attempts to algorithmically

[10]"We arrive at the conclusion that one factor of the most extreme importance in the voluntary activity is that what control technicians call *feedback* . . . when we wish that a movement follows a given pattern, the difference between this pattern and the movement actually accomplished is used as a new *input*, that is, one new *input* to conduct the adjusted part to move itself in a way to bring closer its movement offered by the pattern" (Wiener, 2017, p. 29).

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artificialize not only body mechanisms, but also cognition, are only enabled by the computer – ever since Turing (1950), but in a general sense from the emergence of cognitive sciences[11]. The idea of *artificial intelligence* (AI), a term coined by John McCarthy in 1956, gains strength with cognitive sciences.

Historically, two concurrent lineages try to artificialize intelligence: a connectionist and a symbolic one (Cardon et al., 2018). The connectionist model approaches cybernetic matrix and postulates an elementary informative codification of the world and a permanent connection with the surroundings. From that, it seeks to obtain a machine capable to autonomously *learn* within its existing context, a process known as *machine learning*.

In connectionism, informations are emptied from their symbolic character and the machine *learns* numerically: in a stimuli group (data), definitions of higher or lower relevance always occur in terms of quantity, by measuring recurrences; after numeric reduction, variation always occurs in degree, never in nature. The process implies no semiotic preconceptions – the predictive action, both from the cybernetic machine and the connectionist learning, arises from comparing informative indexes that enter and leave the system. For example, the predictive system applied by Wiener on anti-aircraft missiles in 1948 functions by permanently calibrating its trajectory, comparing previous records of its position with the target immediate position. In that sense, information must be constantly captured, for that capturing will also constantly indicate the necessary adjustments. The system feeds itself and persistently *learns* with the difference between the previous and current indexes.

The symbolic model emerges with cognitive sciences and the notion of AI during the 1960s, remaining hegemonic until the 1980s. Differently from the connectionist approach, the symbolic model conceives intelligence as a logical system of reading into symbols, renewing the longing for a general theory of the mind. The goal of a symbolic AI is to include previous rules within computers, enabling the manipulation of representations so that the machine can interact with what their programmers foresaw and in the way they foresaw. The main feature of symbolic machines is "breaking the bond with the world and opening autonomous reason within its calculator"[12] (Cardon et al., 2018, p. 187), unveiling a general mathematical logic of intelligence and artificializing all interaction between humans and the world.

In the symbolic lineage, external variations do not alter internal conditions: it implies no learning; what the symbolic machine *knows* was acquired by an innate attribute. That is the main difference between symbolic and connectionist AI. The symbolic model is opposed to the behaviorist matrix

combined with cybernetics; it ignores the physiology and behaves towards unveiling the supposed logical mechanisms of reason. It is an internalized machine; a machine one whose predictive horizon has been defined *a priori*, from previous logical and symbolic conditions.

The symbolic model is debased in the 1980s, when a second connectionist wave is set from the publication of two volumes of *Parallel Distributed Processing: Explorations in the Microstructure of Cognition* (Rumechard & Mcclelland, 1986, 1999), remaining hegemonic until nowadays. The AI, which emerged as a rival of the cybernetics, incorporates its principles from this new notion, namely: adequating (learning) the functions of input, processing, and/or output based on a permanent quantitative connection with the environment. However, one important point that differentiates the two connectionist moments (cybernetic and cognitive) and explains the contemporary force of the cognitive approach is the longing for an increasing inclusiveness of its operation and the material conditions for it: the adequacy of softwares and hardwares to *big data*. This new connectionist process of machine learning, whose possibilities of inclusiveness seem unlimited, structures something we call *algorithmic governmentality* (Rouvroy & Berns, 2018).

The French Yann LeCun (http://yannlecun.com/) (Facebook AI, 2020; LeCun, 2019; LeCun et al., 2015), the 2018 winner of the Allan Turing prize – considered to be the Nobel prize of Computer Science –, is an important name in the connectionist turn of machine learning. Currently an engineering professor at the New York University and director of AI research for Facebook, the author offers a detailed narrative of this historic moment and his participation on it in his most recent book, *Quand la Machine Apprend: La Révolution des Neurones Artificiels et de L'apprentissage Profond* (LeCun, 2019). His technical contribution is mainly related to the development of the so-called *covoluctional neural networks* and the *deep learning* process[13] – a machine learning model developed within the digital universe during recent years that now occupies practically all sophisticate image, words, voice, and face recognition mechanisms, as well as autonomous vehicles systems.

Much of the connectionist renewal owes to algorithms adequacy to material advances in the digital universe: faster processors, nearly unlimited stocks to storage data, and new digital equipments for everyday use. To a greater extent, it owes to the evolution in hardwares, as more places to gather data lead to a better machine learning process and improve the ground covered by algorithms. In a recent interview, LeCun highlights that AI history is inseparable from the hardwares development, and the type of

[13] As understood by certain neuroscience currents, *deep learning* is a machine learning process inspired by the structure of visual context (LeCun, 2019; LeCun et al., 2015). Differently from the symbolic model, in deep learning the algorithms do not work for linear arborescence, but by mimicking neurons multilinear and radial process. According to LeCun, an artificial neuron "is nothing more than a mathematical function calculated in a computer program" (LeCun, 2019, p. 6) (In the original: "un neurone artificiel n'est ni plus ni moins qu'une function mathématique calculée par un programme d'ordinateur"), and deep learning works through a group of them, in a structure called *artificial neural networks*. For details concerning this subject, besides the aforementioned book by LeCun, we indicate the article entitled "Deep Learning" (LeCun et al., 2015).

hardware developed for the next decade will determine AI history course (Facebook AI, 2020).

However, the operation areas for this system are still quite limited to computer and smartphones screen perimeter, creating a great period of inoperance according to the locomotive period – which postulates that the eyes must turn directly to the variations of the immediate surroundings rather than to imagery projections. AR lenses transcend this period, enabling the connectionist vector of machine learning – which is grounded on an exchange relation with the surrounding contingencies – to be considered in its association with AR glasses and other recent devices, namely equipments that allow algorithmic governmentality to cover an even larger field of action.

AUTOMATISM, OPACITY, DIVIDUALITY, AND PREDICTION

During one of his lectures at the University of Vincennes in 1986, Deleuze (2014) tries to follow Foucault's track of a possible access to the *outside* of language through literature. According to the lecturer, at that moment, the innovations of genetic engineering and cybernetic machines would represent virtual vectors of an *outside* of the organism and of labor: the two axes, along with language, to support *mankind* and, thus, modernity (Foucault, 1999). When imagining silicon devices as disrupting forces for the disciplinary order, Deleuze possibly uses the concept *society of control* for the first time, which was later publicized in a more moderate tone in his famous *Post-Scriptum Sobre as Sociedades de Controle* ["Post-Scriptum About the Societies of Control"] (Deleuze, 2010).

Curiously, the first volume of *Parallel Distributed Processing* (Rumechard & Mcclelland, 1986) was also released in 1986, in California. As we may observe, the forces diagram of an algorithmic governmentality does not emerge without the assertion of a new plot of knowledge statements. In this case, that assertion updates the old scientific desire for objectivity (Daston & Galison, 2007): the belief in the capacity to produce knowledge without the marks of contingency. If the Kantian veto about rationalist and empiricist claims exposes the issues underlying the conditions of possibility of human knowledge, an algorithmic objectivity is asserted by overcoming such issues, that is, overcoming the cognizant limitation proper to humans. In that sense, algorithmic governmentality seeks to surpass human beings in at least four ways: automation, opacity, dividuality, and prediction; and all four concomitantly.

Automation is to substitute human beings for machines. As described by Rouvroy and Berns (2018), automation is implied within all stages of algorithmic

governmentality – captation, storage, processing, and intervention – under the alibi of removing subjective marks of those institutionally responsible for the operations, such as businessmen, engineers, and scientists (Cardon, 2016). Thus, algorithmic reason dodges the cognizant subject.

Besides their automaticity, algorithms fancy an asymmetric opacity between those who produce knowledge and their target – which is, by many, considered a necessary property to avoid data contamination with users' subjective intentionality. In this process, details of technological operation are hidden to remove consciousness of use and capture the behavior manifestation in its *purity*. Once more, this procedure implies a behaviorist background: the behavior is believed to manifest itself apart from intentionality; so conscious actions should be avoided when capturing and predicting its expression in a more *natural* way. According to the behaviorist perspective, these processes will better predict subjects' behavior the lesser their knowledge regarding the processes interpreting them.

Algorithms also waive the traditional foundation of individuality; they operate distant from the cognizant subject, by elements and scales bellow and above the individual. Differently from the naturalist objectivity, the algorithms no longer act by visual conscience, but by pre-visual patterns extracted from the *pure* physiology of the eye: pupil dilation, eyeball rotation, facial microexpressions, physiological patterns, iris scanning (CNET News, 2017; Crampton, 2019). Moreover, they do not operate by the traditional categories of the modern subject such as the masses, population ethnics, and gender, but by relational aspects, meticulous and multiple, among which those concerning emotional and affective features are especially important (Bruno et al., 2019).

The reason for that is legal and scientific, contemplating the ethic respect to privacy and the spontaneous purity of behavior for the purpose of objectivity. Thus, algorithmic objectivity operates on a radical behaviorist basis (Cardon, 2016) in which the behavior is ideally captured in full form, scrupulous, constant, and more *natural*. The precision of this procedure is directly proportional to the present and to the amount of available data, and consequently to the accuracy of its connection with the immediate reality. The horizon is such a refined adjustment to behaviors that their operational agency seems empty and arouses no inhibition gesture from consciousness – Bentham's panoptic inverted; it wants to guarantee the inhibitor effects by the virtual, and not real presence of the vigilant (Foucault, 2004).

Algorithms also escape the subject by the mechanism of behavioral prediction. Differently from disciplinary moldings that operated over what

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the subject should be, prediction acts over what the subject still is not in a given period of time; or better, over what the subject will probably be. Whereas discipline sought to stabilize the bodies by excluding the *outside* (Lazzarato, 2006)[14], control acknowledges the *outside* for monitoring and stabilizing it as *profile* (Rouvroy & Berns, 2018). Behavioral profiles extracted from machine learning are like statistical silhouettes, at the same time moving, anonymous, and hyperpersonified. Although intimately connected to the minutiae of behavioral actuality, these profiles are projected for a non-teleological (but probable) upcoming future, adjusted to the immediate contours of the present with a shadow ahead of a body that walks, suggesting possible ways of executing the next step.

Pasquinelli (2015) resorts to the Gestalt principle of *apophony* to characterize machine learning and the predictive profiling, which he synthesizes as *algorithmic eye*, and to question its descriptive objectivity. Apophenic action is defined by circumscribing a reassuring imagery pattern that works as a defense for cognition supposedly unable to confront indeterminacy and manifests itself as cognitive experience to find forms and logical connections in random data. According to the author, apophony approaches the algorithmic search for any statistical patterns among the endless and chaotic ocean of data. Being a cybernetic eye, the searched pattern is not determined *a priori*. In turn, it seeks to provide a numeric contour to abnormality patterns that can indicate vectors releasing from the amorphous mass of data. This modulating mechanism presupposes an almost paranoid aspect: from this statistical contraction supposedly descriptive, comportamental profiles are predictively projected, enabling a subsequent intervention over them. In that sense, it no longer entails disciplinary norming or biopolitical *norm* – both founded in productive assumptions or settings, biological or moral (Foucault, 2008) –, but *mathematization or the abnormal* (Pasquinelli, 2015), to encircle it, pursue it, stabilize it, and distribute it; to anticipate or accelerate a movement supposedly about to occur.

AR lenses seem to enable the algorithmic desires for objectivity to reach spontaneity and inclusiveness limits never reached before. With these devices, as well as with wearable devices in general[15], the tendency is to completely eliminate intentionality. In this new model, an object is no longer chosen, actively handled, kept, or deactivated among others. Rather, the computer becomes the condition for us to perceive certain space elements and other objects, which seem to be confused with the images. When the PageRankda Google was founded in 1998, one of its goals was for users to forget its existence (Cardon, 2016); with the lenses, this goal seems to reach

the *hardware* dimension. Besides the algorithmic mechanism organizing and recommending informations and actions as if they were adapted to our most intimate *nature*, Google seems to want users to forget they are even connected to the infrastructure making that possible. According to Osterloh's text (2020), that seems to be the proper definition of *environmental computing*.

ALGORITHMIC TRAP AND COGNITIVE CAPTURE

Up until now, we have considered algorithmic governmentality as a system of descriptive objectivity that, although fragile, relies on legal and scientific alibis. Perhaps now we came to a moment where algorithms and apps developers professedly seek to intervene in behaviors, altering, redefining, or producing them rather than maintain them within an established pattern. With that, we would be leaving one paradigm that seeks correspondence and legitimacy in a supposedly pure or more probable reality towards another, which assumes active interference as the main objective. According to Seaver (2018), this new paradigm implies a *captological* or persuasive paradigm, operating through the *design* of algorithmic architectures and content recommendation.

Captology is the acronym for *computers as persuasive technologies*, proposed by Brian Jeffrey Fogg, professor at Stanford University and founder of the Stanford Persuasive Technology Lab in 1998[16]. According to Fogg, a self-declared *behavior designer*, persuasion is "a noncoercive attempt to change attitudes or behaviors" (Fogg et al., 2009, p. 134, cited by Seaver, 2018, p. 424). In that sense, whereas the predictive paradigm tries to eliminate the cognizant subject to capture behavior in its purest manifestation, captology ethically relies on behavior voluntarism to defend that algorithmic recommendations are not authoritarian – if the user's individual decision includes respect for autonomy, there is no coercion, but persuasion.

We abandon a naturalist assumption of subjectivity (which, since behaviorism, understands behavior as a purely physiological action unrelated to consciousness) for an individual consciousness unrelated to contingency. In other words, we prioritize neoliberal free will over a displacement of behavior assumptions from basic mechanic. For us, subjective processes do not seem to comprise a pure nature nor an unconditioned cognition, independent of prerequisites to manifest itself. Precisely at this moment of the conditions of possibility for decision-making that captology seeks to create digital recommendation architectures, erasing certain decision behaviors at the expense of others. The process creates the necessary conditions for a certain

[16]Later on, the Lab name changed to Behavior Design Lab (https://behaviordesign.stanford.edu/).

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behavior to be more likely to manifest, but its non-coerciveness is justified by subjects' autonomy – virtuality constraint is based on individual choice.

To oppose to the idea that persuasion is a process solely related to consciousness, Seaver (2018) resorts to the anthropology of animal hunting, especially the classic work of Otis Mason. The anthropologist defines captological processes as acts of algorithmic capture, and algorithms as actual cognitive traps. For him, traditional traps such as trapdoors, mouse traps, or nets are subjective and contextual systems, so that the ultimate gesture of imprisoning prey is not dissociated from the hunter's previous knowledge regarding the target's habits nor from the strategies for environmental artificialization. Before being a physical action, any trap is a strategic mental interaction, subtle and persuasive, that operates by trying to conduce the body movements, just as the *behavior design* does. Thus, the only difference between traditional and algorithmic traps is that while the first offers deciding behavior steps that leads to bodies death and/or immobilization, the latter seeks to hold their users attention, particularly eye attention, in a dynamic and automated circuit of stimuli and recommendations.

A major characteristic of such captological turn is the corresponding shift in indicators of algorithmic efficiency – increasingly fundamental for *startups* to pursue investors (Seaver, 2018). In the predictive process, the success of an algorithm is measured by explicit confirmation by the users: increased clicks, likes, shares, and purchases. For a prediction to be considered precise, the foreseen manifestation must be confirmed, although disguised from the users. On the other hand, algorithmic efficiency in the captologic process is measured through changes in continuous use, such as in the length of stay in a given activity. As long as users remain committed and their attention captivated, how they feel or express is not as important. Instead of anticipating a reality that is supposedly about to occur, captology seeks to create situations capable of cognitively retaining the user, regardless of the approval or reproval parameter.

Although ethically based on the conscious decision of persuaded subjects, the goal of captologic operation is to create imperceptible ambiances, opaque and dividing, so that determinate decisions become not only more probable but preferably unavoidable. By arguing some points exposed in *Hooked: How to Build Habit-Forming Products*, a book written by Nir Eyal, *behavior designer* and former student of Fogg in Stanford, Bentes (2019) gives us the practical notion of how captologic traps operate. As Fogg, Eyal understands behavior as a sum of three elements: motivation, action, and trigger (Fogg, 2003). From this basis, the author develops the *hook model* (*hook*), which promises

to produce services that become habits, "automatic behaviors unleashed by situational clues: the things we do with little or no conscious thought" (Eyal, 2014, cited by Bentes, 2018, p. 228). Thus, *hooking* or habit development is a four-step process, including: (1) trigger, that is, internal (memories, feelings) or external elements (images, icons, colors) unleashing actions; (2) actions that, according to the author, must be as simple as possible – "acting must be easier than thinking" (Eyal, 2014, cited by Bentes, 2018, p. 230); (3) unpredictable rewards, which will reinforce the motivation unleashing the action; and (4) investment by the user, which produces expectations and a long-term *hooking*.

The goal of captology is never to stop or terminate the flow of any movement, but rather to stimulate, insert this movement within a circuit, a behavioral microsequences pipeline. As stated by Jiménez and Nahum-Claudel (2019), it is an environmental infrastructure trap, a scenario being set little by little, receiving discreetly small elements, and surrounding us as a fundamental part of its plot in a way that we ignore its presence.

As an infrastructure binding imagery and locomotive, AR lenses may boost these traps efficiency and sophistication to the extreme, capturing and conducing not only attentional action by image production, but also the displacement of the body throughout space.

THE FACE AND THE STREET

If we initially approached AR lenses as a technology capable of merging imagery and locomotive by adding the translucency and the imagery possibilities of screens, we must also consider the ambivalence of its vigilant function, which works as both a surveillance mechanism and a simultaneous face-space correlation. A technology especially important for this matter is the light detection and ranging (LiDAR) technology, a system similar to that of bats echolocation and air force radars – all three detect and capture special properties remotely to obtain measures of distance and/or volumes. However, instead of sound or radio waves, LiDAR emits and captures light waves.

We may find LiDAR systems in Face ID (a face recognition mechanism present in iPhones since model X) and in Volvo, a promising self-driving car project (Hawkins, 2020). Although Google has not yet disclosed details on its lenses, we may rightfully assume that the company will employ a system similar to that of LiDAR for capturing users' sensible variations and offering a realistic experience of projection over spatial materiality, given

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[17] We used the LiDAR as an example for being currently one of the most sophisticate and promising systems of algorithmic space monitoring. However, several other systems of measurement and tracking spacial dynamics are already been used (Lawson, 2012). In most cases, the systems can act jointly, in a complementary manner. The project Soli – a miniature radar that can be attached to various objects to monitor body gestures –, developed by ATAP Google Studio, is yet another recent and promising system It is (https://atap.google.com/soli/).

[18] Despite offering detailed information, biometrical reading still raises much questioning. More information can be found in Crampton (2019).

that they promise to mediate the imagery interaction between the eye and real spacial dimensions[17].

Self-driving car are a type of drone that seems the most foresseeable possibility of a technology capable of displacing bodies in space independently of human decisions. Likewise, facial recognition systems seem to be the most advertised technological possibility of algorithmically translating subjective processes (Crampton, 2019). When reading its surroundings, autonomous car yield the attentional capital normally retained by locomotive demands, allowing their internal attention to focus on and move around other terminals, such as street, screens, other passengers, etc. Conversely, facial recognition systems offer detailed information[18] about news, records, and cognitive, affective, sensory and emotional tendencies by scanning and monitoring faces. Both cases implicate *digital platforms* (Srnicek, 2017): the first, *automotive platforms* (Leon, 2019), which extract comportamental data from transported bodies, especially networks and locomotion nexus; and *biometric platforms* (Crampton, 2019), which encode, extract, and interpret body data. Similarly to social networks interactions, these elements can easily identify relational patterns with territory, consumption, and other people – which is already performed by smartphones from location devices (Andrejevik, 2015).

Once again, these systems are devices and complementary processes: conducting the body or the attention improves both space and body monitoring. Automotive conduction can only be freed from immediate human agency by the continuous and detailed algorithmic interpretation of drivers' behavior – either generic driver, who obey traffic laws and norms, or the *profiled* driver, created based on users' behavioral patterns, which will enable the tracing or recommendation of customized trajectories. Automated facial recognition systems promise a detailed behavioral interpretation and, consequently, a more efficient intervention, be it vigilant (policing) or visual (imagery, advertising). In that sense, AR lenses advance on vigilance, by providing a deep facial reading, and on visuality, by releasing attention to the surrounding space, whose flow can be readily captured by the imagery circuits projected by the lenses.

In these systems, expression, security, and advertising – body, vigilance, and visuality – are deeply merged, producing subjects whose expressive importance is directly proportional to their vigilance refining and to their consumer induction effectiveness (Bruno, 2013). The Face ID system offered by Apple since iPhone X gives us a dimension of it: the LiDAR system installed at their frontal and back cameras allow these devices to perform

a luminous search of space, scanning and digitizing its elements according to tridimensional variations. With LiDAR, the camera becomes a spacial measurement tool, recording not only the lightness on a surface (as cameras already did), but also measuring the length, intensity, and frequency of the rays, allowing an image projection without fixing the angle at which light was captured – a record that, from a single perspective, can project all others available.

Using LiDAR, the iPhone X frontal camera is able to map and monitor in-depth 30 thousand dynamic positions in space (CNET News, 2017), providing a type of hyperpersonal security and the possibility of shooting portraits with an enormous 3D-editing power. Companies have also developed some editing applications for using Lidar with the back camera of *smartphones*, focused on the luminous scanning of space. For example, the app Home Design 3D can digitize the interior of domestic spaces and offer tridimensional images of rooms from the search made by LiDAR (AllThings Tech, 2020). Besides offering resources, these equipments also capture and process data that can improve even further systems of behavioral prediction and induction.

Thus, AR lenses may be thought as a synthesis of the functions offered by facial recognition systems and self-driving car, offering both maximum surveillance and maximum capacity to intervene over subjectivity and space at the same time with the aim of ordering bodies and encounters, besides governing urban trajectories.

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What does the future hold for a multitude of *drone-bodies* mapping ambulatory becomings and creating virtualized singularities? Algorithmic governmentality acts in a constant and imperceptive way. When it comes to environmental computing, the body going through space is a data reservoir. Cybernetic technologies emerge in connection with a continuous (self) administration of subjectivation processes. These control technologies are improved by vision, which acts converted into *data*, and modulate themselves in a "form of exceeding value in a market based on the accumulation of data about users' behavior" (Crary, 2014, p. 56).

As stated by Virilio (2011) in the beginning of the 1990s, we would be just waiting for *watching machines* "capable to watch, to perceive instead of us" (p. 132). AR lenses and the LiDAR system mediate an immersive work performed by the eye and the body in space, which seems to optimize the possibilities for monetizing our ocular physiology and corporal sociology in a

speed incompatible with our storage load, or with our conscious and attentive responses. In modern infrastructures that survived through contemporaneity, *multi-tasking* – as in the simultaneous usufruct of apps, *gadgets, and devices* following a bureaucratic self-management in space and time – is believed to strengthen a "feeling of individual ingenuity", which would give the "temporary conviction that we are at the winning side" (Crary, 2014, p. 66). On that matter, Crary highlights whether we would be the ideal prototypes of these modulations within this relationship, willing and involved in the connectionist rhizome in its algorithmic expansion.

As Canevacci (2008) reminds us, our eye, "which is in no way naive or manipulable" (p. 19), feels willing to select and distinguish, to be distinguished and selected; soon, it becomes conditioned to decodification. If painter Paul Klee (cited by Virilio, 1994, p. 86) foresees in the early 20th century a dreamlike landscape, where objects in space lurk at us – "now the objects perceive me" –, the idea of *drone-body* would emerge from the virtualized objectification of our perceptive becoming, from our "will to wrap the future" (p. 132) sold in data.

FINAL CONSIDERATIONS

Drone-body is a remotely-controlled body that partially or totally looses the autonomy for deciding over its displacement in space. This article debates this possibility within four complementary construction layers: (1) resoldering imagery and locomotive machines by AR lenses, establishing the reconnection of eye and foot – both segments over which it was possible to sustain modern body; (2) overtaking *mankind* through automatic, opaque, dividing, and predictive mechanisms while escaping reason, consciousness, and individuality as modernly built; (3) capturing cognitive aspects by algorithms, creating behavioral contexts, landscapes, and ambiances – automatic, dividing, and opaque – to effectively reduce and induce the individual decisory processes from their most germinal elements; and (4) coding and digital correlating face and space using LiDAR system, both at the most advanced systems of biometrics surveillance and more promising projects of self-driving car. We turned to the LiDAR technology to try to imagine how AR glasses promised by Google would project interactive images before the eye while respecting spatial proportions, as if perceived by the naked eye.

The body dronization process discussed in this work is not a recent or sudden phenomenon. In fact, the body, eye, and cognition automation and displacement dates back to the most basic longings of modern knowledge, either from the perspective of the eye, leading us to the early modern times

of technology and science through perspective, map, printer, psychology, cybernetics, and cognitive sciences or from the perspective of the foot, whose substrate docks in transportation systems and urbanism (Chun et al., 2019). The fusion of these two technological epistemic fields, enabled by algorithmic governmentality and AR lenses, seem to permit the total or partial dronization of the body. **M**

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