



WALKING RECOGNITION: A BIOPOLITICAL APPROACH

Reconhecimento de marcha: uma abordagem biopolítica

Lucineia Rosa dos Santos, Thiago Gomes Marcilio

Pontifícia Universidade Católica de São Paulo

E-mail: rosadossantoslucineia@gmail.com; tgm.marcilio@gmail.com

ABSTRACT

This article intends to analyze how walking recognition operates in a mechanical system that deals with uncertainty and the use of it to create biopolitical power. The objectives are to identify the physics theory how they connect with the philosophical approach. The hypothesis is that this system works in a structure identical to quantum physics laws. New algorithmic techniques have led to the exercise of Foucauldian biopolitical disciplinary power over bodies in the present, using uncertainties about the future as a raw source for defining interventions. Algorithmic prediction, and the panopticon model, are rooted in the desire to understand and exert power over bodies. It was found that, a predictive algorithm implies distinct temporal lines and expands time, which resonates with Schrödinger's model of possibilities and uncertainties, particularly when the observer's intervention can alter the state of affairs. While the past offers limited raw material for manipulation (as in the book "1984"), the future provides an inexhaustible speculative source of hypothetical scenarios (as in Isaac Asimov's book "Foundation") for AI, potentially diminishing the centrality of human self-determination over lives.

Key words: Artificial Intelligence, Biopolitics, Discourse, Prediction, Intervention.

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RECONHECIMENTO DE MARCHA: UMA ABORDAGEM BIOPOLÍTICA

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Lucineia Rosa dos Santos, Thiago Gomes Marcilio
Pontifícia Universidade Católica de São Paulo

E-mail: rosadossantoslucineia@gmail.com; tgm.marcilio@gmail.com

RESUMO

Este artigo pretende analisar como o reconhecimento ambulante opera em um sistema mecânico que lida com a incerteza e o uso dela para criar poder biopolítico. Os objetivos são identificar a teoria da física como ela se conecta com a abordagem filosófica. A hipótese é que esse sistema funciona em uma estrutura idêntica às leis da física quântica. Novas técnicas algorítmicas têm levado ao exercício do poder disciplinar biopolítico foucaultiano sobre os corpos no presente, utilizando as incertezas sobre o futuro como fonte bruta para definir intervenções. A previsão algorítmica e o modelo panóptico estão enraizados no desejo de compreender e exercer poder sobre os corpos. Verificou-se que, um algoritmo preditivo implica linhas temporais distintas e expande o tempo, o que ressoa com o modelo de possibilidades e incertezas de Schrödinger, particularmente quando a intervenção do observador pode alterar o estado de coisas. Enquanto o passado oferece matéria-prima limitada para manipulação (como no livro "1984"), o futuro fornece uma fonte especulativa inesgotável de cenários hipotéticos (como no livro "Foundation" de Isaac Asimov) para a IA, potencialmente diminuindo a centralidade da autodeterminação humana sobre as vidas. Palavras-chave: Inteligência Artificial, Biopolítica, Discurso, Previsão, Intervenção.

INTRODUCTION

The implementation of new algorithmic technologies has enabled the ability to predict results through advanced statistical methods (machine learning) (Garnelo, 2019) The application of new methods such as neural networks (Vainzof, Gutierrez, 2021), whose explainability and accountability remain opaque in a black box, as well as the indetermination has brought to light concerns regarding safer applications by different entities and ethical standards, in order to guarantee the defense of human rights in a vigilant world (Vought, 2019).

Applications in controlled environments, such as games, are examples of the potential of these tools, such as Alpha Go (Silver, Huang, Maddison, 2016), for the game Go, Deep Blue (Hassabis, 2017) for chess. In January 2023, Microsoft surpassed Amazon's model and announced speech synthesis through an audio sample of just 03 seconds. (Wang, 2023). As a result, artificial intelligence (AI) applications reverberate in the social environment in a way that converted them into tools, structures and perhaps even environments with a life of their own, to aid in decision-making at different hierarchical levels and various institutional spaces. Beyond the questions *Can machines think* (Turing, 1950). The doubt is now on for what purpose they think the way they think.

This scenario can be observed through the interdisciplinary dialogue between (i) the programming of an AI; (ii) the theories of quantum physics in order to present a *biopower* mechanism that uses an algorithmic application and (iii) the social results, from the perspective of Michel Foucault's biopolitical theory.

The object of study of this article is the *walking recognition* (WR), which can be used to specifically identify individuals in crowds and which, added to predictive movement algorithms, can anticipate behaviors considered suspicious and establish criterias for intervention on people's bodies.

However, the operating logic has to deal with the presence of uncertainties, which become raw material for the movement recognition system and how it is coupled with the biopolitical strategy of intervention over bodies.

1 BIOPOLITICS

Michel Foucault introduces us to the theory of biopolitics, which deals with the control of bodies. His historiography indicated that from the 17th century, punitive pomp ceased to generate death and began to manage life, demonstrating that the past of torture was mythical, a historical construction that made biopolitics narratively less aggressive with bodies (Foucault, 2014). Control and scourge, however, have become more subtle and invasive.

Having no original source or defined holder, the *biopolitical power* (*biopower*) that manages lives circulates, flows between *subjects*, objects and bodies, sometimes containing them, sometimes being contained by them (Foucault, 2014). The architecture of spaces plays a fundamental role, since the control of space guarantees the possibility of better articulation of power. An example of it is Jeremy Bentham's work, on the panopticon and the architectural similarities between hospitals, schools, convents and asylums (Foucault, 2014). The macro control of spaces would enable the micro control of behaviors during interactions and practices of knowledge and its body control liturgy. All these interactions have the particularity of taking place in a determined space in the present time. The public spaces are now open where surveillance systems are constantly present.

AI applications have expanded in public security. Facial recognition, fingerprint recognition and, more recently, WR, which determines the way a person behaves, (NoLeak, 2023) can identify and track individuals in real time, (Valor Journal, 2022) as well as being able to create a journey history. Real-time surveillance with detailed recognition of individuals makes it easier to identify the paths of each subject and discipline the bodies.

Another aspect worth mentioning refers to the fact that the assumption of this WR is *anonymization*, since the individual cannot be identified as a person, but only as a *subjected body* whose movements are more or less consistent with a discipline, etiquette or expectation of behavior. The *rebellious body* is identified, and only then the *person* would be identified. This would neutralize, at least initially, racial, gender, pathological or age biases, as only the movements would be the object of observation. It is not intended in this study to remove this *anonymization*, as this is inherent to the WR tool, which is already in use in the market. Furthermore, predictive algorithms can establish hypothetical scenarios in which certain behaviors would represent local risks: which would justify preventive intervention on dangerous *subjects*.

1.1 Space-time-power relation

Physics presents us with the link between time and space and, for biopolitical theory, this relationship is also relevant. The application of *power* is done strategically and precisely in the present time and in a determined space in order to always reach the physical body.

The three spatial dimensions would add to the immaterial fourth dimension of time (Rovelli, 2015). Carlos Rovelli indicates that time is a sentient projection and not a physically accessible dimension, constituting a hypothesized dimension, accessible by individual observers, who may have their own temporal lines (personal stories) or shared ones (events and historical records), but are constructs of mental processes, whether memories or future projections. “[...] the very history of the world happening can only be an effect of perspective” (Rovelli, 2015), an internal principle that orders our perceptions. It is possible, on a mental level, to relive past moments or mentally project situations that may occur in the future. It so happens that human perception of facts and elements is limited to the present.

Therefore, predictions about the future need to be converted into a format that can flow in time, either from the past to the present or from the future to the present, the *discourses (parole)* that, through a set of truths, will constitute subsidy to justify the interventions. From this conversion derives the form and channel through which *biopower* will flow until reaching the most tenuous individual conducts in public spaces, which are equipped with a “public interest” whose defense and promotion in the present time will be left to the police forces. (Foucault, 2014).

Therefore, the hypothesis outlined (i) is that the connection between the control of space and time, as well as the assumption of future states of space and bodies, become tools for controlling bodies in the present. (ii) Projecting the uncertain states of the future can justify the controlled observation of the present and the eventual intervention in that same present, with the alleged *discourse* of reaching a determined future state. (iii) Each predicted future state of space creates a distinct timeline, multiplicity of possibility, or multiverse.

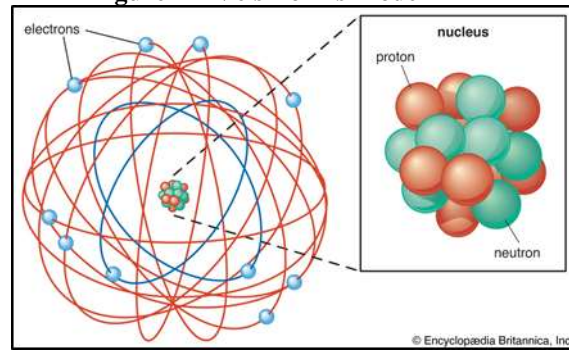
The first conclusion is that *biopower* cannot reach a future body, nor a past body, without being contemporary to the. However, *biopower* can articulate past and future *discourses* that permeate a place to justify interventions in the bodies of the present.

1.2 Prediction of uncertainties

The algorithmic prediction process lists possible occurrences and indicates those that are statistically more likely to happen. However, predicting possibilities is not the same as knowing which one will occur, which is the basis of the *uncertainty principle*, described by physicist Werner Heisenberg. In his theory, analyzing the position of an electron is to assume its approximate location, so that there would be a more or less probable zone where the atom would be located. This means that knowing its exact position would annul the possibility of verifying its velocity, while knowing its velocity would annul the possibility of verifying its exact position (Heisenberg apud Wheeler, 1983).¹ From these two impossibilities derives the *uncertainty principle*. It would be inherently impossible to know velocity and position simultaneously. The reality of the electron calculation would be closer to a cloud of possible positions (Hilgevoord, 2016) than to a sequence of orbits like in Bohr’s model (Niels Bohr’s Model) (Bohr, 1913).

¹ “At the instant of time when the position is determined, that is, at the instant when the photon is scattered by the electron, the electron undergoes a discontinuous change in momentum [...] the more precisely the position is determined, the less precisely the momentum is known, and conversely.”

Figure 1 - Niels Bohr's Model



Source: Britannica

In addition to systemic uncertainties, there would be uncertainties introduced by the observer himself when calculating or interacting with other elements of the system. In human relations there are non-constant factors neither precise measurements, which forces the new technologies to an environment of approximate measurement and approximate quantitative precision (Mises, 2018). For this reason (i) the analysis of human aspects through the use of correlations and functions, and (ii) the mathematical descriptions of facts that happened in a given space-time with certain people will ignore the vicissitudes and uncertainties of human behavior.

Hence, uncertainty in predictions about human behavior, since the complexity of human phenomena derives from the absence of constants that could provide empirical laws and exact precisions, disregarding the possibility of eradicating uncertainty of human state and *value judgments*.

2 AI AND THE PREDICTIVE ALGORITHM

Only after the increase in computational processing capabilities did it become possible to run such algorithms. It became possible to perceive dangerous behaviors such as suicidal tendencies, robberies, articulated actions by terrorist groups or misdemeanors.

Behaviors or movements would be statistical indicators of a greater or lesser probability of committing crimes, creating a range of future scenarios that have a greater or lesser probability of occurrence, that can generate a biased Violent Recidivism Risk Scale (VRRS) (Jackson, Mendoza, 2020). They are future scenarios, therefore immaterial and inherently uncertain, generating a tree of possibilities. The Algorithm foresees future situations, but it can observe, in fact, only the present and the occurrences presented to it between the moment of information processing and the presentation of the result.

The algorithm is able to assume overlapping possibilities and observe the consolidation of facts within the predicted timelines. Like a loom wheel, the possible future lines decay, and only one line remains: the line of the consolidated present. This consolidated present may or may not be aligned with one of the possibilities foreseen by AI or it may be different from the predictions, leading to a scenario that was not initially calculated.

The question then arises: *What is the advantage of this strategy of assuming the future, if the exercise of biopower can only be done in the present?* What are the motivations for a tool to consider future scenarios to act in the present?

What happens is a connection between dispersed and innumerable possibilities that are condensed in a single moment in the present, in a process of merging possibilities that creates an intervention argument strong enough to justify a disciplinary preventive action. This results in a unified discursive field, in which dispersed possibilities dialogue with condensed possibilities, producing discourses and truths.

The observation of future paths is not the end of the strategy, but a tool to create *paroles* that justify the present disciplinary intervention. This strategy creates three advantages. (i) the assumption of future states is broader than the assumption based solely on past history, generating a greater probabilistic role; (ii) Overcoming the limits of time, so that it becomes possible to assume countless movements within the same physical space, enabling the calculation of how many temporal lines can exist in a specific spaces.

And it becomes (iii) possible to dilate time by increasing the number of frames in each second, expanding the number of moments suitable for intervention on bodies. By way of comparison, a human being observes 60 frames per second (ps), on average, which gives the observed images a feeling of fluidity (Davis, 2015). An insect

(fly) can observe 250 frames per second (Ruck, 1961), which guarantees more information within the same time. A slow motion camera can capture more than 1,000 frames per second (Pueo, 2016). There would therefore be 1,000 frames in which intervention would be possible. In this way, predictive AI, with the right monitoring equipment, can collect enough frames (*momentum*) to dilate time and calculate countless timelines over the same space.

Its results would be limited only by the a) applicability of the prediction, which may decline before the intervention decision is taken, due to the change in behavior understood as dangerous; or b) by the impact that the assumption has on the design of the future hypothesis when in contact with variables, what could decrease the statistical risk.

In case a) the hypothesis of a person, on a train platform, places his right hand on his back, which would lead to the assumption that a gun would be drawn, however, the person just put his hand in his pocket and took out a lighter from his back pants pocket, which generated a risk decay. In case b) a succession of competing statistics can overthrow the final result, as would be the case of a group of people sitting for a considerable time at the same train station, Only because technical problems stopped the train line.

Therefore, it matters (i) what will happen, (ii) when it will happen and, (iii) whether such movement is closer or further away from the line of discipline, so that (iv) the action or inaction of security forces, being (v) the assumption of timelines and (vi) the dilation of time is also important.

2.1 Past, present and future

A highlight must be made. The present is the physically accessible temporal dimension, so both the past and the future do not touch the physical space, requiring a mediating element, which is the discourse. The speech (parole) relations will allow the definition, the classification, the explanation and the way to work over objects and how to execute the speech itself (Lecourt, 1980). Human material perception is located in the infinitesimal contact with the present.

Just as hypotheses and assumptions are created about past facts, so that one can understand the present state of things, the same is done with the future: assumptions are created about the future, so that the present pieces can be properly adjusted towards the best future hypothesis.

If, on one hand, it is possible to reinterpret the past, this alteration is limited to what the past bequeathed to the present. In the book *1984*, the main character, Winston Smith, changes old newspaper headlines and adapts them to the present reality, so that the present is kept coherent and controlled by the dictatorial government (Steinbock, 1975). The past is reviewed in order to justify the present.

However, in the logic of the predictive algorithm, Isaac Asimov's book *Foundation* the character Hari Seldon creates a predictive science named *psychohistory*, capable of anticipating historical facts on galactic scales based on statistics and social interactions. The forecast, however, is the trigger of the foreseen crisis (Elkins, 1976). Those who anticipate the future have more raw material.

It happens that the past acts as causality, where the cause precedes the effect. But in the inverse relation (future to present), retrocausality occurs, so that a future fact, or its possibility, influences decision-making in the present. Causality and retrocausality interact with each other. For example, anticipating risks leads a person to hire a life insurance (retrocausality), just as knowing the rate of previous accidents makes the person more cautious (causality).

However, this predictive model is endowed with uncertainty regarding future results and the results of preventive interventions in the present.

Erwin Schrodinger proposes an experiment to explain the *state of uncertainty* that derives from interventions, regarding the position of an electron is an experiment that also elucidates Heisenberg's *uncertainty* principle. The experiment consists of the presence of a cat inside a box, along with a Geiger radiation counter connected to a hammer, so if a radioactive element decays, the hammer will break a vial of poison, killing the cat (Schrodinger apud Wheeler, 1983).

The moments are. First (i) closed box that prevents us from knowing the real state of the cat, if alive or dead. From a probabilistic perspective both possibilities exist in a theoretical but not practical way, so the cat is alive AND dead. By opening the box one of the two answers will be revealed. The cat will indeed be alive OR dead. This, however, still depends on the radioactive element, which has an uncertain behavior.

The second moment is linked precisely to the mental organization of time. Until the box is opened and it is possible to have an orderly answer, that is, if the cat is alive OR dead, the human mind, which projects these future results, understands the situation as confusing and overlapping.

What determines the resolution of the problem and gives a satisfactory answer is the Third moment, the opening of the box, that is, the scientist's biopower of intervention over the physical space of the box at a present time.

Intervention is the only factor over which the scientist has control, since the others are uncertain (life, death and radioactivity). The same applies to biopower exercised by public security, it has only the present time to touch the *subjected bodies*. However the scientist-observer can change the reality of the observed system. Looking at the consolidated result could change it, so the cat could die moments later. There is persistent uncertainty in the prediction and also in the post-intervention moment. Jorge Luis Borges in the short story *The Aleph* presents the idea of a mutable mathematics, whose results are always different, even if the calculation made is the same constituting a myriad of uncertain results (Borges, 1945).

Therefore, if an AI is still under uncertainty principle, the only *biopower* left is the capacity to intervene in the physical space observed in the present, taking as justification the need to adjust the present state to a future predicted state. Observing and controlling to get to a future (causality) and at the same time predicting the future to act in our present (retrocausality) (Friederich, 2022). In the case of the cat, the intervention is carried out directly by a human, but in the case of the application of AI in public security, the implications fall on an AI intervention which is mediated by a human or, even a direct and autonomous intervention of AI, almost like an embodied AI capability, *corpus artificiale*. Once again the uncertain results will be seen.

Anticipating future scenarios and comparing them with a discipline line justifies the intervention in the present, and grants the prediction a preventive *aura*, so that there is control over the continuous today, without any pretense of suppressing the uncertainties. The future uncertainty is the crude oil that, once refined, becomes the fuel of present discipline.

Knowing (i) what can happen is enough, (ii) since one cannot know what will actually happen, (iii) and can be built by the intervention in the present.

If used only elements from the past, *biopower* would be poor in its resources and procedures, monotonous and repetitive, constituting only a prohibitive and censoring power. Considering future possibilities offers broader possibilities for (in)action, as the future facilitates an articulation of "multiple potentials" (Foucault, 2014).

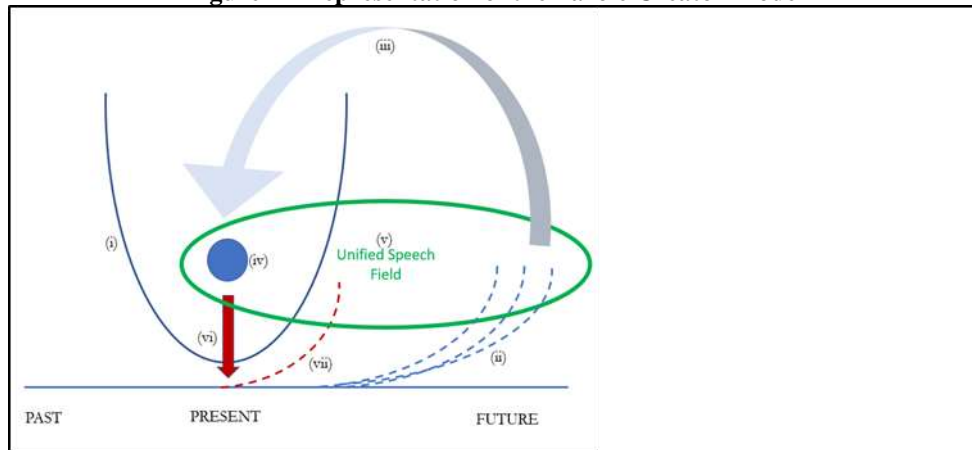
2.2 Predictive Algorithm as a parole creator

The dynamic between *biopower* and uncertainty was already present in the *panopticon*. The observation tower, centralized, could observe all the cells, without letting the prisoner know the exact moment of the presence of the security guard, nor the exact moment when his eyes would fall on the observed. There was certainty about the observation, but uncertainty about the moment of observation. However, the advent of cameras emerged the certainty about observation and the uncertainty of the intervention on the bodies.

The breadth of open public spaces, the anticipation of timelines and the increase in observed frames expands the possibilities for intervention, far beyond the responsiveness of the *subjected bodies*.

In this way, a possible parole model creator becomes possible, as represented in the image below, in which (i) the arc represents the perspective on the present time, without being able to touch the present, that is why it is floating. (ii) From the present moment, predictive AI presents probable future scenarios; (iii) these possibilities are then projected (arrow) to the present moment perception of the decision maker and (iv) condensed in one discourse (*parole*), in order to create a (v) *Unified Discourse Field*. Once this correlation is established, it becomes possible to (vi) carry out an intervention in reality that may result in one of the predictions presented or may lead (vii) to another result not initially foreseen.

Figure 2 - Representation of the Parole Creator Model



Source: Image created by the author

In a biopolitical approach, the main objective is to use the indicated model to generate a series of *discourses* that justify the intervention in the subjects' bodies, indicated by item *iv* of the image. A parole-generating machine is constituted for interventionist *discourses*.

The model goes beyond the legal norm, using other heterogeneous techniques beyond the State legal framework, so that the law has less power in this model.

This adaptability, in terms of predicted future, allows a more localized articulation of force correlations and moments of power. There is an exercise calculated from the outside with a view to specific objectives and which tries to use the greatest possible number of useful instruments for the greatest possible number of maneuvers (Foucault, 2014). In the end the predicted results may not occur but the intervention and bodies' management will be justified.

2.3 Limitation of reality

There are two other relevant aspects. First, the prediction of movements is limited to the captured elements, which means that there are possibilities of events and other possibilities that are not probabilistically possible, but can occur once "probability theory properly captures uncertainty due to the randomness of precisely observed phenomena (Denoeux, 2020). An example is that an AI can predict a theft on a train platform, but cannot assume that a plane will fall on the platform minutes before triggering a security theft alert. Was it possible for a plane to crash? Yes, but it was an extra-systemic element, external to the platform and its nature.

This means that the observed space will limit the possibilities listed by AI and, consequently, its predictive capacity. At another time, this also limits human conduct itself, because if AI lends itself to capturing elements that go beyond human vision, creating an *aura* of super-capacity and a presumption of omnipresence, its limited vision will also limit human *subjects*.

It is like a scenario in which the AI would look through a keyhole in a room and only give us the wall color choices, being unable to grasp the completeness of the space. The very belief in the superhuman capacity of AI is a process of subjectivation (Taylor, 2010) of the unquestionability of the tool, which facilitates the application of the discipline over people.

The second aspect is the totalization, because if AI has observational limitations, then the most prudent option is to open the observation horizon as wide as possible. The AI would then be able to anticipate the plane's crash on the train platform and trigger an emergency alert or, in the worst case, not trigger the alert and let the passengers on the platform enjoy moments of spiritual peace. After all, once the probability of a crash of the plane is anticipated, the next probabilistic analysis would fall on the chances of survival of the passengers on the platform.

This alleged process of avoiding predictive errors creates a presumption of aggregation of predictive applications. This observational limit permeates all scientific processes, but if the range of vision is total, then it will be possible to predict individualized movements and in their individuality, so that one would no longer speak of predictive models, but of reliable reproductions of reality.

It is the methodological problem of Science, which needs limited models, otherwise instead of modeling

there would be a copied representation of reality as in the short story by Jorge Luis Borges entitled *On Exactitude in Science*, in which the simulation becomes identical to the simulated object, such as a city-sized map. (Borges, 1982).

This creates an impasse in which, being limited to AI, it will also limit human possibilities, but if it is totalizing, only a full and complete knowledge of reality would eliminate observational failures. This totalizing observation is a *deification* of AI (or AIs, in the case of an interoperability), to whom we would hand over most of the control over reality.

In any scenario, knowing the future, (i) within the limits of a system or (ii) assuming to know it (iii) creates the risk of a self-fulfilling prophecy which, (iv) being forecast, limits futures and justifies interventions, (v) whose results, even being unknown, gain strength to justify the intervention, (vi) leading to limiting assumptions for human bodies.

CONCLUSION

Faced with this scenario, reacting to biopolitics requires not only its anticipation, a phenomenon that is also creative because it offers subsidies for its practices, but also the execution of actions in reality. Michel Foucault brings us *self-care* as a sum of consciousness and practices.

One can then speak of the *practice of consciousness*, that put into execution within oneself and for oneself and; in *practicing consciences*, which are outside themselves, projected into the material world. In a metalanguage, the function of this article is the *practice of consciousness*, as individualized and self-reflected, while the *practicing consciousness* of the intellectual who reads and promotes it is to externalize it and project it onto the reader's reality.

Although human integration and AI is inevitable, part of the process of understanding this phenomenon must be exercised frankly and freely on the uses of these new technologies, in a process of *parrhesia* that does not intend to anticipate the future, but to generate awareness in itself and in the listener about future risks.

However, unlike past times, when *biopower* was widely used in physical space, the emergence of continuous virtual environments, which permeate physical spaces and sometimes surpass them in terms of interaction and attention, forces scholars to develop a dynamism that facilitates the migration from the virtual to the real.

AI precognition leaves a virtually ethereal environment, gains physical contours, within the possibilities of materiality, and reaches the *subjects* physically. Thus, it is not possible for freedom in human practices to be limited to merely mental or virtual practices of consciousness, as the equated, algorithmized body will continue to be disciplined.

As a result, the moment demands that the *specific intellectuals* mentioned by Michel Foucault be even more present, not replacing *universal intellectuals*, but with functions that dialogue and make debates and understandings more palatable for the public, instead of writing and speaking to specific audiences, but acting strategically and punctually, evading the field of knowledge and entering the field of politics.

Therefore, the action against the extensive use of predictive algorithms on human interactions is a turning point, a fact to be worked on, analyzed and criticized in the physical-material world, of the practicing consciences, so that there is no risk of loss of civilizational self-determination.

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