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Artificial Intelligence as a New Field of Human Interaction: A Critique of Knowledge Production

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Abstract

Artificial intelligence (AI) has gained a prominent role in human interaction and information production in various social spheres. At the same time, warnings are emerging from multiple institutions and experts regarding its proliferation, whether due to the possibility of automating certain jobs or tasks or the increasing difficulty in distinguishing between what is produced by a human being and what is produced by this new technology. However, in many of these discussions, a set of terms such as "communication", "information", "knowledge", "consciousness" and "creativity", among others, without due concern for defining these capabilities and situating them historically — hence the rapid descent into a perspective that is either apocalyptic or enthusiastic, without understanding the social processes involved and the possible consequences of the development and application of these technologies. Faced with this discursive landscape, which proliferates in all types of media, by focusing on the production of databases on which the various models of generative AI are based, we aim to situate the development of AI, and more specifically generative AI, historically in the context of the development of capitalism; to advance a critical perspective on human capabilities (namely, communicating, thinking and producing knowledge) and, finally, to try to anticipate the possible consequences of the introduction of these technologies not only in the production process but also in the sphere of consumption.

Keywords
artificial intelligence, communication, knowledge, capitalism

A Inteligência Artificial Como Novo Campo das Interações Entre Humanos: Uma Crítica à Produção de Conhecimento

Resumo

A inteligência artificial (IA) tem ganho um papel preponderante na interação entre indivíduos e na produção de informação nas mais diversas esferas sociais. Ao mesmo tempo, surgem alertas de diferentes instituições e especialistas quanto à sua proliferação, seja pela possibilidade de automatizar determinados trabalhos ou tarefas, seja pela progressiva dificuldade em distinguir aquilo que é produzido por um ser humano daquilo que é produzido por esta nova tecnologia. No entanto, em muitas destas discussões são utilizados termos como

"comunicação", "informação", "conhecimento", "consciência", "criatividade", entre outros, sem a devida preocupação em definir estas capacidades e em situá-las historicamente — daí que rapidamente se caia numa perspetiva ora apocalíptica, ora entusiástica, sem que se perceba os processos sociais em causa e as possíveis consequências do desenvolvimento e aplicação destas tecnologias. Face a este panorama discursivo, que prolifera em todo o tipo de média, ao focarmo-nos na produção de bases de dados nas quais os diversos modelos de IA generativa se baseiam pretendemos situar historicamente o desenvolvimento da IA, e mais concretamente da IA generativa, no contexto do desenvolvimento do capitalismo; avançar uma perspetiva crítica sobre as capacidades humanas (nomeadamente, comunicar, pensar e produzir conhecimento) e, por fim, tentar antecipar possíveis consequências da introdução destas tecnologias não só no processo produtivo como também na esfera do consumo.

Palavras-chave
inteligência artificial, comunicação, conhecimento, capitalismo

1. Introduction

The wealth of contemporary societies dominated by the capitalist mode of production presents itself to us in the form of an enormous accumulation of different "intelligent" machines[1] that confront us in the most diverse social spheres of life. This social reality tends to reinforce the observation that "all our invention and progress seem to result in endowing material forces with intellectual life and in stultifying human life into a material force" (Marx, 1856/2010, p. 656). In other words, we are increasingly confronted with technological artefacts that seem to be endowed with capabilities that, in contrast, human beings seem to be losing, whether in calculation or in artistic creations.

In view of the development of the latest technologies, especially those related to artificial intelligence (AI), several authors have attempted to demonstrate that these are products of a specific mode of production, consisting of material and, therefore, social networks[2] that are complex on a planetary scale: so-called "intelligent" technologies function on the basis of workers who select and categorise the data essential to their functioning[3] (Altenried, 2022; Cant et al., 2024; Crawford, 2021; Gray & Suri, 2019),

[1] This is, as the reader may suspect, a modification of the sentence with which Marx (1867/2024) begins his masterful work, *Capital*: "the wealth of societies dominated by the capitalist mode of production appears in the form of an 'enormous accumulation of commodities'" (p. 13). It is worth noting that the history of automatons in Western thought (Kang, 2011) overlaps with another: the attribution of intelligence to animals. Take the case of Hans the horse, who, in the 19th century, fascinated part of Western society by supposedly being able to "solve math problems, tell time, identify musical tones and spell out words and sentences" (Crawford, 2021, p. 1).

[2] This aspect is particularly relevant in view of the ecological crisis, as the development of these technologies, especially large-scale models such as ChatGPT, consume a lot of raw materials, which are mostly found in China, South America and Africa (Arboleda, 2020), energy resources (in an economy dependent on fossil fuels) and a significant amount of water to cool the hardware. Although this information is not easy to scrutinise, and even based solely on the annual reports produced by the companies themselves, the data is alarming; for example, Google claims that its data centres "consumed" 20 billion litres of water, most of it drinkable, in 2022 (Li et al., 2023). It is, therefore, possible to say that "digital destroys the planet" (Pitron, 2021, p. 20). For a summary of these material bases, see also the report by the AI Now Institute (2023).

[3] This perspective is in line with the long-held argument that to "make machines look intelligent it was necessary that the sources of their power, the labour force which surrounded and ran them, be rendered invisible" (Schaffer, 1994, p. 204).

combined with the rarely conscious contributions of users in digital spaces, which creates an illusory perception in consumers that the machine responds more efficiently and immediately than any other entity. Ultimately, these machines would know better than us what we like or want (Zuboff, 2018/2020). Different authors have attempted to demystify these "revolutionary" capabilities — both in predictive AI and generative AI, as well as in applications for content moderation[4]. Presenting the theoretical assumptions and their technical limitations, they also highlight the various moral and political issues related to the automation of decision-making processes in areas such as health and border or population control, or the possibility of (re)producing disinformation, emphasising that the use of these technologies reinforces social inequalities at different levels (class, gender, race; Benjamin, 2019; Narayanan & Kapoor, 2024).

Assuming that AI technologies play an increasingly important role in communication between human beings and that it is also necessary to consider their impact on communicative action, according to the meaning given by Habermas (1981/2012), we intend to analyse them by asking the following question: what are the modes of data production that support the development of AI technologies that accelerate interaction between humans?

Maintaining the understanding, which to date has not been contested by robust empirical evidence, that the *human-machine relationship* is, above all, a *human-human relationship*, since "in dealing [in a mediated form] with the Machine, human being is in fact dealing with another human being, say, the creator, the user, or the owner of the machine" (Azeri, 2024, p. iii), we will attempt to contribute to this debate, which is of interest to many in social and communication theory, with the aim of demonstrating the intrinsically social dimension of AI databases. This implies opposition to any form of neutrality, in line with Harvey's (2018) arguments about techniques. To know and understand how much of the social is embedded in data, we must scrutinise the modes of knowledge production and their effects on communication between humans, marked by the growing power of technologies in social life. As Martins (2011) noted, technical innovations promise, in the view of many, to endow computers and other technological artefacts with characteristics specific to life and skills that, until now, have only been present in human beings with biologically unique brains[5]. Challenging the very notion of "human" contradicts the neutrality

[4] Predictive artificial intelligence aims to predict events based on data that represent a portion of reality (for example, attempting to statistically predict the probability of a patient developing a certain disease so that a hospital can create procedures to reduce the probability of developing that disease, thereby substantially reducing the costs of this type of treatment). Generative artificial intelligence, on the other hand, generates information (whether text, audio, or images) based on a set of user-provided inputs. Finally, its use for content moderation serves to filter out anything that does not comply with a platform's rules (e.g. violent videos, hate speech, etc.).

[5] Although this is discussed in the following pages, it should be emphasised that the fact that humans are only produced through socialisation does not rule out the relevance of the brain in the realisation of this process. That is, for the human individual to be social, communicate with other human beings and be self-aware, they depend on the existence of a functioning brain with unique biological characteristics: tens of billions of neurons housed in a skull measuring more than 1,300 cm^3. Unlike microprocessors, nature does not miniaturise cells, neurons and other biological elements. Thus, as Gould (1977/1988) long observed, our brain had to grow significantly throughout the evolution that brought us to the current species, *homo sapiens sapiens*. This growth is inseparable from the intensification and complexity of social relations, particularly hunting and manual activities, and from a hand that has also changed (Moscovici, 1977). The work of Damásio (1994), particularly the well-known *Descartes' Error*, confirms the essential role played by the functioning human brain in the socialisation of individuals.

of these technologies. In line with Harvey's (2018) arguments about techniques, AI also involves dilemmas that give rise to political and moral confrontations, for example, around its purpose: human enhancement or, in contrast, human augmentation (Morozov, 2024)[6].

2. The Historicity of Knowledge and the Production of the Human World

To say that human beings are social beings, rather than simply interacting with other human beings and participating in a given culture, is to recognise that the way they think, communicate with others and relate to the world around them is the result of a long and complex process of socialisation that is historically situated. In the same sense, the formation of self-awareness is the result of this process of incorporating values, norms and knowledge that structure a given human culture or civilisation and are materialised in a panoply of cultural artefacts. Therefore, analysing the process of knowledge production and transmission, as well as how it is communicated in a given socio-historical context, is fundamental to understanding certain contemporary social dynamics, such as the relationship between humans and machines.

Currently, the process of knowledge production and transmission is increasingly concentrated in a small group of companies that, in intense competition, produce and own generative AI technologies and their respective infrastructures, such as OpenAI (ChatGPT), Google (Gemini), Anthropic PBC (Claude), NVidia, Amazon, among others[7]. Only time will tell how this process will develop. However, these technologies have been progressively replacing other forms of knowledge production, transmission, and control, such as encyclopaedias, technical books and articles, teachers and educational institutions at different levels, or even the media, including television and YouTube. These had already been replacing so-called "traditional" forms, such as oral tradition or guilds, which were characterised by their ability to control knowledge at a more local level and use specific techniques for recording and transmitting knowledge.

It is interesting to note that some of the leading figures in the fields that have contributed scientifically to the development of AI consider that the technology they develop or, more generally, the technologies that fall into this category, constitute a case

[6] In a debate that dates back to the 1970s, Morozov (2024) uses satellite navigation systems to elucidate the difference between improvement and augmentation. The use of these systems allows for greater precision in travelling a route but does not add any further knowledge about the territory and the life that inhabits it. In other words, "augmentation takes away our capabilities in the name of efficiency, while improvement gives us new capabilities and enriches our interactions with the world. This fundamental difference determines how we integrate technology into our lives to transform ourselves, either into passive operators or creative artisans" (Morozov, 2024, p. 35).

[7] In terms of infrastructure, the production of artificial intelligence requires enormous amounts of processing power and information storage, a huge number of processors and reliable internet connections, mostly via fibre optics linking continents across oceans, following maritime routes — objects whose history is closely linked to "European colonialism, the creation of a global capitalist market and the waging of hot and cold wars" (Cant et al., 2024, pp. 74–75; Starosielski, 2015). Currently, there are companies that specialise in one of these infrastructures.

of a sentient, rational, creative[8], intelligent, communicative[9] being, among other characteristics that we generally associate with "human" beings. If the enthusiastic reaction of a former Google engineer to the development of the LaMDA programme[10] was quickly criticised (and even mocked), what can be said about the position of one of the scientists who won the Nobel Prize in Physics in 2024, who considered that these new machines are intelligent, have experiences, make decisions and, in the future, will have self-awareness[11]? Or that of the acclaimed physicist and cognitive scientist Douglas Hofstadter, who, faced with an audience of Google engineers and confronted with evidence of what AI had already achieved (according to scientific standards): "I find it very scary, very troubling, very sad, and I find it terrible, horrifying, bizarre, baffling, bewildering, that people are rushing ahead blindly and deliriously in creating these things" (Mitchell, 2019, p. 11).

This apparent anthropomorphisation of machines (used here in a broad sense) underlying this type of discourse is, first and foremost, the result, rather ironically, of the mechanisation of humans (Dupuy, 1994/2009; Gerovitch, 2002) and, more specifically, of the understanding that the activity of thinking (and therefore of knowing) concerns a "property of a certain class of machines" (Dupuy, 1994/2009, p. 4), in which the human brain would be only one of the types — until recently, holding undisputed superiority in all domains. In other words, the theoretical paradigm that characterises the thinking of scientists, which includes disciplines such as computer science and cognitive science, and capitalists is now either a crude materialism — human beings react to external stimuli, that is, in computational language, to inputs — or idealism — human beings understand and transform the world through mental processes. Both are flawed, in a way, by a fetishistic understanding that reduces human beings to their brains and separates them from a functioning body and, more specifically, from social life and social relations; that is, they disregard the active, creative, and transformative dimensions of human activity. Furthermore, in both perspectives, the creation of knowledge is reduced to logical procedures.

More than the constitutive force of metaphors that understand human beings as complex and efficient machines, or communication as the mere transfer of information in different formats (Gerovitch, 2002), or simply a lack of consensus or concrete

[8] In the case of literary translation, there is a debate in the national publishing sector about translation using software such as ChatGPT or DeepL. Some publishers, such as BookCover, are accused of translating in this way ("Escritores, Tradutores e Editores Exigem Medidas Sobre Uso da Inteligência Artificial Pelas Editoras", 2024; Vale, 2023).

[9] See the case of Sword Health, which recently proposed to the government that its artificial intelligence technology be used to replace pre-hospital emergency care technicians at INEM (Portuguese Institute of Medical Emergency). The company's director confidently states that 'no human can tell that it is a machine talking' (Arreigoso, 2024, para. 1).

[10] This is the acronym for language model for dialogue applications, a language model that was developed to create chatbots (i.e., a computer program that attempts to simulate a human being in communication) for different applications. The engineer in question transcribed the "conversation" on his blog, considering it proof of the technology's consciousness (Lemonie, 2022).

[11] "Future Technology" (60 minutes, 2024).

definition of certain concepts[12], we are faced with a specific historical understanding of human beings and their capabilities. In this way, intelligence is understood as devoid of materiality and, therefore, only as "a property of the formal manipulation of symbols rather than enaction in the human lifeworld" (Hayles, 1999, p. xi). In other words, there is a radical break, which can be traced back to the tradition of Western thought, between a "represented body" and an "enacted body", which implies a transformation of the question "who can think" to "what can think" (Hayles, 1999, pp. xiii-xiv)[13]. It should be noted that the most recent materialisations of AI for the general public are representations of female figures, such as the robot Sofia (and we can add Google's Siri technology or Amazon's Alexa): the choice of the female figure, which conveys a seductive or appeasing idea of these technologies in contrast to representations in pop culture (e.g., *Terminator*), is solely due to a question of form (representation) and not content (the identity of the communicating subject). In the same vein, knowledge is reduced to *information* (independent of the medium) and understood as an entity with its own existence — "can circulate unchanged among different material substrates" (Hayles, 1999, p. 1; be it the brain, sheets of paper, digital infrastructures, audio, image, etc.).

At this point, it becomes easier to understand that the various discourses that have marked the history of AI up to the present day repeatedly ignore a central dimension of the human being:

> dreaming of a thinking machine which is as perfect, or even more perfect than a human, many cyberneticians proceed [in their formulations] from the notion that it is the brain that thinks. Therefore, they imagine that it is enough to build a model of the brain to get artificial thinking as well. Unfortunately, no [this is not how it happens]. Because it is not the brain that thinks, but the human with the help of the brain. (Ilyenkov et al., 2024, p. 157)

While it is true that a material basis is indispensable for human thinking, more specifically, a (physiologically) healthy brain and a set of sensory organs (Ilyenkov et al., 2024), this is not sufficient since development outside society results in the creation of "Mowglis" and "Tarzans" (Last, 2024), that is, beings who develop solely in contact with animals (non-humans). Such cases, which contributed in the 19th century to the development of important questions surrounding the specific qualities of human beings, demonstrate that the act of thinking is not "coded" in humans but is acquired through a process of generational socialisation (i.e. from older to younger people) from an early

[12] It is interesting to note the tautological explanation given in certain intellectual works. See the report produced by Stanford University in 2016: "this report views AI primarily as a branch of computer science that studies the properties of intelligence by synthesizing intelligence" (Stone et al., 2016, p. 13). A renowned author on the subject argues that artificial intelligence "is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment" (Nilsson, 2010, p. xiii). Although this latter definition tends to be more concrete, it is controversial because, as we will see later, it can be applied to any type of organism since it tends to look at things from the point of view of adaptation and survival.

[13] It is no coincidence that the Turing test, following the format of a game played in Victorian times by the aristocracy, assumes that the judge cannot see who he is interacting with.

age, in order to incorporate (or internalise) a system of social norms, values and needs[14] (Bakhurst, 1991; Ilyenkov et al., 2024). For this to happen, children need to actively engage with the different forms that make up the world of objects in their community (basically, all kinds of cultural artefacts). In other words,

> the ability to use one's brain for thinking, — as well as one's hands for labour, as well as one's tongue for speaking, — is, from beginning to end, one hundred percent, a social product. (...) [This function] is not defined by the morphological organisation of the individual's body in itself, but by the organisation of that enormously complex system which in the language of science is called "the totality of social relations between people". (Ilyenkov et al., 2024, p. 159)

One of the immediate consequences of this perspective is that the individual is not an autonomous entity that can be analysed in itself but corresponds to an "organ of the system", that is, a participating part of the social whole. This means that there is an intimate connection between the individual and the society in which they developed. The moment of union between these distinct poles (individual society) is a social activity, more specifically, the *production of objects*, from the most elementary (a spoon, for example) to the most complex (a space station or a work of art). Therefore, in their most diverse activities,

> human beings create and sustain an environment written through with significance; they nurture a world enriched with ideal properties, with value and meaning. This is the world we know. Indeed, only an idealised world can be known, for only such a world may be complemented by a subject able to reproduce it in thought and experience. (Bakhurst, 1991, p. 217)

The world we know is, therefore, a *socially mediated reality*, even when observable from a panoply of technological artefacts, such as those used in the production of scientific knowledge. This is because human beings, in a given social group, endow "the material world with a new class of properties that, though they owe their origin to us, acquire an enduring presence in objective reality, coming to exist independently of human individuals [such as laws, norms, scientific theories, values, world views, etc.]" (Bakhurst, 1991, pp. 179–180).

In this way, the production of objects can be understood according to the process of idealisation, that is, a kind of "stamp impressed on the substance of nature by the social-human life" (Ilyenkov, 2014, p. 58) that cannot be reduced to a phenomenon of consciousness, much less an ideological illusion. On the contrary, cultural artefacts acquire meaning by virtue of being "created as an embodiment of purpose and incorporated into our life activity in a certain way" (Bakhurst, 1991, p. 182) for a reason and a certain use.

[14] While it is true that biological needs have a material basis, that is, human beings cannot escape them, such as the need to eat, and the very way of responding to them depends on material conditions; this satisfaction of "natural" needs is always socially mediated through a culture (the type of food, taboos, seasoning, times, utensils used, places, etc.; Heller, 2018).

Similarly, we can analyse the production of language: words, which are not exhausted in their materialisation on paper or in lines of code in a computer language[15], are closely related to human activity, to what we do, to the form and intentions with which we transform nature according to historically locatable needs — therefore, to the way we participate in the world. For this reason, in this process, human beings turn nature into an "objectification of oneself" (Marx, 1932/1994, pp. 67–68); that is, human beings see themselves in the world they have created and acquire self-awareness (Bakhurst, 1991).

However, while the empowerment of cultural artefacts is part of the very reproduction of a given culture, that is, through their constant use in a wide variety of activities to the point that more recent generations incorporate certain worldviews more "naturally" (for example, the history of a people, categories such as space and time, ways of communicating an idea and, consequently, of interacting), this process develops in a particularly perverse way in capitalism. Due to the fact that the distribution of resources is governed by the logic of private ownership of the means of production, the creation of cultural artefacts of all kinds is based on the ignorance of individuals and, therefore, on their alienation. Our daily contact with new technologies occurs "magically" in a mediated form in the market (on the shelves of shopping centres or online stores). In the same sense, knowledge of human civilisation seems to be just a click away. No less important, we ultimately participate in the development of new technologies such as AI without realising it, in an unconscious gesture of "giving"[16]: when we search the internet, when we ask for knowledge to perform a given task (e.g. to write an essay or an article) when we publish a photograph and catalogue it (e.g., #family, #car) or even when we click on pictures of bicycles or cats to enter a website (and thus "prove" that we are not robots to Google's reCAPTCHA; Crawford, 2021).

3. Cataloguing and Archiving Knowledge: The Objectification of the World in the Production of Artificial Intelligence

Until the 1970s, researchers attempted to create machines that simulated some human capacity (more specifically, and not by chance, a specific job or task) based on a program of rules that aimed to "reduce the field of possible actions by articulating forms of logical reasoning" (Crawford, 2021, p. 99), such as certain linguistic principles, they later realised that such conceptualisation was unsuccessful in the real world, where events are characterised by enormous uncertainty and complexity. In fact, communication in different contexts involves various registers (some written, others face-to-face, etc.), different sentence structures, vocabulary, tone, accent, facial expressions, and idioms, among other elements that comprise communicative interaction between humans. Furthermore, much everyday communication does not follow standardised grammatical

[15] It is the production of code on interfaces such as a computer screen that creates the illusion that they are magically products of the capabilities of the programmer's brain and the capabilities of the machine or, because they are produced in a "virtual" space, that they are autonomous from society and therefore pure and objective.

[16] Although understood by some Marxists as unpaid online work (Fuchs, 2014), it is analytically more advantageous to think of this type of activity as a gift: an "accessible, abundant, and cheap raw material" (Best, 2024, pp. 41–42).

rules. Another point, no less relevant, is that human beings incorporate these (more or less formal) rules unconsciously; it is precisely when they are in an unfamiliar context that they are most aware of these social rules.

In view of this, in the mid-1980s, research centres in universities and companies began to focus on a probabilistic perspective: in the case of text production, what is the most likely word to appear, taking into account the previous words that form a given sentence[17]. In other words, machine learning does not aim to calculate "not an exact pattern but the statistical distribution of a pattern" (Pasquinelli, 2019, p. 4). For this reason, we can understand these systems as "a device that maps and perceives complex patterns through vast spaces of data" (p. 5) by drawing "a function that approximately describes their tendency" (p. 11) through a process of interpolation (projection and prediction of an output that is within the range of input values) or extrapolation (projection and prediction of an output that is beyond the range of input values, which increases the inaccuracy of the results)[18].

This probabilistic perspective, which has come to dominate the contemporary development of generative AI, has as one of its main material dimensions a database of words, images or sounds. For this reason, however good the results may be, these systems are necessarily limited to the fragmented world constructed in the production process (by scientists and others; Pasquinelli, 2019). The ability to be applied in real contexts, such as the creation of chatbots, depends on the quality of the database, ultimately, its size and diversity, in order to be able to adapt to the most diverse social contexts and interact in the least mechanised way possible (or at least appear to do so).

The archiving of knowledge is not a new concept. Greco-Roman cultures confronted the "need to select information from a huge corpus and developed various means to store (...) with a view to subsequent retrieval" (Taub, 2017, p. 113) in areas of knowledge as diverse as physics, astronomy, mathematics and medicine. Not less interestingly, the techniques used in these cultures made it possible for "the same information (including data and ideas)" to be "reconfigured and transformed (...), contributing to the creation of a new expression of the material previously held in the archiving text" (Taub, 2017, p. 114)[19]. In modern times, the first cases of big science emerged, in which the development of knowledge and technology is based on large projects usually funded by one or more governments, partly due to the high costs involved, which requires large-scale cooperation and the hierarchisation of scientists from different institutions with different areas of expertise (Galison, 1992). As is evident in projects such as *Carte*

[17] For a technical and visual explanation, see the YouTube page 3Blue1Brown (https://www.youtube.com/@3blue1brown).

[18] Giving expression to what can be called "logical rules of generative artificial intelligence", interpolation operates in "safe territories", that is, within known data ranges. At the same time, extrapolation depends on hypotheses and assumptions that are outside these ranges. Both are essential elements, but interpolation is generally more accurate because it operates within the field of already validated input values. In contrast, although extrapolation is necessary, it is inherently uncertain because it projects results outside the field of validated values.

[19] It is interesting to note that the cybernetic understanding, which continues to guide the current development of artificial intelligence, is precisely the opposite: knowledge is reduced to data (independent of the medium), understood as something that "can circulate unchanged among different material substrates" (Hayles, 1999, p. 1), whether in the brain, on paper, within digital infrastructures, or through audio and images, among others.

du Ciel (mapping the Sky) and *Corpus Inscriptionum Latinarum* (collection of epigraphs in Latin), although they involve significant amounts of labour, money and time, their purpose was not to produce new knowledge about human beings or nature, but rather to create an archive on which future knowledge could be built, hence the need to bring together different areas of expertise, from the natural sciences to the humanities (Daston, 2017). However, these projects do have points in common with their contemporaries, funded by military or financial agencies, in that there is a fruitful relationship between knowledge production and geopolitical competition:

> both were backed by massive state funding (...). Both were international collaborations; both pioneered new methods, standards, and forms of labour organisation (paid and voluntary); both required a high degree of standardisation and therefore of consensus on matters of technical selection, format, and schedule; both took decades to finish if they were ever finished at all. Both were conducted within a context of international competition and cooperation (often two sides of the same coin) framed by global imperial ambitions that loosened state purse strings and enlisted the sciences in new forms of cultural rivalry (...). The pathos of progress and positivism saturated their manifestos. (Daston, 2017, p. 162)

As is clear, these projects concern a concrete part of social reality (often in the past). Until the emergence of the internet and social networks, it was very difficult to build a database rich in information and knowledge that was not limited to a single country, culture, or field of expertise. It is no coincidence that already in the 20th century, various research groups made choices that seem strange today in the development of AI. For example, the IBM group, comprising computer scientists and linguists in the 1980s, created a database using "technical manuals, children's novels, patents of laser technology, books for the blind, and even the typed correspondence of IBM fellow" (Crawford, 2021, p. 101). The same group later created its database using transcribed testimony from a lawsuit brought against the company by the United States federal Government, enabling it to obtain a set of 100 million words.

This historic leap can be attributed to the initiative, not of a company but of a renowned university, underscoring the importance of these institutions in the production of science and their connection to companies. At the end of the first decade of this century, Fei-Fei Li, professor of Princeton University, created the ImageNet database (https://www.image-net.org/)[20], comprising more than 14 million images sourced from the Google search engine and organised into 20,000 categories. This project, which continues to serve as a database for the development of digital object recognition software, represents the modern iteration of a long-standing dream: "we're [Fei-Fei Li and team] going to map out the entire world of objects" (Gershgorn, 2017, para. 5).

[20] Other widely used databases are MNIST (handwritten numbers), Common Crawl (text) and Labelled Faces in the Wild (people's faces). Common Crawl alone incorporates 200 to 300 terabytes of text content from Google every month.

The globalisation of the internet came to be seen by AI research groups as an easily exploited natural resource, especially by those who owned search or social media platforms, as a way to "train" their models (Crawford, 2021). Faced with this new reality, there was no longer the need

> to stage photo shoots using multiple lighting conditions, controlled parameters, and devices to position the face. Now there were millions of selfies in every possible lighting condition, position, and depth of field. People began to share their baby photos, family snaps, and images of how they looked a decade ago, an ideal resource for tracking genetic similarity and face ageing. Trillions of lines of text, containing both formal and informal forms of speech, were published every day. (Crawford, 2021, p. 106)

That said, a database is only useful if it is properly catalogued (e.g., under categories such as "white man", "Persian cat", "dashed line", etc.). Otherwise, the programme will never be able to interact with a user when they ask for "a photo of people drinking coffee from orange mugs". In fact, this task accounts for 80% of the time spent "training" AI (Cant et al., 2024). To do this, as Fei-Fei Li quickly realised, a huge workforce is needed. In her case, as it was very expensive and time-consuming to pay elite university students, they decided to use the Amazon Mechanical Turk platform, as this allowed them to access the global market, where the workforce exists in large quantities, at low cost, without social rights and always available to perform this type of work, in addition to not having to explain the ultimate goal to the alienated workers (with whom she does not contact directly; Crawford, 2021).

Finally, the cataloguing process relies on a set of categories that workers must use in their tasks, and this definition is anything but neutral. In the case of ImageNet, the categories follow the logic of another lexical database for English, WordNet[21]. Created in 1985 by a Princeton research centre and funded over time by State organisations such as the US Office of Naval Research, the Defense Advanced Research Projects Agency and the Natural Science Foundations, it constructs categories according to semantic relationships between words (e.g. synonymy, hypernymy or hyponymy), reducing the categories to "verbs", "nouns", "adjectives" and "adverbs". This type of knowledge hierarchy tends to be presented as neutral, rigorous and scientific. However, several institutions, such as universities, companies and military agencies, build databases to train their models based on "conservative and outdated taxonomies" that reproduce "a distorted view of world cultures and diversities. These taxonomies often reflect social hierarchies and are an expression of normative power" (Pasquinelli, 2019, p. 9).

Although generative AI projects are presented as fundamental efforts in the production of knowledge about the world, as a large library easily accessible to users around the world, their economic nature is revealed through algorithmic logic: models are designed

[21] This database consists of more than 155,000 distinct words in English.

to "achieve a result in the shortest number of steps consuming the least amount of resources, such space, time, energy, etc." (Pasquinelli, 2019, p. 12). For this reason, categories with similar statistical probabilities tend to be grouped, which necessarily means a loss of knowledge. At the same time, there may also be an elimination of categories that appear infrequently (that have little "statistical relevance"), which, according to Pasquinelli (2019), leads to an "equalisation of anomalies [that is, what is distinct] to an average norm" (p. 13). Faced with this "rational", economical way of understanding the world, our repertoire of words diminishes. Our way of thinking and communicating ends up reduced to an average, to an uncreative sameness, where the strange, the new, the "deviant", the "potential lines of flight" (Comité Invisível, 2014/2024, p. 236) are eliminated if these companies cannot control them. This thinking updates the idea of the population as a political body that must be known and controlled by the modern State:

> at the start of the seventeenth century, (...) the sovereign's necessary knowledge (*savoir*) will be a knowledge (*connaissance*) of things rather than knowledge of the law, and this knowledge of the things that comprise the very reality of the state is precisely what at the time was called "statistics". Etymologically, statistics is knowledge of the state, of the forces and resources that characterise a state at a given moment. (Foucault, 1978/2009, p. 274)

In a world where knowledge is understood from a probabilistic perspective and reduced to interchangeable tokens[22], it is worth questioning whether human communication has not undergone progressive changes as it has become increasingly mediated by machines. The exchange of messages is an example of the logic of capital: we write based on the fastest logic of sending information (reducing words and punctuation, accepting the recommendations of the "auto-correct" tool, replacing emotions with emojis, etc.) and, more or less recurrently, through the "auto-correct" tool that tries to predict the most likely word to be used. In the same vein, a "good" Google search cannot involve a sentence that we would use to communicate with a librarian or bookseller but must be reduced to keywords[23]. When it comes to interaction with chatbots, many forms of communication are excluded because they are not included in a database. In this way, the number of words and the way we communicate are reduced to a standard, and, just as importantly, culture increasingly equates to what is available on the internet or in a database. At the same time, the attempt to automate knowledge production means that culture is increasingly understood in a linear manner, with no room for contradictions and divergences. In the

[22] In generative artificial intelligence, a word, a point in an image, or a sound is referred to as a token. This abstract unit allows information to be compared and the relationship between, for example, two words to be understood or the probability of the next word to be calculated. In this process, communication and knowledge are reified because each part (word, pixel, etc.) is understood in isolation from the whole.

[23] Furthermore, the links that appear follow the logic of Google's search engine algorithm (PageRank), created in 1998, in which the relevance of a page is the result of the number and quality (i.e., the number of links that the page has already accumulated) of the links it has from other pages. In other words, this form of presenting archived knowledge follows the structure of knowledge production in contemporary academia, where the number of citations (quantity) determines the importance (quality) of a scientific article (Brin & Page, 1998).

case of images, these are "remarkably slippery things, laden with multiple potential meanings, irresolvable questions, and contradictions" (Crawford & Paglen, 2019, p. 1107).

4. Final Considerations

AI is a long way from fulfilling the fetishistic dreams of technophiles, who are excited by the invention of "machines" with creative and communicative abilities endowed with consciousness and intelligence as humans understand it. As argued throughout this paper, AI is based on a long history of accumulating and organising knowledge in archives, with data centres now serving as a fundamental resource. In line with the arguments of Pasquinelli (2019), among others, we have sought to demonstrate that AI has a human "head" and "fingers". In other words, it does not yet seem safe to admit that AI, in its various forms and "physical" supports, has the autonomous capacity to produce new knowledge and communicate from a position that reveals self-awareness. By this, we emphasise that AI remains, like all other innovations in the field of computing and digital technology. This human creation exists thanks to the work of many individuals. These are scientists, engineers, technicians from a wide range of fields, as well as workers who provide the data that AI works with. Given their fundamental role in the field of AI, their work, whether as data labellers or content moderators, is far from neutral from a social and political perspective. This lack of neutrality is particularly evident when this work involves data trainers. Casting a chill on the enthusiasm of technophiles, we are faced with a technology that is developing thanks to the work of human beings. However, this is not happening through a collective and active consciousness, but rather, as has been the case with many other technologies in the past, controlled by private interests and their concomitant moral values.

In other words, as has been argued, we are faced with a relationship between human beings in which a majority is increasingly influenced in their most diverse activities without being sufficiently aware of this by what is communicated by the different instances of mediation in which AI expresses itself. Therefore, ignorance of the social processes underlying the production of knowledge associated with the functioning of AI implies a loss of agency in social action: "we have become 'spectators' of our own lives: mere observers of a historical existence that we could potentially consciously shape and direct" (Bunyard, 2018, p. 4).

For this reason, contemporary capitalist society is based on the attempt to make the total production of knowledge, on the one hand, the sum of each individual's activity at all times and in all spheres of their life and, on the other hand, the reduction of this production to the same standardising measure and uniform culture. This ideal does not align with reality. If "intelligence is not a 'natural' gift (...) [but] a gift from society to a person" (Ilyenkov, 2007, p. 12), then the algorithmisation of the socialisation process of human beings means a reduction of that same intelligence to a state in which, despite

the increase in the circulation of information — every day, terabytes of data are produced —, knowledge about reality does not necessarily increase. Human beings often lack the critical capacity to think and participate in collective transformation.

By distancing ourselves from the more optimistic readings about the imminent viability of AI development in terms of acquiring characteristics that are currently specific to humans, such as self-awareness and intelligence in a dimension that does not exist in any other living species, does this mean that we are completely dismissing it? If we take the advances in the field of technoscience and life sciences as a reference, we must be cautious. If we think outside the framework where intelligence has existed until now — a brain housed in a body that socialises — we will have to admit other possible futures. For example, this concept was suggested by Stanley Kubrick in *2001: A Space Odyssey*, a film inspired by the novel *The Sentinel* by the master of science fiction, Arthur C. Clarke. Made in 1968, the Hal 9000 computer (Heuristically Programmed Algorithmic Computer) can be understood as the archetype of artificial intelligence as it is currently conceived. As already pointed out in 2022, we are dealing with an intelligent system that controls artefacts and other electromechanical devices without the capacity for autonomous functioning, that is, bodies without intelligence (Ribeiro, 2022). While the most sceptical will say that we are still in the realm of science fiction, we cannot rule out the possibility that the future may bring non-human intelligent life. We can even imagine the very suppression of the matter that makes the body intelligent, namely the replacement of neurons by silicon and various rare metals. Despite the uncertainties, the possibility of a radically different future looms on the horizon, with other forms of intelligence, without this necessarily leading to the disappearance of knowledge and communication — specifically human capacities.

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References

AI Now Institute. (2023, April 11). *ChatGPT and more: Large scale AI models entrench big tech power*. https://ainowinstitute.org/publications/large-scale-ai-models

Altenried, M. (2022). *The digital factory. The human labor of automation*. The University of Chicago Press.

Arboleda, M. (2020). *Planetary mine: Territories of extraction under late capitalism*. Verso Books.

Arreigoso, V. L. (2024, November 21). Empresa oferece ao Governo solução de inteligência artificial para retirar técnicos do atendimento de emergência. *Expresso*. https://expresso.pt/sociedade/2024-11-21-empresa-oferece-ao-governo-solucao-de-inteligencia-artificial-para-retirar-tecnicos-do-atendimento-de-emergencia-126fbfe9

Azeri, S. (2024). On the nature of thought: Centennial of Evald Ilyenkov. *Marxism & Sciences*, *3(1)*, iii–xxiv. https://doi.org/10.56063/MS.2403.03100

Bakhurst, D. (1991). *Consciousness and revolution in Soviet philosophy*. Cambridge University Press. https://doi.org/10.1017/CBO9780511608940

Benjamin, R. (2019). *Race after technology: Abolitionist tools for the new Jim Code*. Polity.

Best, B. (2024). *The automatic fetish: The law of value in Marx's* Capital. Verso.

Brin, S., & Page, L. (1998). The anatomy of a large-scale hypertextual web search engine. *Computer Networks and ISDN Systems*, *30*(1–7), 107–117. https://doi.org/10.1016/S0169-7552(98)00110-X

Bunyard, T. (2018). *Debord, time and spectacle*. Brill. https://doi.org/10.1163/9789004356023

Cant, C., Muldoon, J., & Graham, M. (2024). *Feeding the machine. The hidden human labor powering A.I.* Bloomsbury Publishing.

Comité Invisível. (2024). *A insurreição que vem, aos nossos amigos, agora* (Edições Antipáticas, Trans.). Tigre de Papel. (Original work published 2014)

Crawford, K. (2021). *Atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press.

Crawford, K., & Paglen, T. (2019). Excavating AI: The politics of images in machine learning training sets. *AI & Society*, *36*, 1105–1116. https://doi.org/10.1007/s00146-021-01162-8

Damásio, A. (1994). *O erro de Descartes*. Publicações Europa-América.

Daston, L. (2017). The immortal archive: Nineteenth-century science imagines the future. In L. Daston (Ed.), *Science in the archives: Pasts, presents, futures* (pp. 159–182). The University of Chicago Press.

Dupuy, J.-P. (2009). *On the origins of cognitive science. The mechanization of the mind* (M. B. DeBevoise, Trans.). The MIT Press. (Original work published 1994)

Escritores, tradutores e editores exigem medidas sobre uso da inteligência artificial pelas editoras. (2024, April 5). *Jornal de Notícias*. https://www.jn.pt/4434486895/escritores-tradutores-e-editores-exigem-medidas-sobre-uso-da-inteligencia-artificial-pelas-editoras/

Foucault, M. (2009). *Security, territory, population: Lectures at the Collège de France, 1977-78*. Palgrave Macmillan. (Original work published 1978)

Fuchs, C. (2014). *Digital albour and Karl Marx*. Routledge.

Galison, P. (1992). The many faces of big science. In P. Galison & B. W. Hevly (Eds.), *Big science: The growth of large-scale research* (pp. 1–17). Stanford University Press.

Gerovitch, S. (2002). *From newspeak to cyberspeak: A history of soviet cybernetics*. The MIT Press.

Gershgorn, D. (2017, July 26). The data that transformed AI research—And possibly the world. *Quartz*. https://qz.com/1034972/the-data-that-changed-the-direction-of-ai-research-and-possibly-the-world

Gould, S. J. (1988). *O mundo depois de Darwin* (P. Vitória, Trans.). Presença. (Original work published 1977)

Gray, M. L., & Suri, S. (2019). *Ghost work: How to stop Silicon Valley from building a new global underclass*. Harper Business.

Habermas, J. (2012). *Teoria do agir comunicativo: Racionalidade da ação e racionalização social* (P. A. Soethe, Trans.). Martins Fontes. (Original work published 1981)

Harvey, D. (2018). *The limits to capital*. Verso.

Hayles, N. K. (1999). *How we become posthuman. Virtual bodies in cybernetics, literature and informatics*. The University of Chicago Press.

Heller, A. (2018). *The theory of need in Marx*. Verso.

Ilyenkov, E. (2007). Our schools must teach how to think! *Journal of Russian & East European Psychology*, *45*(4), 9–49. https://doi.org/10.2753/RPO1061-0405450402

Ilyenkov, E. (2014). Dialectics of the ideal. In A. Levant & V. Oittinen (Eds.), *Dialectics of the ideal* (pp. 25–78). Brill. https://doi.org/10.1163/9789004246928_003

Ilyenkov, E., Arsen'ev, A., & Davydov, V. (2024). Machine and human, cybernetics and philosophy (I. Maksymets, Trans.). *Marxism & Sciences*, *3(2)*, 155–174. https://doi.org/10.56063/MS.2408.03209

Kang, M. (2011). *Sublime dreams of living machines: The automaton in the European imagination*. Harvard University Press.

Last, J. (2024, January 17). What feral children can teach us about AI. *NOEMA*. https://www.noemamag.com/feral-intelligence/

Lemonie, B. (2022, June 11). Is LaMDA Sentient?—An Interview. *Medium*. https://cajundiscordian.medium.com/is-lamda-sentient-an-interview-ea64d916d917

Li, P., Yang, J., Islam, M. A., & Ren, S. (2023). Making AI less "thirsty": Uncovering and addressing the secret water footprint of AI models. *arXiv*. https://doi.org/10.48550/arXiv.2304.03271

Martins, H. (2011). *Experimentum humanum – Civilização tecnológica e condição Humana*. Relógio D'Água.

Marx, K. (1994). *Manuscritos económico-filosóficos de 1844* (M. A. Pacheco, Trans.). Edições Avante. (Original work published 1932)

Marx, K. (2010). Speech at anniversary of *The People's Paper*. In *Marx & Engels: Selected works* (Vol. 14; pp. 655–656). Lawrence & Wishart. (Original work published 1856)

Marx, K. (2024). *Capital: Critique of political economy* (Vol. 1; P. Reitter, Trans.). Princeton University Press. (Original work published 1867)

Mitchell, M. (2019). *Artificial intelligence: A guide for thinking humans*. Farrar, Straus and Giroux.

Morozov, E. (2024, August). Uma outra inteligência artificial é possível. *Le Monde Diplomatique*, *214*, 34–37. https://pt.mondediplo.com/2024/08/uma-outra-inteligencia-artificial-e-possivel.html

Moscovici, S. (1977). *A sociedade contranatura* (F. Sequeira & J. D. Gil Nave, Trans.). Bertrand.

Narayanan, A., & Kapoor, S. (2024). *AI snake oil: What artificial intelligence can do, what it can't, and how to tell the difference*. Princeton University Press.

Nilsson, N. J. (2010). *The quest for artificial intelligence: A history of ideas and achievements*. Cambridge University Press.

Pasquinelli, M. (2019). How a machine learns and fails: A grammar of error for artificial intelligence. *Spheres*, *5*, 1–17.

Pitron, G. (2021, October 1). Quando a tecnologia digital destrói o planeta. *Le Monde Diplomatique*, *171*, 20–22. https://diplomatique.org.br/quando-a-tecnologia-digital-destroi-o-planeta/

Ribeiro, F. B. (2022). Sem corpo (ou o futuro pós-humano). *Supernova*, (1), 26–29.

Schaffer, S. (1994). Babbage's intelligence: Calculating engines and the factory system. *Critical Inquiry*, *21*(1), 203–227.

60 minutes. (2024, May 26). *Future technology* [Video]. YouTube. https://www.youtube.com/watch?v=wrJsExM8D-o&t=1824s

Starosielski, N. (2015). *The undersea network*. Duke University Press.

Stone, P., Brooks, R., & Calo, R. (2016). *Artificial intelligence and life in 2030*. https://ai100.stanford.edu/sites/g/files/sbiybj18871/files/media/file/ai100report10032016fnl_singles.pdf

Taub, L. (2017). Archiving scientific ideas in Greco-Roman antiquity. In L. Daston (Ed.), *Science in the archives: Pasts, presents, futures* (pp. 113–136). The University of Chicago Press.

Vale, F. (2023, June 19). *Traduções por inteligência artificial (IA) chegam a Portugal sem se fazer anunciar*. Comunidade Cultura e Arte. https://comunidadeculturaearte.com/traducoes-por-inteligencia-artificial-ia-chegam-a-portugal-sem-se-fazer-anunciar/

Zuboff, S. (2020). *A era do capitalismo da vigilância* (L. F. Silva & M. S. Pereira, Trans.). Relógio D'Água. (Original work published 2018)

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