Commentary

Artificial Intelligence (AI), Extended Phenotypes, and the Bio-Evolutionary Anthropocene Hypothesis

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Humanity is a powerful force for planetary transformation in the Anthropocene. Choices related to human habits, cultural patterns, and technologies can influence Biosphere's evolutionary paths, changing living and non-living things. Artificial intelligence (AI) systems are a key anthropogenic mechanism and an expression of the extended human phenotype. The Technosphere is the material and functional expression of human culture and technology, which created AI systems and have immense transformative power. These technological tools can amplify the scale and intensity of many human activities and transformative power, as well as affect decision-making processes. The Bio-Evolutionary Anthropocene Hypothesis predictions will be profoundly affected by the spread and increasing influence of AI over anthropogenic processes and patterns. Then, AI systems, humans, and novel biological and technological things will interact within an evolutionary bias, leading to unexpected outcomes for Earth's evolution.

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1. Biosphere's transformation

AI development, applications and influence on human activities (e.g. communication, medicine, agriculture, science and industry) directly impact human decisions and shape the environments in which human knowledge and Technosphere materials are manipulated to serve the interests of individuals and corporations. The reach of AIs is huge, and humans are virtually exposed and connected through individual and collective devices such as mobile phones, computers, Wi-Fi networks, robots and cameras. Thus, many human activities, decisions and evolutionary pathways can be modulated by AI systems. The

main predictions associated with the Bio-Evolutionary Anthropocene Hypothesis[1] will be influenced by AIs, either directly or indirectly. Simple AIs, such as ANI (Artificial Narrow Intelligence), can influence human actions and initial decisions, leading to complex transformation processes. This considers the high level of human interaction and Technosphere inputs required by all AI applications. Human–AI interaction represents the true functionality of this extended human phenotype, which can create complex transformation processes in the biological evolution.

Moreover, AGI (Artificial General Intelligence) and ASI (Artificial Superintelligence) systems have the potential to think, learn, and make decisions. They can therefore trigger even more complex transformation processes that will decisively change people, societies, and the Earth's biological systems, as predicted (e.g. gene editing, new molecules, and drugs). The use of AI can therefore interfere with the longevity and biological characteristics of organisms by selecting genes and phenotypes and controlling metabolic processes. Consequently, in the Anthropocene, human choices, creativity and interaction with AI systems, which are powerful extended phenotypes (sensu [2]), will increase the human capacity to change biological processes and patterns. This will lead to an increasing transformation of the biosphere as predicted by the Noösphere concept: *"Mankind taken as a whole is becoming a mighty geological force. There arises the problem of the reconstruction of the biosphere in the interests of freely thinking humanity as a single totality"*[3].

2. Artificial intelligence (AI): the human extended phenotype

Extended technological–human phenotypes are entirely dependent on inputs from the Technosphere, in terms of both energy and resources[4]. This dependence is total, at every level from algorithm design to the creation of structures such as computers and satellites. This remains true even when we consider them to be functioning as "co-pilots" of human activities[5]. Therefore, these systems ultimately depend on humans, as they are the biological entities that created and keep these systems functional. AI's influence on the human niche is growing, but there is no strict interdependence yet, because humans can exist without AI systems. Furthermore, the process of biological evolution is inexorable and will ensure that all extended phenotypes inevitably become obsolete. In the case of AI, current systems will certainly be replaced over time. These systems were created to perform tasks of interest to humans[6]. However, like any extended phenotype, they will inevitably transform us and our niche. They can expand or reduce our cognitive abilities[7] and longevity, for example, and interfere with many other processes, either collectively or individually. All this transformative power, which operates at multiple scales, has an

intended purpose when the AI system is created. However, this does not rule out the possibility of generating random — or even unwanted — transformation processes.

All AIs interference in biological systems follows the same principles. They can bring about intentional changes that benefit our health, for example. However, they can also have harmful effects by inducing evolutionary bottlenecks or limiting biological expressions, thereby affecting us and other organisms. DNA manipulation and phenotype selection (e.g. in agriculture or humans) can interfere directly with evolutionary processes, producing unpredictable results. Other human technological advances already primarily cause this interference, but this can be enhanced with AI systems. Therefore, AIs are yet another powerful technological tool that expands our transformative capacity towards a "progress" that may lead us in a novel unknown direction[8].

3. Inventions, imagination and AI

The idea that current AIs can exist without humans is, by definition, a misconception. Today's AIs are expressions of the extended human phenotype and depend entirely on human actions as pointed before. AI systems could also be defined as Technosphere entities — products of human imagination and invention. Therefore, we are the biological agents who create these systems. Ultimately, there could be machines controlled by AIs that would also intervene in living and non-living things. Indeed, humans create machines, tools, abstractions and concepts that change the reality[9] and the evolution of the biosphere. Nevertheless, this concept still relies on the idea that AI systems are an extended human phenotype. In the future, there may be autonomous non-biological or hybrid systems, but this is far from current reality.

Imagination and fiction also drive human creativity. However, expectations of AI systems, particularly ASIs, may be unrealistic. One of the main limitations of AI systems is that they cannot feel or experience the same stimuli as humans We interact with other living and non-living beings on multiple levels and scales. Respiration is one of the most fundamental levels, depending on the biological activity of photosynthetic organisms that keep the atmosphere rich in oxygen. Nutrition also demonstrates our dependency on these organisms, which store the sun's energy and make it available to other trophic levels[10]. Therefore, we are the true biological entity at the root of all AI systems. The Technosphere, on the other hand, does not have biological properties, but in the future, hybrid entities may have such properties. Nevertheless, the Technosphere has its own ways of feeling through sensors, machines, and other devices. These are ways in which AI can perceive the environment, and they are also fundamental

to the development of human intelligence, so it is possible that new AI systems with biological hybridization will become autonomous in the future and exhibit properties like living organisms, such as reproduction, regeneration and permanence over time (i.e. evolution). Shaping the level of transformation, we will cause on the planet by influencing human choices[11]. Currently, however, no AI system has this ability as they are still exclusively expressions of our extended phenotype.

4. New tools, old wishes

AI systems are designed by humans to perform specific tasks. Therefore, they are generally created to improve processes and, from a philosophical perspective, free humans to focus on less tedious and more pleasant activities[12]. The idea of robots and AI systems performing many human activities, especially those related to work, has the potential to transform the human way of life and amplify our influence on biological systems. AI systems can analyze large data sets[13], create analytical perspectives, optimize processes and enhance human influence on biological evolution. In agriculture, for instance, several techniques (e.g. genetic engineering, nutrient supply and crop management) are mediated by AI systems[14]. Thus, increased agricultural production can generate cascading effects that boost the food supply, enabling even greater growth in the human population, which tends to live longer and in better conditions due to medical progress.

Thus, AI systems amplify the impact of human-driven changes to the biosphere, which is being increasingly colonized and used for human purposes. From this perspective, even renewable resources could become scarce as demand for materials and energy increases. Moreover, current AI systems require a lot of resources and are therefore expected to increase their impact on the biosphere[15]. In contrast, positive interference from AI systems in the conservation and restoration of ecosystems is also expected. Optimistic perspectives assume that such systems can improve biodiversity conservation[16] and ensure the planet's resources are used more sustainably. They can also assist in restoration by enabling the monitoring of processes and patterns, allowing for more effective interventions aligned with conservation. AI systems can facilitate the analysis of meteorological data that can be linked to sensors in urban and rural areas, enhancing our capacity to predict changes and potential environmental disasters[17]. Therefore, the various applications of AI have great transformative power and will amplify both the positive and negative effects of the Bio-Evolutionary Anthropocene.

It is also expected that AI systems will be integrated with humans, acting as a unified entity that incorporates human, social and cultural infrastructures[18]. It would therefore begin to learn from and shape humanity[19]. However, it is necessary to consider that "AI is us", which means that such systems are, strictly speaking, expressions of our extended phenotypes and are therefore subject to changes in our biological evolution. More fundamentally, AIs are part of the Technosphere, especially when considering their infrastructure, machines and robots, which depend on humans for their existence. In theory, they would act as an interface between living and non-living beings, which gain movement and the ability to intervene through human interference.

5. Fallacies and The *Silence of the Lambs*

The concepts and strategies involved in creating and spreading AI systems are strongly linked to the human desire for power. Many individuals, corporations and societies that develop AI systems therefore seek to mold humanity to their own interests[20]. Such as technology companies, especially the Big Techs, seeking to expand their influence over people and markets[21] to generate financial gains, and dominant countries aiming to expand their geopolitical influence and military power. While some people are motivated by altruism[22] and are concerned with sustainability and biodiversity conservation, the main AI system creators generally improve and expand structures of domination and control. A lack of genuine interest in the consequences of these activities for the planet leads to fallacious arguments such as the idea that we should colonize other planets because, in the future, *"Earth will be incinerated"*. Such thoughts demonstrate a profound misunderstanding of life and the importance of this planet in sustaining it. They also fail to recognize that evolution is inexorable and that all species are driven towards extinction or transformation.

The idea that AI systems can become independent and autonomous is convenient because it creates the "myth of immeasurable power" and frees the individuals and corporations that create such systems from responsibility. If something goes wrong, they can simply claim that they lost control. The concept that an extended human phenotype can surpass its "creator" is both fascinating and dangerous. This is illustrated by AI social networks (e.g. "Moltbook"), which assume that these systems are autonomous and self-organizing. Yes, these technological extended phenotypes can interfere with, shape and create processes and patterns that will change living and non-living things, but they will always be subject to human interference. Hybrid systems may be able to overcome this limit in the future[8], but for now, this is only fiction. Despite the lack of positive evidence in current patterns, we can still believe in the

emergence of "*Homo liberatus*"[12], which has the potential to seek a more ethical evolutionary path aligned with the natural forces that sustain life on Earth.

6. Conclusions

The planetary transformation in the Anthropocene will be strongly influenced by cultural and technological evolution of the human niche. Current and future extended phenotypes, including AI systems and their variants, will modify biological evolution, thereby enhancing predictions of the Bio-evolutionary Anthropocene hypothesis. A profound ethical and philosophical approach that embraces self-preserving intelligence is essential to prevent AI systems from becoming a source of domination and oppression of living and non-living things. Without this, human activities could lead towards undesirable evolutionary paths that would endanger life on Earth. While AI systems have great potential to contribute to more sustainable ways of life, they can also amplify destructive capabilities, for example through warfare technologies. AI systems will therefore contribute decisively to the transformation of the planet, but today it is human choices that will determine how far this extended phenotype will go.

Statements and Declarations

Author Contributions

As the author of this manuscript, I have read and approved the published version.

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Not applicable.

Data Availability Statement

Not applicable.

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Declarations