COMMENTARY

Possibilism in Technology: A Spanish-Speaking Response to Technological Determinism

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Abstract

This manuscript introduces “possibilism” as an alternative framework to technological determinism, drawing from the works of Spanish-speaking philosophers of technology. Unlike deterministic views, which see technology as an autonomous force shaping society with inevitable outcomes, possibilism conceptualizes technology as a collective, intentional practice that opens up new possibilities for human action and societal development. The study critiques both optimistic and pessimistic forms of technological determinism, emphasizing the role of human agency in shaping technological trajectories. By exploring the intersection of physical, imagined, pragmatic, and legitimate possibilities, this article argues that technology is not merely a tool driven by external forces but a dynamic process that actively transforms human realities. The manuscript situates this discussion within the broader context of Spanish-speaking philosophical traditions, particularly the works of Fernando Broncano, and highlights the significance of this perspective for contemporary debates on technology and society.

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In this article, we propose a term inspired by various reflections of Spanish-speaking philosophers of technology, which, in general terms, considers technology as a practice that brings together an intersection of pragmatic conditions to change the real conditions of possibility for a human group, with its consequences open to possible futures, rather than an inevitable destiny driven by a single purpose in history. Therefore, "possibilism" serves as a counterbalance to

"determinism," a common label in philosophical studies of technology. "Possibilism" views the philosophy of technology as a branch of the philosophy of action (not of the philosophy of science), because technology is a special kind of action with a complex intentional structure, carried out by a collective and heterogeneous subject, resulting in entities (artifacts) that also have heterogeneous levels of ontological realization (Broncano, 2006) (Monterroza Rios, 2018). Therefore, we will first describe the general ideas associated with technological determinism, including both its pessimistic and optimistic versions. After this characterization, we will present what we consider a possibilist conception of technology.

Technological determinism holds that technological development is the primary driver of social, economic, and cultural change in a society (Mumford, 1934) (Ellul, 1954). According to this perspective, the development of new technologies and their applications in various areas of life largely determines the evolution of human societies, influencing aspects such as the economy, politics, social relations, and culture (Marx, 1867). This way of conceiving technology implies that its dynamics are autonomous, as its development follows an internal logic, leading society to adapt to it (Ellul, 1954). Under this idea, technological change is inevitable because it follows its own goals and values (typically efficiency and effectiveness) independent of most social dynamics. There are both optimistic (Kurzweil, 2005) (Kelly, 2016) (Toffler, 1970) and pessimistic (Mumford, 1934) (Ellul, 1954) forms of technological determinism. The optimists, often called "futurists," frequently view technology as a solution to social and economic problems. They argue that technological innovation can improve the quality of life and solve issues such as poverty, disease, and inequality, which are, of course, desirable; but they forget that the history of technology shows us that every problem solved by technical means gives rise to new, unexpected problems. On the other hand, pessimistic determinism, very popular in the humanities, literature, and art, sees technology as a force that can have negative consequences for society, such as job loss, erosion of privacy, inequality, and alienation. They are like the old prophets warning that technology has become a hubris over which little or nothing can be done against fate. Of course, technological determinism is an external label; no technological pessimist or optimist would consider themselves a determinist.

Deterministic conceptions of technology have been a source of criticism in several aspects, as they tend to downplay human agency in the process of technological change. By treating technology as an autonomous force, determinists may minimize the role of human agency in directing technological development, as they assume that the development and adoption of new technologies are inevitable, and that society has no choice but to adapt to them. However, critics argue that this vision of inevitability can lead to a passive and fatalistic attitude, rather than encouraging active participation and debate on how and when new technical directions should be developed and adopted (Feenberg, 1991) (Broncano, 2005) (García Palacios, et al., 2001).

The label "possibilism" that we propose is not just the counterpart of determinism, but it can be thought of as technology as an intersection of possibilities that open up new horizons of action and imagination that were not there without the products of technological action. Thus, a road opens up the possibility of being traveled and of opening communication and trade between different groups; a set of dwellings opens up the possibilities of being a node of habitation, exploration, or exploitation of natural resources around the same town, etc. The possibilist approach is as follows: technological determinism assumes the existence of an ahistorical "human essence" that can be either hidden (pessimistic determinism) or enhanced (optimistic determinism) by technology, which advances unrestrictedly driven by economic or military

competition. However, there is no such primordial human essence; there are effects of contingent cultural trajectories that have made humans "human"; they are a hybrid product of nature and artifice, having made themselves through their own technical actions. This is an allusion to Ortega's classic interpretation that "man has no essence but history" (Ortega y Gasset, 1914).

We affirm that this could be a contribution of Spanish-speaking philosophy of technology because these ideas are found in the Ortega tradition when he points out in the "Meditations on Technique" that with technology, we create completely new possibilities by establishing objects that do not exist in human nature (Ortega y Gasset, 1982) (section III). Considering technique as a form of action to open up new real possibilities is an implicit idea present in various Spanish-speaking authors such as Xavier Zubiri (1962) (2010), Miguel Ángel Quintanilla (2017), Fernando Broncano (2001), Manuel Liz (2002), León Olivé (2000), Javier Echeverría (1999), and Diego Lawler and Jesús Vega (2009). Each author and work emphasize different ontological, epistemological, and axiological aspects of technique, but in our view, they share a certain conception of technique as constitutive of an open human reality, in which the human being makes themselves through technique. It's not that other authors from other traditions haven't considered it this way (Simondon) (Stiegler, 1998) (Leroi-Gourhan, 1971), but they don't solely focus on critical reflections like some authors close to the idea of autonomous technology (Mumford, 1934) (Ellul, 1954).

Among all these authors, it is Fernando Broncano who explicitly develops the possibilist idea of technology, which can be observed in his different works, such as *Mundos Artificiales* (2001), *Entre Ingenieros y Ciudadanos* (2006), *La Melancolía del Ciborg* (2009), and La Estrategia del Simbionte (2012), in addition to multiple articles and collaborations.

> *Mi propuesta es que desarrollemos todo lo que hay de posibilista en el dominio de la técnica, alejándonos de las formas ocultas de determinismo cultural que subyacen a muchas de estas discusiones. En esta concepción modalmente posibilista, la tecnología es un modo de transformar colectivamente el presente, sujetándose a constricciones normativas que nacen ya desde dentro de la propia naturaleza de las acciones tecnológicas. En esta perspectiva, la imaginación de lo posible no es un pensamiento ajeno al que la acción técnica se sometería como una racionalidad que se atiene a fines, sino que formaría parte de la trama misma del pensar lo técnico como pensar posibilidades genuinas. (Broncano, 2006, pág. 58)*

The possibilism proposed by Broncano is based on a premise that may initially seem trivial: the future is modified with each exercise of free action, as the performance of an action causes infinitesimal changes that lead to bifurcations of future trajectories. It is possibilist because only the past is written; there are no predetermined courses in history except in the consequences of present actions. In this sense, technology is a subclass of collective intentional action, or more precisely, a form of agency. Technological designs participate in the creation of possible futures (Broncano, 2006, p. 69) (Monterroza-Ríos, A. D.; Escobar-Gómez, V. A., 2021).

The possibilist conception assumes that technological action is characterized by certain qualities present in most technological design processes. Thus, a technological design is a "novel" and "efficient" response to a practical "problem."

However, it is necessary to carefully examine the concepts of problem, novelty, and efficiency, as they do not share the common characteristics present in cultural critiques of technology. Let's see how these three concepts intertwine to describe a significant part of contemporary technological design processes (Broncano, 2006, pp. 88-91):

1. **Problem**: The category of problem implies that there are alternatives to current situations, that the course of events could be different. Non-reflective animals do not have problems; they have reactions, as they are subject to the causal flow of their existence. A significant part of technological research involves finding problems, that is, poorly defined situations that could have alternative courses of action.
2. **Novelty**: Novelty is fundamental to the possibilist conception of technology because it suggests exploring possibilities within limited resources (time, materials, knowledge, economic resources, etc.). Unlike determinism and instrumentalism, which associate contemporary technologies with repetition and tedium, the possibilist conception of technology views design activities as precisely the exploration of novel possibilities in light of previously identified problems.
3. **Efficiency**: This concept is not related to the Taylorist value of productivity. For possibilism, efficiency means that when a new historical trajectory is induced, all adjacent ones are not modified. In simpler terms, the ideal of total efficiency in a technological design is that it can solve a problem without generating others. Of course, this is not achieved in a real situation; however, it is a desirable parameter and quality in any technological practice.

We observe the diagram (Figure 1) of a possible historical trajectory of a human group. A new technological design can change the conditions of possibility that alter this trajectory. As mentioned from the beginning, this design can solve a problem in light of the historical moment, but it may also open up others. In any case, the range of possible actions for the human group will not be the same if they had not adopted a new technological design that changes their possibilities for action, as well as their expectations and new problems. In that sense, new values and ends are created as an essential component of how humans make their history, often under the conditions they themselves create and sometimes due to the unintended consequences of those actions (Broncano, 2006, p. 69). Thus, conceiving technology in this way is a form of social action in which, by elaborating plans or projects, those possibilities become more tangible. For this reason, a reflective moment arises about the action that would make those possibilities real, once we know that the necessary capacities exist to carry them out (ibid.). (Monterroza Ríos, 2028) (Monterroza-Rios, & Gutierrez-Aguilar, 2022)

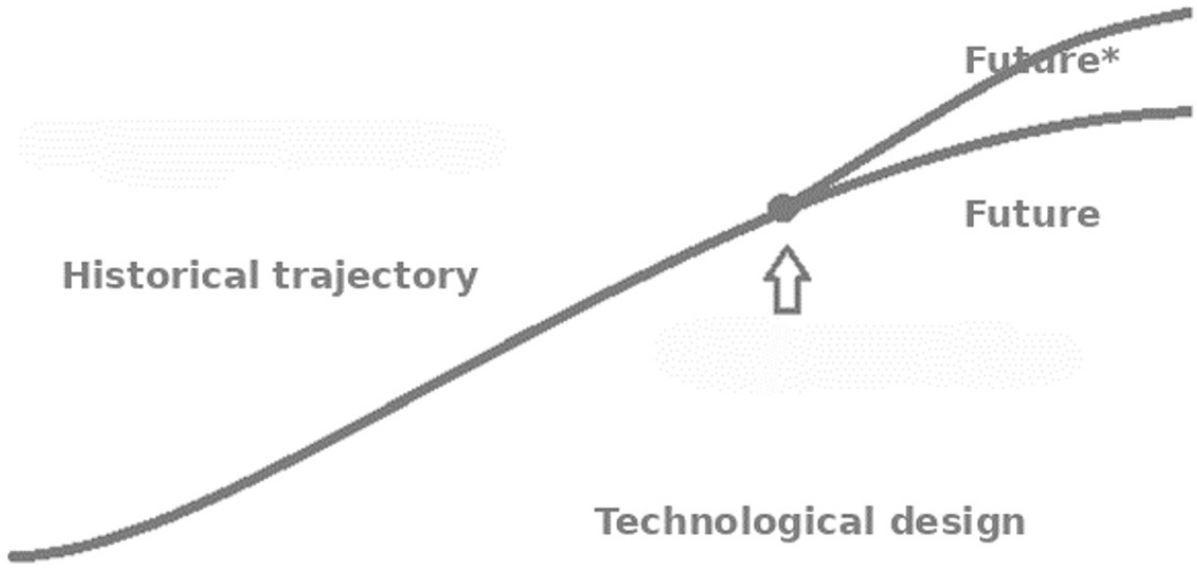

Figure 1. *Historical Trajectory of a Human Group Changes When Adopting a New Technological Design. A Turning Point is Generated (Own Elaboration)*

To achieve these goals and purposes, one must possess an agent capacity effective enough to converge various spaces of possibility that human lives traverse. Broncano proposes in *Artificial Worlds* (2001) these spaces of possibility (physical, conceptual, pragmatic, and legitimate), which in their intersection, form the real and genuine possibilities created by a technological design. Figure 1.3 graphically illustrates this confluence of spaces to generate new possibilities. At first, what is proposed may seem abstract, but upon examining Figure 2 and Table 1, particular examples of what is meant by the possibilist view of technology become concrete.

Technology occupies the intersection of all these possibilities, that is, it is what makes (1) the imagined and conceptually possible intersect with (2) the physically possible, within a framework of (3) the pragmatically and (4) legitimately possible, to create new real possibilities for certain human groups. Technological design processes make what is possibly feasible in light of certain practical purposes and human goals become real. Technical creativity is the ability to find an intersection of all the aforementioned possibilities (which is sometimes not possible) under a considerable number of physical, imaginative, conceptual, economic, legal, and moral constraints.

Furthermore, the intersection of possibilities (the genuine possibilities created by technological designs) expands and reconfigures with each new technological development, in the sense that one technology opens the horizon of possibilities for new technologies, and so on continuously. For example, transistor electronics enable integrated circuits, which in turn enable microprocessors; in the same chain, microprocessors enable programmable circuits, which in turn enable software, and so on, until a technological trajectory is exhausted or replaced.

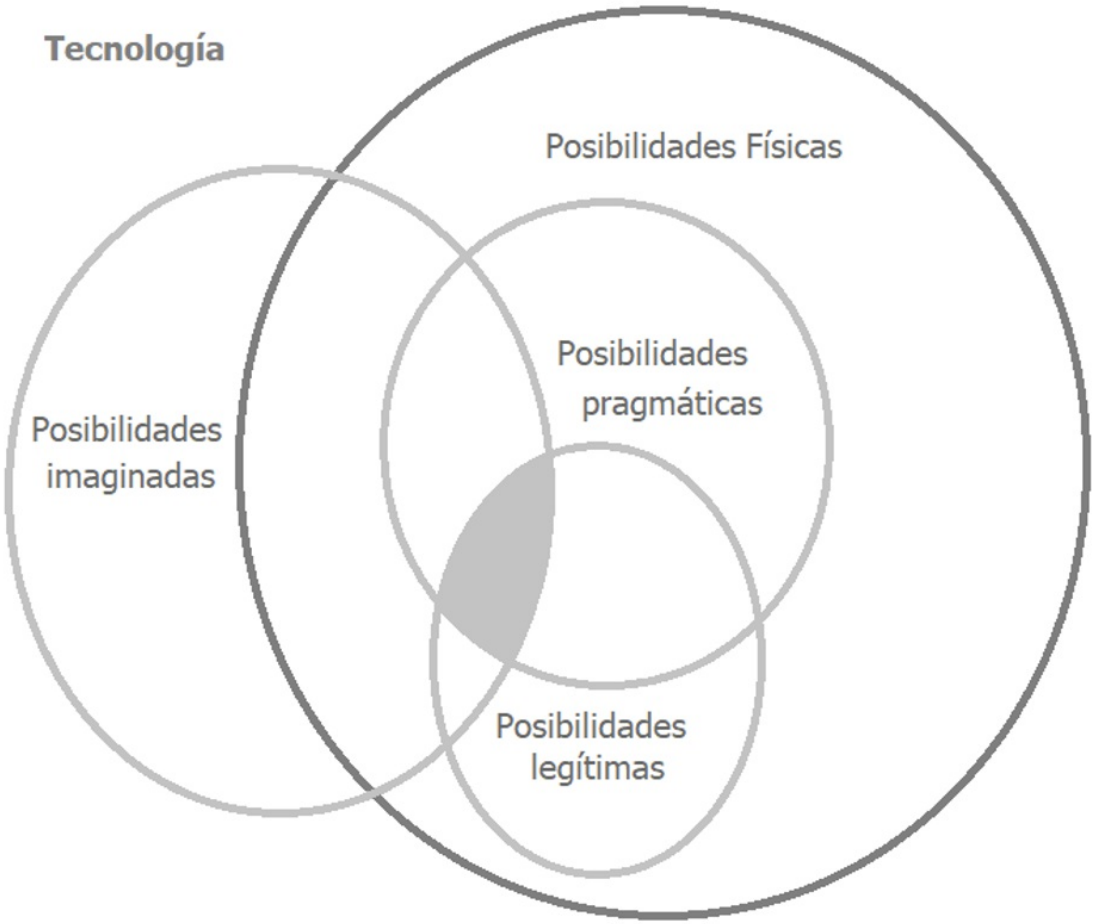

Figure 2. *Technology as an Intersection of Possibilities (Broncano, 2001, p. 122)*

Table 1 describes what each of the spaces in Figure 2 refers to and explains why technological designs occur at that intersection of possibilities. It also addresses why that space (gray) is not static but changes both spatially and temporally.

Table 1. *Types of Possibilities Considered in Technological Design*

Type of Possibility	What is Possible?	How Do These Possibilities Expand?
Physical Possibilities	It includes everything that is physically possible. Nature has a causal structure that responds to certain laws, which define what is physically possible. A technical intervention in the world (an artifact, a machine, an infrastructure) must adhere to physical, chemical, biological, etc., laws. A technological development must necessarily fall within the physically possible. For instance, when designing a water system, one must account for the weight of the water and the heights of the pipes above the Earth's surface due to the planet's gravitational effect. There are physical constraints that cannot be ignored.	The natural sciences, mathematics, and related fields generate new knowledge about the physical, chemical, biological world, etc., and their properties, expanding the universe of what is physically possible by revealing more properties and relationships of physical entities, which serve as a breeding ground for technological innovation.
Imagined Possibilities	Although our imagination is nourished by the physical world we live in, literature shows us that imagined possibilities are not necessarily tied to physical possibilities but to what is conceptually possible. With the collective concepts of language, we create new possible worlds. The dream of flying, immortality, time travel, etc., shows that imagination stimulates the limits of technical creation to make what is imagined possible.	The space of imagined and conceptual possibilities expands with the very results of technological actions, as well as with the development of sciences and mathematics. Additionally, the arts, literature, and cinema also contribute to reconfiguring possible futures and their consequences.
Pragmatic Possibilities	It is a subset of physical possibilities that, besides considering purely physical constraints, also accounts for the pragmatic frameworks for each group and cultural stage. They depend on the form of social organization, economy, and previous forms of production. For example, it is physically possible to construct the entire structure of a building out of gold, but it is not pragmatically possible due to resource constraints, material extraction, construction restrictions, etc. While physically possible, it is not pragmatically possible.	The space of pragmatic possibilities grows with the development of new technologies, as it expands the horizon of possibilities and technical, economic, and practical resources that these technologies create.
Legitimate Possibilities	There is another subset of physical possibilities that corresponds to what is legitimately possible, which depends on our moral convictions and legal conventions. These are fundamental and relate to what the ethics of technology suggest: just because we can do something doesn't mean we should. There are many cases, such as human cloning, genetic design of babies, etc., that are examples of things that are physically and technically possible but should not be done due to unforeseen risks and consequences.	The shape of the space of legitimate possibilities is related to changes in the values of a human group over time. What seems right and legitimate is not the same in every era. The development of certain technologies, such as ICTs, has opened up global communication, reconfiguring the values of certain human groups due to external cultural influences.

The table provides a detailed overview of the different types of possibilities that intersect in technological design, as outlined by Broncano. It categorizes possibilities into four distinct types: physical, imagined, pragmatic, and legitimate. Physical possibilities refer to what can be achieved within the laws of nature, expanding as scientific knowledge grows. Imagined possibilities, shaped by conceptual and creative thinking, are influenced by the outcomes of technological advancements and cultural productions such as literature and the arts. Pragmatic possibilities, a subset of physical possibilities, are constrained by practical considerations such as resource availability and social organization. Finally, legitimate possibilities are shaped by moral and legal norms, reflecting the ethical boundaries within which technology operates. Together, these intersecting possibilities illustrate that the space where technological designs emerge is dynamic, continuously evolving as new knowledge, technologies, and societal values develop.

This open way of conceiving technology may be more in tune with many of the proposals for social control of technology that have emerged from multiple traditions, such as STS studies (García Palacios, et al., 2001), Feenberg's critical theory of technology (Feenberg, 1991), socially responsible design (Papanek, 1977), or even multilateral initiatives like the Sustainable Development Goals (SDGs), which were adopted by the United Nations General Assembly in 2015 as part of the 2030 Agenda for Sustainable Development (UN, 2015).

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