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Artefacts as Realizers: How Technology Shapes the World

Abstract: Functionalism defines artefacts as essentially functional entities, grounding their ontology in their intended (human) purpose. In this article, we propose an ontological experiment that reconceives artefacts as "realizers" that bring about corresponding "realizations." We adopt these terms, drawing from the philosophy of mind—particularly the problem of multiple realizability—which also has implications for the philosophy of technology in a different context. We argue that functionalism, and the debates that derive from it, are mired in a series of untenable metaphysical dualisms. Our aim is to develop a metaphysic of artefacts that moves beyond function to account for the full spectrum of their effects across multiple levels of reality. We examine the challenges, limitations, and political implications of this perspective, arguing that the theory of realizers offers a richer and more productive ontological framework for understanding artefacts.

Keywords: philosophy of technology, ontology of artefacts, functionalism, artefact realism, multiple realizability

1. *Introduction*

Discussions about the ontology of artefacts are often entangled in a series of dualisms, such as intentional-material, mental-physical, symbolic-real, social-technical, and function-structure. Drawing on Brey's analysis (Brey 2005), we can see these dualisms reflected in the debates between sociologism and materialism, and between realism and constructivism (or "textualism," as Ferraris [2005] calls it). These dualisms create rigid separations between technology and human agency, often privileging the human side of the divide. Many discussions on these topics, explicitly or implicitly, distinguish between a mental realm of content (intentions and beliefs) and a material realm of physical structures and operations. In the philosophy of technology, the mind-matter dualism underpins "functional essentialism" (Juvshik 2021), which is based on two premises: "(1) artefacts are functional objects and (2) artefact kinds are categorized by a shared function" (Juvshik 2021, p. 4). Functional essentialism, in turn, appears in two guises: intentionalist and non-intentionalist. The first one is undoubtedly the most dominant (Parente, Crelier 2015).

In this article, we propose an ontological experiment that considers artefacts beyond function, as realizers who give rise to realizations. The notion of realizers

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seeks to undo dualistic understandings by focusing on the artefact's structure and performance. It is not our intention to replace the notion of artefact with that of realizer as a new unit of analysis, but to ask ourselves in which ways the notion of realizer illuminates important aspects of artefacts that functional approaches fail to grasp. Functional essentialism confines itself to a small sliver of the artefact's life and ignores precisely what makes artefacts philosophically interesting. In an excessive desire to shoehorn it into functions, we run the risk of ignoring the artefact's proper dimension as a component of an inter-objective network and an enabler of possible worlds.

We begin with two simple premises. First, artefacts are physical structures (energetic, chemical, mechanical, informational, material, etc.) with certain properties that are mostly independent of the human mind (our beliefs about them). Secondly, artefacts are the site of processes that *cause* certain effects in the world, and even within artefacts themselves. The theory of realizers, then, seizes on two dimensions of function: as that which an artefact *does*, the effects it causes in the world; and in terms of *systemic functions*, all the artefact can do by virtue of its physical dispositions. This includes not only the intended uses and cultural meanings of artefacts, but also their unintended effects and potential uses.

We begin with a critique of functionalism as a basis for artefact ontology. We argue that, in its exclusive preoccupation with beliefs and adscriptions, functionalism is unable to grasp the full range of the nature of artefacts. Section 3 presents the lineaments of the theory of realizers. We delimit the scope of the theory, discuss some of its problems (such as the distinction material-symbolic, and the problem of metaphysical minima), and explore its political and ethical dimensions. Section 4 delves into the core problem of normativity, the stronghold of functionalism. Artefacts do not operate in isolation. We expand the theory of realizers by restoring artefacts to their proper place within human practices, with normativity as an aspect of these practices. We suggest that the theory of realizers could align with the perspective known as "possibilism." We also discuss the political and ethical aspects of the theory. The conclusion turns to consider the term "artefact" and the general scope of the theory of realizers.

2. *Functionalism and its shortcomings*

Intentionalists believe that the ontology of artefacts is derivative of human intentionality. What an artefact is, its singular mode of being in the world, is determined by a constitutive reliance on mental states. In this scheme, function acts as a mediating term between mental content and material structure (e.g., Hilpinen 1992; 1993). Hylomorphism is a corollary of this view: the artefact is viewed as an inert piece of material "imprinted" on, or shaped by, human intentions (e.g., Thomasson 2007). Function confers on the artefact an ontological unity and distinctness; it makes the artefact one thing, regardless of its physical or objective features, or its history of development. The nature of artefacts resides (and is exhausted) in their

functional qualities, their 'proper' or privileged functions determined by the intentional states of designers and users. The functional scheme also serves as a basis for ontology. Function does not only confer unity to an artefact, it also marks artefacts as a distinct ontological category, different from natural objects and living things, for example. It also serves to distinguish artefact kinds as ontological subcategories (Mc Laughlin 2003).

The Dual Nature Program (DNP) has attempted unsuccessfully to reengineer the intentionalist view by trying to account for the material side of the structure-function divide (e.g., Kroes, Meijers 2002; Kroes 2012). However, as Vaccari (2013) has argued, DNP merely replicates the dualistic view of intentionalism, getting us no closer to understanding the material nature of artefacts. DNP cares only about beliefs and mental states. "[M]ateriality continually eludes DNP; it is captured only indirectly and obscurely: as capacities that place boundaries on beliefs, thereby justifying said beliefs in the context of plans" (Vaccari 2013, p. 20). In any case, this failure is instructive, as it reveals, more generally, the inherent limitations of functionalism when it comes to grasping the artefacts as a real, material object whose operation has effects on the world.

Non-intentionalist forms of functionalism focus on the reproductive history of an item (Millikan 1999; Elder 2007; Preston 2013). Reproductivism is the most extended form of non-intentionalist functionalism. What is reproduced is not only the design of a chair or the shape of a vessel, but also the appropriate modes of use for each tool (Preston 2013). From this perspective, the trajectories of the different lineages of artefacts are infradetermined by human intentions, that is, their evolution does not necessarily respond to the individual deliberation of intentional agents. Against the intentionalist thesis according to which the designer's intentions establish technical functions, reproductivist approaches suggest that (a) the primary determining factor for establishing technical functions is a certain history of selective reproduction, and (b) the function of an artefact depends on causal histories that possibly, but not necessarily, involve intentional behaviour.

Both intentionalism and reproductivism view artefacts solely as functional objects, resulting in a narrow framework that disregards anything beyond functional ascriptions. Moreover, the functional approach to ontology imposes a strict methodological limitation, requiring us to focus on the mental states of designers and users rather than on what the artefact is actually and effectively doing in a given context.

What is missing here? First, functional essentialism occludes the plane of interobjective relations that are established in the world, both *within* the artefact, and *between* artefacts and the world. Secondly, the anthropocentric focus on intentions and designs leads to an instrumentalist view of artefacts as neutral carriers of human will (Feenberg 1999). Artefacts have no existential or hermeneutical weight (Veerbek 2005); they do not alter, shape or deviate human plans in any way. The third corollary is the semiotisation of artefacts. The textualist vocabulary is characteristic of functionalist approaches, such as DNP (e.g., Kroes 2012), where artefacts are *texts* whose *inscriptions* have been made by an *author* oriented to an

interpreter, who must *decipher* it, among several possible *meanings*, to distinguish the artefact's proper function.

Ontologically speaking, the notion of "proper function" has served to bestow some metaphysical dignity to artefacts, distinguishing them as a class of "thing" in their own right (Kroes, Meijers 2002). Yet it is difficult to take function seriously as a basis for a metaphysic. For a start, a major problem of functional essentialism is getting the right degree of grain (not too fine, not too broad) in functional descriptions and ascriptions. Functions are somewhat arbitrary, general abstractions that have little interesting to say about artefacts.

To stick to a popular example, let's take a corkscrew. Picture the following situation. John has invited his father-in-law to dinner and wants to impress him with a nice bottle of wine, perhaps to make a point about his social status and financial capabilities. John is also speculating that the old man will die soon, in which case John's wife Mary will inherit lots of money–a situation that would obviously benefit John. What is the 'function' of the corkscrew in this scenario? To open the wine? To impress John's father-in-law? To ascertain John's financial wellbeing? What grade of 'fineness' should we adopt here? The example is not merely whimsical, for artefacts are always impacting our lives in a range of dimensions at once, and in ways that have very little to do with what designers projected. A proper function is an iterative realisation that has become socially recognizable as such, but it is a realisation among many other possible ones. Artefacts do a lot more than carry out their intended function. Idiosyncratic uses and appropriations, as well as the potential for unintended uses and consequences, are just as essential to technology as the intentions realised in a design. However, the effects of an artefact's operation are not arbitrary, but bounded by structural and physical constraints. There are so many things you can do with a corkscrew.

Juvshik (2021) raises a related problem. Characterising the specific function of any given artefact "will often include reference to *how* the artefact is supposed to perform its function" (2021, p. 4). Sandclocks, sundials, mechanical clocks and digital watches perform supposedly the same function in very different ways, and each is embedded in its own specific context (historical, social, political, phenomenological). The reduction of their proper function to, say, time-measurement misses something important about these differences.

The problem of function also remits us to historical matters, specifically, the place of function in artefact reproduction (a topic of particular interest to the non-intentionalist camp). Technological lineages escape functional categorization. Seemingly disparate technologies (like the typewriter, the movie camera and the automatic rifle) might share common components and mechanisms that cross-pollinate across industries and centuries. The core mechanism of a movie camera is a rotating shutter that alternates between blocking light and exposing film, akin to the revolving drum in a typewriter and the cylinder of early automatic rifles (such as the Gatling gun). The concept of interchangeable parts, a cornerstone of the Industrial Revolution, was also integral to all three. The evolution of artifacts differs from biological evolution due to the dominance of horizontal information transmission in cultural systems (Eldredge 2011). While genes in biological organisms are primarily passed vertically

from parent to offspring, cultural information spreads across generations and social networks, enabling more rapid and diverse changes.

3. *Artefacts as realizers*

Our proposal should not be confused with classical substantivist accounts of technology. Thinkers such as Jacques Ellul (1964) and Günther Anders (2025) famously described technology as an autonomous, self-expanding system whose internal logic overrides human intentions. Ellul's concept of *la technique* and Anders's reflections on technological obsolescence portray a totalizing technical order that restructures the human condition. Likewise, Baudrillard's analysis of the "system of objects" (1996) emphasizes how artefacts operate within symbolic and systemic structures that exceed individual use. While we share with these authors the intuition that artefacts cannot be reduced to subjective intentions, our approach differs in both scope and ambition. We do not posit an indivisible technical system or a deterministic technological destiny. Instead, we focus on artefacts as localized realizers whose causal operations unfold across heterogeneous networks and temporal scales. The emphasis is not on systemic autonomy, but on distributed realization and scalar effects.

The terms "realizer" and "realization" have been used in various ways across different philosophical subdisciplines over the past sixty years. They have been central to certain debates in the philosophy of mind (Shapiro 2000; Baysan 2015) and the philosophy of biology (Parente, Crelier 2015). From those domains, realizers migrated to the philosophy of technology, in discussions about the problem of multiple realizability (e.g., Simon 1969; Dennett 1987; Houkes & Meijers 2006).

The notions of realizer and realization refer to the dependency relationship between mental states and their neural (physical) basis. If different mental states can be realized by the same physical substrate, it becomes difficult to understand the relationship between two phenomena that seem so fundamentally different in nature. In technology, an analogous problem emerges between function and structure, an issue that the Delft School has analysed in depth (e.g., Kroes & Meijers 2002; Vermaas & Houkes 2006; Houkes 2008). A function is the realization of a structure, yet these two levels appear to be incommensurable and difficult to reconcile analytically.

From our perspective, a realizer is no different in kind from its corresponding realizations. Realizations are the causal outcome of realizers, often working together, converging by accident or design. What we understand by function is the result of certain realization stabilized over time, embedded in repetitive practices and standardized patterns of action. The notion of realizer seizes on one minimal aspect of function: that which an artefact *does*. The performance or operation of an artefact does not require its own level of analysis or language of description. The problem of multiple realizability does not arise, for no two artefacts (even of the same "kind") ever perform the same "function", except at a coarse, human, ideal level of description.

Functionalists address the whole gamut of possible operations of an artefact in terms of *systemic functions* (Millikan 1999; Preston 2009). These are performances anchored on certain physical properties, objective and immanent to the artefact. The same material structure can be articulated in multiple contexts and produce different effects. A hammer serves as a percussive object, a paperweight, a weapon, a kitchen instrument, a memento, a sex prop. Realizations are always plural. A worker in a submarine factory operating a machine that drills holes in a sheet of metal—what is the realization here? The hole in the metal? The finished submarine? Worker boredom? All of these are nested realizations and various narratives are possible depending on what we might find interesting.

One immediate, perhaps trivial, conclusion is that the distinction between material and symbolic, or style and function (e.g. as used by Lemonnier 1993), vanishes. In our view, the symbolic is an extension of the material, expressed through different means. Material efficacy is typically understood as the direct causal impact of an artefact's physical properties, while symbolic efficacy is seen as a social function, shaped by the network of meanings, expectations, and beliefs surrounding the artefact. For instance, the material efficacy of a hammer is defined by its physical properties—being made of steel and having a particular weight—allowing it to drive nails into wood effectively. Symbolic efficacy, on the other hand, does not rely (at least not so directly) on physical properties. A gold ring signifies marriage not just because of the gold (precious metal, durable, biocompatible) or any specific feature but due to its place within a broader material culture where gold bands hold such meanings. Similarly, a pair of jeans serves to protect the body and retain warmth, yet also conveys social identity based on brand, design, and cultural references. Both symbolic and material considerations may contribute to the reproduction of an item within specific cultural niches. In biology, traits like the peacock's stomach contribute materially to digestion, while its feathers contribute to reproductive success through attraction. Here, no separate symbolic-material realms are predicated; the organism simply functions within its environment, processing food and seeking mates. While style is often categorized as an "immaterial" symbolic function, it still fulfills real-world effects within the artefact's social and physical context. For example, we judge certain effects as "effective"—a cup holds liquid, a pencil effectively leaves marks on paper. Likewise, jeans and gold rings are reproduced partly due to the rich web of meanings they embody.

While the notion of realizer approximates the artefact *qua* object (a relatively fixed physical-informational structure), the notion of realization refers to the causal impact of an artefact's performance. We can illustrate the causal structure of realizations by borrowing the light cone analogy from the general and special theories of relativity (Minkowski 2012; see Fig. 1). Just as the cone of light represents the evolution over time of a light beam, which intersects with other beams, a realization refers to a point of material origin in a realizer. This effect can be extended, so that realizations become background conditions for further realizations.

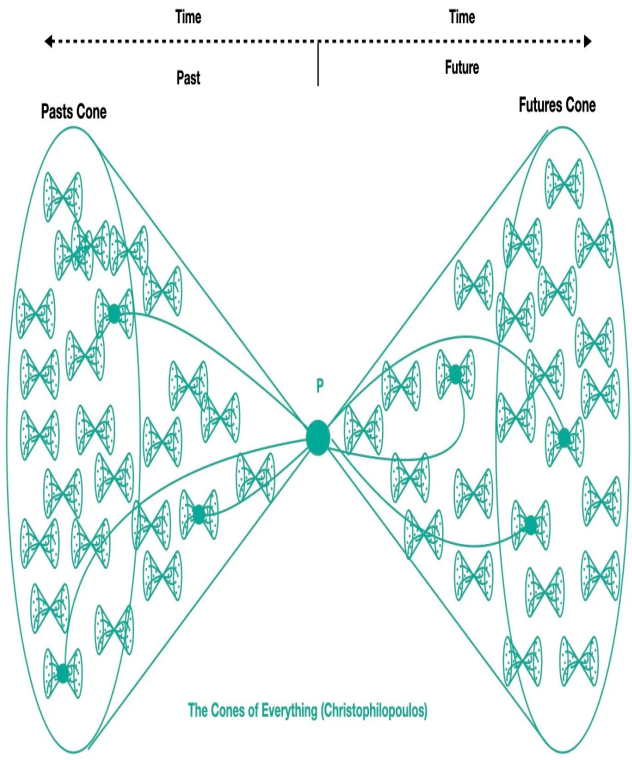

Fig. 1: Light cone, after Minkowski (Christophilopoulos 2021).

As a realizer, an artefact does not have an ontological unity beyond its physical and systemic unity—which gives the artefact its unique ontological character or respectability, and marks it as a singular kind of realizer. A realizer is not a metaphysical minimum, an irreducible component of the world. Indeed, we could regard the components of an artefact as themselves realizers, down to the properties of the materials of which it is composed, as a materials engineers would do. How far down should we extend the analysis? For example, is the colloidal structure of clay a "realizer" of the brick? In any case, we think that infinite divisibility is a trivial corollary of realizer theory, a point we will return to examine in the conclusion.

As we can see in the illustration, the very distinction between realizer and realization is also a question of spatial and temporal scale. Every realizer is, in turn, a realization. Realizations might be ephemeral in time, even when they involve the production of lasting physical structures—but everything is ephemeral nonetheless in its own order of magnitude. In some cases, realizations have more or less precise borders. In most cases, their analysis diverges, tending to an "infinite" description. We can delimit realizers and realizations at different levels of analysis,

and according to criteria of our interest, but any delimitation becomes a matter of perspective. Realizations can include opening a bottle, hammering a nail, the Sexual Revolution, finding a place to park your car, and the Anthropocene. The whole of western civilization can be placed within the "cone of light" of the discovery of the technical uses of fire.

An important dimension of realizations concerns temporality. Realizations operate across different timescales. As Knowles (2011) observes, disasters can be categorized into two types based on their temporal dynamics: fast and slow. A nuclear explosion exemplifies a fast disaster, its catastrophic consequences unfolding almost instantaneously. In contrast, the Anthropocene and the gradual crisis of climate change represent a slow disaster, their effects manifesting over decades, centuries, or longer.

We should also consider *scale*. The actions or effects of a realization are often perceived on an anthropocentric timescale, immediately relevant to human agents. However, this anthropocentric perspective does not encompass the full range of scales on which realizers operate. For example, throwing a cup of yogurt into the trash and driving to school. At the individual level, these actions seem trivial or inconsequential. Yet, when aggregated across populations and over time, they contribute to global plastic pollution and carbon emissions. Here, the same realization—littering or emitting greenhouse gases—extends beyond the individual scale to impact planetary systems. In all cases, big and small, the central question is: what is the causal contribution of artefact X to realization Y in context Z? The theory of realizers seeks to prioritize realizations over functions, situated practices over design intentions, and processual flows over closed identities.

The issue of scale reveals the profound entanglement of artefacts with political and ethical questions. Realizations are not politically neutral; their impacts and the practices they enable carry significant ethical and governance implications. Artefacts can perpetuate systems of inequality, amplify environmental degradation, or stabilize cultural practices and norms. The realization of climate change, for example, stems from myriad individual actions, mediated by artefacts such as cars, industrial machinery, and plastic packaging. However, these realizations also depend on political structures, economic systems, and cultural habits that sustain them. Realizations ripple across time and space, challenging us to think critically about the scales at which artefacts operate and to question the political systems that regulate or fail to regulate their effects. To grapple with the normative dimensions of realizers, beyond the limited scope of functionalism, we must confront the political implications of scale. How do we address the cumulative realizations of artefacts that produce slow disasters like climate change? What responsibilities do individuals, corporations, and governments bear for the effects of artefacts at different scales? And how do we design artefacts to mitigate harmful realizations while fostering sustainable and equitable results?

4. *Normativity: Realizers in practice*

A critical challenge for the theory of artefacts as realizers lies in addressing the cornerstone of functionalism: normativity. Functions are not merely about what an artefact *does* but about what it *should do*. How can we account for this essential normative dimension? To answer this question, artefacts must be situated within practices, where they serve as stabilizing nodes of human culture.

Normativity emerges from practices that actualize—and sometimes suppress—specific causal powers of objects. These causal powers are not static; they can enter into new assemblages and manifest in various realizations. Artefacts, therefore, derive their normative weight not from themselves but from their integration into the complex practices of production, consumption, and use. In these practices, human and non-human agencies are interwoven, creating networks of meaning and functionality. While artefacts do not possess agency in a strict sense, they do exhibit a constrained form of agency: their physical properties and affordances are selectively activated within a hybrid network of human and non-human participants (Parente 2016).

Viewing artefacts as realizers expands their conceptual scope, emphasizing their potential for action on multiple levels. It enables us to appreciate the interconnectedness of artefacts within cultural and ecological contexts. Artefacts do not act in isolation; their effects unfold within broader networks of technical practices and other objects, forming an artificial ecology (Hörl 2017) and scaffolding "cognitive ecologies" (Hutchins 2010). Every realization is, then, a collective achievement, shaped by the constraints and opportunities of the practices in which artefacts are embedded.

Practices themselves are hybrid phenomena, distributed across minds, bodies, artefacts, and environments. They extend over time and space, anchoring themselves in specific objects and places. Artefacts, as nodes within these networks, stabilize cumulative cultural practices (Tomasello 1999) and serve as "attractors" around which human actions are organized (Vega 2020). By virtue of their material robustness and temporal persistence, artefacts scaffold processes of enculturation and collective memory (Parente 2024).

Consider a photograph of a deceased relative. Its realization involves invoking memories and emotions associated with the individual. While this realization is partially supported by the material properties of the image (e.g., its plastic surface or light pixels), it also depends on broader practices. These include rituals of remembrance, image archives, furniture arrangements, and cultural habits of viewing and preserving photographs. Together, these elements form an ecology of practice that sustains the photograph's efficacy as a tool for remembrance.

Now, imagine a hammer abandoned in a forest. Even if no human ever uses or sees this hammer again, it continues to exist as a physical object with specific properties: weight, shape, and material composition. These properties enable it to produce effects independent of human intention or social practice, such as providing shelter for insects and fungi. The hammer's "performance" is a natural outcome of its physical structure, even when divorced from its intended purpose.

Let's consider one last, "big" example: the Social Credit System in China (SCS). The SCS exemplifies how artefacts operate within intricate networks of technical, social, and political elements. Technologically, it integrates CCTV cameras, facial recognition, centralized databases, apps like WeChat and Alipay, internet monitoring, blockchain, AI, and 5G networks. These technical systems are interwoven with cultural norms (e.g., collective responsibility, social harmony) and political frameworks (e.g., regulations, public awareness campaigns, and government-corporate collaboration). The SCS demonstrates how artefacts realize their effects through a confluence of technologies, social practices, and political agendas, forming a powerful hybrid network.

In these examples, the realizations of artefacts are inseparable from the practices in which they are embedded. Artefacts are active participants in shaping human culture and ecological systems. Their causal powers are actualized through collective activity, underscoring the relational and dynamic nature of normativity.

The notion of artefacts we propose bears a deep affinity with "possibilism", a perspective developed in the Spanish philosophy of technology, particularly in the work of Fernando Broncano (e.g., Broncano 2000; 2006). Possibilism frames technology as "a dynamic process that actively transforms human realities" (Monterroza Rios 2024, p. 1). According to Broncano, artefacts are "operators of possibility" (2008, 20), altering the spectrum of potential actions available to a group. Technological artifacts are enablers of collective agency, offering tools to transform human conditions and define possible futures (Broncano 2006). The act of technological design involves envisioning the feasible, identifying the necessary capacities to realize it, and navigating constraints—physical, economic, legal, and moral—to make it real. Technological development is inherently imaginative. From this perspective, the philosophy of technology becomes a branch of the philosophy of action. In the words of Monterroza Ríos, "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" (2024, 1). As we can see, possibilism puts emphasis on the intentional structure of action, while the theory of realizers focuses on the structure of the artefact and its associated field of possible effects. We believe that the "agency" of artifacts always emerges in hybrid taskscapes that conjugate human and non-human agents. Thus agency does not reside in the materiality of an object itself, as if it were a capacity independent of the assemblages in which that entity is incorporated (see Parente 2016).

5. *Conclusion*

Up to this point, we have used the term 'artefact' in a deliberately naive way. However, defining what an artefact is remains far from straightforward. The category includes a wide range of entities—tools, machines, systems, and more—raising the question of how such diversity can be unified under a single concept.

Traditionally, artefacts have been understood in relation to human action and intentionality. Functionalist accounts, as we have seen, maintain that artefacts derive their identity from the intentional acts that bring them into existence. Our goal is to preserve the ontological distinctiveness of artefacts, treating them as a unique category, while avoiding the heavy metaphysical burden of dualism. It is important to stress that the theory of realizers does not entail technological determinism or the thesis of a self-directing technical system. Unlike substantivist theories, which posit an overarching technological logic structuring history as a whole, the realizer framework remains analytically modest. It does not claim that technology forms an indivisible totality or that it unfolds according to an autonomous destiny. Instead, it provides a way of tracking how particular artefacts produce realizations across multiple scales. The focus is ontological rather than historical or civilizational.

However, following the theory of realizers, two related challenges emerge. First, the concept of 'artefact' becomes unclear, no longer anchored in a founding act of human intentionality. This is a common issue in various contemporary 'Theories of Everything.' Our approach, however, differs—at least in intent—from Object-Oriented Ontology (Harman 2010; Meillassoux 2010), which does not distinguish between artificial and non-artificial objects. OOO is not concerned with identifying a unique internal structure or historical logic that sets artefacts apart. Similarly, the concepts of "object" in Harman (2010) and "machine" in Bryant (2014) blur the boundary between artefacts and other entities, denying the artificial its own ontological category. If artefacts are merely a subset of realizers, what ensures their philosophical relevance?

The second challenge concerns the scope of the concept of 'realizer.' If we extend the theory of realizers into a universal 'Theory of Everything,' we arrive at a trivial conclusion: everything, from subatomic particles to galaxies, can be considered a realizer at its corresponding scale. This amounts to the claim that all things have causal effects—a notion that aligns with a scientific worldview but is too broad to be philosophically illuminating. While this generality ensures consistency with modern physics, it risks rendering the theory uninformative. In other words, it states the obvious. This article has sought to apply the theory of realizers specifically to artefacts, exploring what insights it might offer. As a result, we can set aside the second issue—its excessive breadth and lack of novelty—as irrelevant to our discussion.

The first question is the interesting one. How could we preserve the distinctness of the artificial? An answer to this question opens a variety of lines of inquiry. Although artefacts might not be dependent on human intentions, they do seem an essential constituent of human practices. We propose focusing on the operational dynamics of artefacts as a basis for their ontological status. Artefacts have a dual role as physical structures that host processes and act as mediators within human practices. Artefacts are a type of realizer distinguished by material permanence, systemic unity, and a capacity to guarantee iterability; that is, produce effects that are simultaneously consistent and variable. At one level, the properties of an artefact are non-relational, related to what McGrail (2008) calls the "modal weight" of

substance. At another level, artefacts require systemic scaffolds and assemblages to act effectively as realizers. Their efficacy depends on their material properties integrated within broader systems. In this sense, the effectiveness of a realizer—such as a pencil's ability to leave traces on a page—relies not just on material properties but also on systemic scaffolds and contexts that confer agency and qualify it as a genuine realizer.

In sum, artefacts, as a unique class of realizers, open up worlds of possibility for human action. Understanding their specificity requires analyzing their processes, contexts, and systemic dependencies. By framing artefacts within an ontology of realizers, we preserve their philosophical significance while enriching our understanding of how technology shapes, and is shaped by, human life.

The theory of realizers challenges long-standing dualisms and emphasizes the dynamic, distributed nature of artefacts as active participants in human culture and ecological systems. Practices actualize certain causal powers of artefacts while suppressing others, shaping the range of possible realizations. As we have seen, a critical dimension of realizers is their operation across different temporal and scalar levels. This interplay between individual and collective realizations reveals the deeply political nature of artefacts. Understanding artefacts as realizers has significant implications for technical design and ecological sustainability. By acknowledging the layered, distributed nature of realizations, designers and policymakers can better account for the long-term, systemic effects of artefacts.

This perspective encourages a shift from isolated artefacts to artificial ecologies, where artefacts operate within networks of practices, objects, and environments. By viewing artefacts as stabilizing nodes of culture and operators of possibility, we can develop strategies that align technical functionality with ecological and social goals. Recognizing their normative and transformative potential invites us to consider how artefacts can be designed, used, and governed to support sustainable and equitable futures.

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