

Chapter 1

(How) Do Artefacts Have Politics? (Re-)Tracing the Ontic and the Ontological in Winner's Legacy



Anthony Longo and Mark Coeckelbergh

Abstract This chapter revisits Langdon Winner's question "Do Artefacts Have Politics?" to argue that contemporary philosophy of technology has overly confined political analysis of technologies to an ontic register, focusing on discrete artefacts and their immediate social effects. We reconstruct an ontological approach that investigates how technologies help constitute the very conditions of possibility of politics. First, drawing on Heidegger's ontic/ontological distinction, we show how the empirical turn reads Winner's 1980 essay in isolation and thereby reinforces an ontic focus. Second, we retrieve the neglected ontological impulses in Winner's later account of "technologies as forms of life" supplemented with the transcendental "grammars" that pre-shape technological meaning and use. Third, we connect this line of thought to Arendt's analysis of artefacts as the material "in-between" that enables political intersubjectivity, re-reading Winner's Moses' bridge case as world-structuring rather than merely behavior-shaping. Finally, we extend this framework to social media algorithms, arguing that their processual, constantly recalibrating character inaugurates a distinct, indeterminate way of "having politics" that cannot be captured by the classic politics-of-artefacts template. The chapter thus proposes a productive entwinement of ontic and ontological inquiry for analysing political technologies in the algorithmic age.

Keywords Ontic-ontological distinction · Forms of life · Wittgenstein · Hannah Arendt · Politics of algorithms

A. Longo (✉)
Department of Philosophy, Tilburg University, Tilburg, The Netherlands
e-mail: a.n.longo@tilburguniversity.edu

M. Coeckelbergh
University of Vienna, Vienna, Austria
e-mail: mark.coeckelbergh@univie.ac.at

© The Author(s), under exclusive license to Springer Nature
Switzerland AG 2026

A. Fox, D. Cressman (eds.), *Arrangements of Power: Tracing Langdon Winner's Legacy Within and Beyond the Philosophy of Technology*, Philosophy of Engineering and Technology 50, https://doi.org/10.1007/978-3-032-17371-3_1

1.1 Introduction

With his article “Do Artefacts Have Politics?” (1980), Winner set the course for the contemporary study of the relationship between politics and technology. His thinking gained traction in the context of arguments against general analyses of Technology-at-large in phenomenology and critical theory and in favor of the concrete study of human-technology relations in everyday life. It thus became part of the empirical turn (Achterhuis, 2001) and postphenomenology (e.g. Ihde, 1990). However, because of this influence, political theory of technology has mainly concerned itself with the ‘ontic’ level of description, focusing on the direct social histories and political consequences of artefacts. This is especially problematic if we want to account for the politics of algorithmic technologies such as AI and blockchain, that typically move beyond the one-on-one relation between an individual and an artifact, and which influence is interwoven in complex ways with the social and political realm.

In this chapter, we argue that this approach risks losing sight of those aspects of technologies and their influence that cannot be reduced to an ontic level but require an ‘ontological’ analysis into the conditions of possibility for politics that artefacts also create. While the dominance of ontic-level inquiry over ontological analysis may have been influenced by Winner’s power-based approach, we claim that this is more so due to a reading of his 1980-article in isolation from his other work that does address ontological concerns. Therefore, we propose an ontological approach to the politics of artefacts that escapes these worries. As a starting point for such an approach, we return to Winner’s ([1983] 2001) often overlooked application of Wittgenstein’s concept of ‘forms of life’ to technology. We further unpack this approach drawing from Coeckelbergh’s ‘grammatical’ approach to technology and connecting this to Arendt’s ontological approach to politics, in which artefacts provide the transcendental ground for political intersubjectivities and power relations.

The chapter proceeds in five steps. In Sect. 1.2, we clarify the distinction between ‘ontic’ and ‘ontological’ with the help of Heidegger’s critique of Western metaphysics and show how current thinking about the politics of artefacts, as influenced by Winner, fits into the ‘ontic’ level of analysis. Section 1.3 then returns to Winner’s (2001) article “Technologies as Forms of Life” as a starting point for ontological inquiry into technology to make clear what is lost when overemphasizing the ontic level of being at the cost of the ontological. This loss is compensated by introducing Coeckelbergh’s (2022) ‘grammatical’ approach to technology that considers the conditions of possibility that already pre-shape (ontologically) what we do with technology before the actual (ontic-level) interaction with technology. In Sect. 1.4, we use a subtle reference to Arendt in a footnote by Winner (2001) to connect Winner’s Wittgensteinian approach to technology with Arendt’s ontological approach to politics. In Sects. 1.5 and 1.6, we use Arendt’s framework to elaborate on Winner’s ontological concerns, first theoretically and then more concretely, by going back to Winner’s case of Moses’ bridges and moving forward with an analysis of social media algorithms. Throughout this article, we suggest ways in which

ontic and ontological levels of inquiry can each be put to use for a more productive and nuanced analysis of the politics of artefacts.

1.2 The Ontic and the Ontological in Philosophy of Technology

So-called ‘classical philosophy of technology’ gets its name, as well as its controversies, from its specific way of analyzing technology. Mainly inspired by Martin Heidegger, this tradition is explicitly concerned with an ‘ontological’ inquiry into technology as a mode of Being. Heidegger famously argued in *The Question Concerning Technology* ([1954] 1977) that technology is more than just an instrument to help people achieve certain goals. It embodies, rather, a certain way of understanding the world that characterizes a historical era. Modern technology, for example, structures our relation to the world in such a way that everything appears as a ‘standing reserve’, always-available for us to exploit it. In criticizing modern technology, Heidegger is not concerned with concrete artefacts and their properties but with Technology as a mode of revealing the world. Speaking in his own terms, we must move from an ‘ontic’ level of inquiry—focusing on the concrete properties, behaviors and arrangements of entities, i.e. whatever can be known *empirically* about artefacts—toward an ‘ontological’ analysis, asking what it is for a certain class of entities (e.g. artefacts) ‘to be’ in the world. Heidegger warns that if we skip this ontological inquiry into the different ‘ways of being’ of animals, artefacts, human beings, etc., we risk flattening our understanding of various kinds of entities in the world based on mere surface resemblances (Slaby, 2021, 542). However, as Heidegger writes, ‘these ontological foundations can never be disclosed by subsequent hypotheses derived from empirical material’, rather ‘they are always “there” already’ (BT 75/50). The task of the philosopher, then, is to make explicit these ontological foundations that are always-already there and how they structure the concrete behaviors we can study empirically. In other words, classical philosophy of technology proceeds in the style of a ‘transcendental analysis’ into the conditions of possibility of concrete human-technology relations rather than the technologies themselves (Verbeek, 2005, 7).

This transcendental approach is precisely the main target of the ‘empirical turn’ (Achterhuis, 2001). While Heidegger saw it as crucial to move ‘upwards’ toward ontological analysis, scholars like Peter-Paul Verbeek and Andrew Feenberg were very critical of *imposing* ontological frames ‘top-down’ onto the ontic level of existence. The way philosophers like Heidegger but also Horkheimer and Adorno ([1947] 2016), Ellul ([1964] 2011) and Marcuse ([1964] 2003) tackled philosophical questions about technology was deemed insufficient because of its generalizing and monolithic conception of technology. The source of this tendency, according to Feenberg, is that they allow ontological presuppositions to ‘intrude unacceptably on the ontic level’, covering up the different ways that people can engage with

technology in specific social and historical contexts (Feenberg, 2010, 449). Moreover, the neglect of the *actual* relations that people enter into with technology (on ontic level) results in an ‘aporetic’ stance that leaves us hanging with a conception of technology as a totally binding force yet still allowing exceptions, making modern technology into an ‘incurable disease with a cure’ (Belu & Feenberg, 2010). While classical positions in the field tend to reduce technological artefacts, systems and practices to their ontological conditions, the empirical turn urged philosophers of technology to take the empirical reality—or as Heidegger would say: artefacts in their ‘ontic concretion’ (Heidegger, 2007, 78)—as a point of departure to bring to light the social and political effects of particular technologies (Verbeek, 2022, 39).

In this context, scholars have regularly turned to Winner’s seminal article “Do Artefacts Have Politics?” (1980) to illustrate what the empirical turn aims to uncover (e.g. Achterhuis, 2001; Ihde, 2010, 82; Smits, 2001; Verbeek, 2022, 40). His analysis of the political properties of artefacts like Robert Moses’ bridges in New York and McCornick’s molding machines gained traction precisely because of its focus on the direct, ontic effects of concrete technologies. Although Winner does not explicitly engage with the ontic-ontological distinction, the ‘ontic’ level is clearly prioritized over the ontological question. Anticipating on later critiques of social constructivism in STS, Winner notes that a political analysis of technology is incomplete if it does not account for the concrete properties of the technologies at stake: ‘Rather than insist that we immediately reduce everything to the interplay of social forces, the theory of technological politics suggests that we pay attention to the characteristics of technical objects and the meaning of those characteristics’ (Winner, 1980, 123). At the same time, merely a description of these characteristics will not suffice either; in being more-than-instrumental, technologies encompass ‘purposes far beyond their immediate use’ (Winner, 1980, 125). We therefore always also need to understand the technical, societal and political arrangements that *precede* the use of the artefacts in question (Winner, 1980, 125).

Technologies become *inherently* political when these man-made systems *require* particular kinds of political relationships:

the adoption of a given technical system actually *requires* the creation and maintenance of a particular set of social conditions as the operating environment of that particular system. [...] In this conception, some kinds of technology require their social environments to be structured in a particular way in much the same sense that an automobile requires wheels in order to run. The thing could not exist as an effective operating entity unless certain social as well as material conditions were met (Winner, 1980, 130).

Elsewhere, he writes that the tangible effects of technological innovation are the ‘result of a new system’s own *operating requirements*: it simply will not work unless human behavior changes to suit its form and processes’ (Winner, 1993, 11). One could read these passages as a ‘transcendental’ analysis, emphasizing the conditions of possibility of certain technologies that have to be met in order for these technologies to be or become political. However, Winner continues immediately by correcting this interpretation: ‘The meaning of “required” here is that of practical (rather than logical) necessity’ (Winner, 1980, 130). This helps us understand the ‘ontic’ demarcation of Winner’s approach in this article. In line with his later critique of

social constructivism (cf. Winner, 1993) he already proposed in 1980 a move from social *properties* that define the context of making and using technology towards the societal *arrangements* that correspond with, or are *required by*, certain technologies. In doing so, Winner constantly flirts with the transcendental but never goes so far. This flirting comes back when he distinguishes ‘internal’ conditions inseparable from ‘the workings of a given technical system’ and ‘external’ conditions ‘removed from the organization of those technologies as such’ (Winner, 1980, 130).

Many scholars within STS, political philosophy and philosophy of technology have followed Winner’s plea to consider the political properties of artefacts by examining their technical properties as well as their corresponding socio-political contexts. Postphenomenologists have built on Winner’s power-based approach by analyzing the kinds of human-technology relations that enable these power relations in the first place by shaping people’s perceptual and agentic capabilities (Verbeek, 2020, 143). Robert Rosenberger, in particular, has demonstrated at length in *Callous Objects* (2017) how technical mediations can be used to discriminate against specific groups (e.g. benches with armrests making it impossible for unhoused people to lay down). Lucas Introna and David Wood have applied Winner’s framework to show how digital systems, like facial recognition software, are political in the same sense as Moses’ bridges: each, ‘by its very design, includes certain interests and excludes others’ (Introna & Wood, 2004, 179). Again in comparison with Moses’ bridges, Bucher argues that algorithms are a ‘really blatant example of that same logic as they explicitly decide, order, and filter the world in specific ways’ (Bucher, 2018, 23).

Some have taken Winner’s approach as a baseline to expand his framework. Jenny Lee Davis, for instance, explicitly positions her work in *How Artefacts Afford: The Power and Politics of Everyday Things* as an extension of Winner’s ‘classic work’ to think of technologies as ‘encoded with power relations that produce patterned effects’ (Davis, 2020, 55). While Winner sticks to what technologies may ‘require’, Davis distinguishes different ways in which artefacts can participate in power relations: artefacts may ‘demand’ or ‘refuse’ people to act in certain ways (in a strong sense), but they may also ‘request’, ‘encourage’, ‘discourage’ or ‘allow’ particular behavior. These ways of affording may overlap and depend on who it applies to: for instance, low hanging bridges may ‘allow’ small vehicles to pass under, while ‘refusing’ buses to do so. Davis calls these mechanisms ‘analytic stopping points that help describe the intensity with which technological objects facilitate or impede particular lines of action and social dynamics’ (Davis, 2020, 65).

Note that these ‘conditions’ still remain within the ontic level of inquiry. Both the technical and political arrangements, as well as the internal and external conditions of technologies that make them possible, are ‘objective’ states of affairs that we can empirically describe from an third-person perspective. In Heideggerian terms, the objects of study (i.e. the artefacts, the societal context, the required political relationships) are equally treated as ‘present-at-hand’ (*Vorhanden*) within a ‘theoretical attitude’, and not—as an ontological inquiry demands—as involved in the world in their respective ways of Being. Therefore, if we follow Heidegger, the empirical approach evades the ‘real *philosophical* problem’ (Heidegger, 1977, 45),

namely, to understand how the interaction between artefacts, societal arrangements and political relationships is possible in the first place because of their specific way of Being.

These shortcomings of the empirical turn have motivated certain scholars to call for a rehabilitation of the ‘ontological’ in philosophy of technology (e.g. Coeckelbergh, 2017, 2022; Lemmens, 2022; Lemmens et al., 2017; Misa, 2009; Zwier et al., 2016). However, it seems that, so far, debates within philosophy of technology are mostly split into two opposite ‘camps’, with the empirical-ontic approach on the one side, and the transcendental-ontological approach on the other. However, this split need not be as dichotomous as is often presented. As Nolen Gertz’s (2018) study on nihilism and technology, for instance, illustrates, it is possible to use empirical reality as a starting point to build up towards transcendental analysis. Indeed, as Heidegger himself continually warned in *Being and Time*, the move from ontic to ontological is unsuccessful if it is a move *away* from the ontic. Although the distinction between the two remains philosophically crucial for him, the ontic level is the ‘stepping stone’ necessary for reaching the ontological in the first place (Slaby, 2021, 542). This is a fundamental insight for philosophy of technology that has not been given full consideration yet. As a thorough read of Heidegger’s work shows, ‘the relationship between the ontic encounter and the a priori ontological structure of being-with cannot be characterized as a simple priority of the latter over the former’ (McMullin, 2013, 89–90). The *difficulty* of philosophical inquiry is precisely to keep distinct that which is, in practice, always entwined: concrete ontic encounters *evoke* the ontological categories or *existentia-lia* through which they are understood, and at the same time we must account for the very possibility to *receive* these evocations.

1.3 Retracing the Ontological in Winner

Although at first sight Winner’s approach entails a prioritization of the ontic level of analysis, we interpret his overall body of work in a way that reveals a much more nuanced and complex appreciation of both the ontic and ontological levels of technological mediation. A more contextual reading of his separate works indicates that his turn to the ontic level in “Do Artefacts Have Politics?” does not necessarily imply a complete abandonment of ontological concerns. This is exemplified by his ambiguous relation with Ellul’s ‘classical’ approach in *The Technological Society* (2011), as ‘Winner’s feelings towards Ellul oscillate between love and hate’ (Smits, 2001, 155). In fact, Winner himself warned throughout his works against completely giving up what classical philosophy of technology has taught us: ‘Before we forget our Marx or our Mumford, Ellul, or Heidegger, it is important to notice what one gives up as well as what one gains in choosing the intellectual path to the study of technology and human affairs’ (Winner, 1993, 367). A purely empirical-descriptive approach has certain advantages, though they come at ‘significant cost’ (Winner, 1993, 368). Even if social constructivism succeeds in opening the ‘black box’ of

different social actors and relationships that socio-technical arrangements often are, ‘the box they reveal is still a remarkably hollow one’ (Winner, 1993, 375). What they lack, according to Winner, is not only an evaluative stance towards certain technical systems but also a fundamental philosophical reflection on ‘the larger question about technology and the human condition’, i.e. how technologies may affect the ‘basic commitments and projects’ of our current age (Winner, 1993, 375). So, while Winner, in line with the empirical turn, takes issue with Heidegger’s and Ellul’s generalizing and monolithic conceptions of technology, he also does not go so far to completely disregard ontological analysis.

Still, given that his engagement with the ontological is mostly only *implicit*, the next section will turn to Arendt’s critical appropriation of Heideggerian phenomenology to fully draw out the ontological dimensions in Winner’s overall philosophy of technology. Before we do that, however, we need to understand how ‘the ontological’ enters Winner’s philosophy of technology.

In an often overlooked paper, “Technologies as Forms of Life” ([1983] 2001), Winner uses Wittgenstein’s term ‘forms of life’ to argue that we should not only study the “impact” of technologies but also how technologies restructure our physical and social worlds and, ultimately, our lives. Just as Wittgenstein argued that the speaking of a language is not just about *using* words but a way of shaping our practices, Winner suggests that in adopting technologies, ‘they become woven into the texture of our everyday existence’ and eventually ‘shed their tool-like qualities to become part of our very humanity’ (Winner, 2001, 12). In other words, the instrumentality of technologies itself leads to its ‘more-than-instrumental’ character, since it is precisely through their use, in everyday contexts, that technologies shape humanity:

We do indeed “use” telephones, automobiles, electric lights, and computers in the conventional sense of picking them up and putting them down. But our world soon becomes one in which telephony, automobility, electric lighting, and computing are forms of life in the most powerful sense: life would scarcely be thinkable without them (Winner, 2001, 11).

In this sense, technology is a strong driver in shaping cultural practices. But as Winner rightly argues, the influence goes in both directions. On the one hand, technologies bring about ‘significant alterations in patterns of human activity and human institutions’—they make ‘new worlds’ (Winner, 2001, 11). Yet, on the other hand, the forms of life in which new technologies enter and are embedded also shape our use, interactions, and expectations. As Wittgenstein wrote in his “Philosophy of Psychology” (published with the *Investigations*), that forms of life are the ‘given,’ ‘what has to be accepted’ (Wittgenstein, [1954] 2009). This ‘given’ exerts its influence on the use of technology and related interactions. In a similar spirit, Winner writes that ‘most of the transformations that occur in the wake of technological innovation are actually variations of very old patterns’, giving the example of the humanization of computers:

Forms of life that we mastered before the coming of the computer shape our expectations as we begin to use the instrument. One strategy of software design, therefore, tries to “humanize” the computers by having them say “Hello” when the user logs in or having

them respond with witty remarks when a person makes an error. We carry with us highly structured anticipations about entities that appear to participate, if only minimally, in forms of life and associated language games that are parts of human culture (Winner, 2001, 14).

Technologies-in-use are interwoven and interdependent on social and cultural patterns and roles that existed before the innovation took place—patterns that are altered in the wake of the innovation, when the technologies are used. With Winner, we can place technologies in the context of the ‘vast multiplicity of cultural practices that compromise our common world’ (Winner, 2001, 15).

In this regard, our use of technologies are deeply embedded in what Wittgenstein calls ‘language games’, again in two directions. Winner’s example of the computer, cited above, illustrates very well the relationship between technology and language. Existing linguistic frameworks continuously pre-mediate both our making and using of technologies. Metaphors often play a key role in how we make sense of new technologies and integrate them in our daily lives, both making visible *and* hiding certain aspects of technologies: ‘each machine metaphor has opened areas of both insight and radical blindness as it becomes means of interpreting what happens in our world’ (Winner, 1977, 45). As he notes in his critical study of the concept of ‘autonomous technology’, the continuing changes between the machines that shape our social and political relationships, and the metaphors that we use to make sense of them explain how technology is a permanent ‘source of concern’ (Winner, 1977, 45). Yet because of this, technologies also disrupt the very language we use ourselves to make sense of society and of ourselves. We cannot always count on existing words and metaphors to grasp the meaning of new technical and political arrangements. This struggle is obvious in how we currently are trying to make sense of AI-driven technologies like ChatGPT: should we call them autonomous writers, assistants, stochastic parrots, or something entirely different? How we speak of technologies, what we name them, which verbs and adjectives we associate with them, all illustrate that ‘language reflects the content of technical practice’. And what Wittgenstein can teach us here, Winner suggests, is that ‘we would expect that changes of this kind would appear, sooner or later, in the language people use to talk about themselves’ (Winner, 2001, 15).

Using vocabulary from phenomenology one could say that Winner is suggesting here that technology has an ‘ontological’ dimension and not only an ‘ontic’ one: politics of technology is not only about ‘what things do’ (to use Verbeek’s famous phrase), that is, their more-than-instrumental impact here and now in and through a particular use and interaction, but *also* about what structures technology and what gives it meaning. Compared to “Do Artefacts Have Politics?” (1980), here Winner already starts moving ‘upwards’ to a transcendental level of inquiry, moving his concern from mere ‘practical requirements’ (Winner, 1980, 130) toward the ‘logical’ requirements that enable technology to become political in the first place. Yet to further develop this argument we have to move beyond Winner. While later Winner returns to Wittgenstein when exploring the connection between language games and technology (Winner, 2018), acknowledging Coeckelbergh’s work but mainly focusing on language in the sense of the rhetorics about technology, he never developed

the more structuralist and ontological approach to (the politics of) technology itself he suggested in the “Forms of Life” paper. This can be done, however, by drawing on Coeckelbergh’s “grammatical” approach (Coeckelbergh, 2018, 2022).

Coeckelbergh crafted his approach in order to move beyond the phenomenology and hermeneutics of individual human-technology relations as found in postphenomenology (Ihde, 1990; Verbeek, 2005), which focuses on individual artefacts without taking into account the role of language and (other) more structural elements that also shape the meaning and influence of technology. Taking inspiration from Wittgenstein, Ricoeur, Bourdieu, and Cassirer, Coeckelbergh proposes a structuralist and transcendental approach to what technology is and means. His use of the term ‘transcendental’ does not make technology into a large Heideggerian abstraction, as Ihde worried, but is rather mobilized to claim that ‘the use and meaning of technology are made possible by, and structured by, some other elements that are not themselves necessarily technological and material. These structures or conditions pre-shape the meaning of, and our performances with, technology.’ (Coeckelbergh, 2018, 151). In order to develop this conceptually, he expands on Winner’s adoption of the term ‘form of life’ from the later Wittgenstein (2009). He argues that the role of the transcendental structure of technology is analogous to that of the transcendental structure of language: like language use, technology’s use is also embedded in a form of life, in a broader structure that gives it meaning. Technology is part of our social and political world and must be understood within its “grammars”. At the same time, both language use and technology use actively shape that wider world. Grammar is given and rather resilient, but not entirely. Structures move. This opens up room for change.

Coeckelbergh (2022) identifies four structures that expand on Winner’s framework and function as transcendental conditions or ‘grammars’ of technology: language, social relations, human bodies, and material infrastructures. He gives the example of Artificial Intelligence (AI): what AI is and means depends on how we speak about it and thus literally on grammar (for example when we address a particular chatbot as “she” this taps into the structures of our language) and on the narratives that circulate in our culture, but also, for example, on family relations and gender relations: the way we speak to an AI assistant may be shaped by structural gender biases in our society. Language games already shape how we use and interact with certain technologies, even *before* we actually engage with them. This interaction also has a particular meaning and impact, of course, but one should not neglect the grammars of use that already pre-shape that very meaning and interaction. This also has normative implications. When we evaluate technology, we also have to evaluate its grammars, its transcendental conditions ‘the challenge of understanding and questioning technology means nothing less than the challenge of understanding and questioning our ways of being in the world—indeed our form of life’ (Coeckelbergh, 2022, 159). In that sense, the proposed phenomenology and hermeneutics is political. Questioning technology becomes also questioning the social order.

This is in line with the spirit of Winner’s work at large and with the initial paper on ‘forms of life’. While, as Winner later explains, he comes more from the political

theory side rather than, say, phenomenology, his use of the term opens up interesting avenues of doing politics of technology if interpreted in the light of Coeckelbergh's theory. It shows that next to paying attention to the use of words about technology (rhetorics about technology), which is needed since language is part of the grammar of technology, Winner's project of a politics of technological artefacts can be expanded to a broader transcendental approach to technology that considers a range of (other) background conditions that 'structure' technology use, and in that way does fully justice to the *critical* potential in Winner's work. Starting from Winner's suggestion that we must attend to forms of life, we have thus not only retracted the ontological in Winner but also further developed what this means. In the next sections, we continue this move from the ontic to the ontological in response to Winner drawing from Arendt's critical engagement with the ontological difference in her analysis of modern technology.

1.4 Re-Reading Winner with and Along Arendt

The choice to mobilize Arendt's analysis of modernity to expand on Winner's reflections on technology is less than obvious. Not only is Arendt rarely taken seriously as a philosopher of technology (with a few exceptions, e.g. Longo, 2024; Markell, 2011; Undurraga, 2019), in even fewer occasions is her work connected to Winner's. This strikes us as a missed opportunity, given the regular references one finds across Winner's texts to several aspects of Arendt's political theory. For Winner, Arendt is one of those few 'radical thinkers' (Winner, 2018, 301) who had thoroughly examined the repercussions of modern technology for 'what it means to be human and what constitutes the "human condition"' (Winner, 2001, 56). If, as Winner claims, 'The basic task for a philosophy of technology is to critically examine the nature and significance of artificial aids to human activity' (2001, 4), there is no doubt that Arendt is a philosopher of technology. Moreover, wherever Winner cites Arendt, he mostly does so to suggest *potential* elaborations on his own analyses without developing them further himself. This section therefore will unpack Winner's suggestions in an Arendtian spirit.

Although both come from different traditions, they often reach similar conclusions about the relationship between politics and technology. In these moments, they both continually rely on the two-way influence between technology and language. While technology is seen as disruptive, it can only disrupt our lives because it enters into the pre-understanding (*Vorverständnis*) of the common world. Winner's claim that technologically induced transformations occur as 'variations of very old patterns' corresponds with Arendt's hermeneutic orientation in which encountering the world always happens by drawing from long standing interpretative frameworks (Borren, 2010, 23). It is in this context that both testified of the impression that the atom bomb had had on them (Arendt, [1958] 2018, 6; Winner, 1980, 131): the first atomic explosion had set into motion a 'process' of which the consequences could no longer remain in anyone's hands. Such inherently political technologies were not

just new ‘instruments’ for those in power, they became part of the new conditions under which political life from now on would unfold (Arendt, 2018, 9): ‘once artefacts such as nuclear power plants have been built and put in operation, the kinds of reasoning that justify the adaptation of social life into technical requirements pop up as spontaneously as flowers in the spring’ (Winner, 1980, 134). While originally citizens acting together in the public realm had the privilege of setting into motion such processes (which, for Arendt, is what the capacity for action is all about), modern society has made scientists the true actors of our time (Arendt, 2018, 323; Winner, 1977, 96).

For these reasons, Arendt and Winner were very critical of the notion—if not the *metaphor*—of ‘progress’ to speak of politics and technology. Thinking history in terms of process rather than a series of related but contingent events was a result of the rising dominance of the so-called ‘natural sciences’ in the nineteenth century, in which the biological ‘life process’ as a set of causal sequences became the model to understand all human affairs, including political and technical practice (Arendt, 2006, 61). This did not remain a mere intellectual problematic but one with practical effects, Winner argues:

Why has a culture so firmly based upon countless sophisticated instruments, techniques, and systems remained so steadfast in its reluctance to examine its own foundations? Much of the answer can be found in the astonishing hold the idea of “progress” has exercised on social thought during the industrial age. In the twentieth century it is usually taken for granted that the only reliable sources for improving the human condition stem from new machines, techniques, and chemicals (Winner, 2001, 5).

By the same token, both rejected any attempt to ‘predict’ the effects of political and technical actions on the common world. For Arendt, these attempts in which ‘permanence is entrusted to a flowing process’ (Arendt, 2006, 75) goes back to Plato, ‘the first to design a blueprint for the making of political bodies’ and who’s approach ‘has remained the inspiration of all later Utopias’ (Arendt, 2018, 227). Although the figure of the ‘philosopher-king’ is rarely defended anymore in contemporary debates, ‘mainstream philosophy is still caught in the same trap [...] making redundant the haphazard contingency of accommodations reached in actual political arenas’ (Canovan in Arendt, 2018, xviii). Winner similarly notes that such urges to predict which changes technology will bring about—‘a somewhat more farsighted version of technology assessment’ (Winner, 1980, 10)—is still very visible in debates on the social impact of digital technologies.

The unease with modes of predicting the effects of technological developments was indeed one of the main issues that Arendt and Winner had with Heidegger. While Winner more specifically has taken issue with Heidegger’s monolithic and over-imposing ontological conception of ‘Technology with capital T’, Arendt, for similar reasons, challenged Heidegger’s ontological project in its entirety. Instead of conceptualizing human existence in terms of *existentialia*, Arendt spoke of the pre-given and man-made *conditions* of human existence (Arendt, 2018, 7). This implies a shift in attention from ‘modes of Being’ to ‘modes of activity’ (cf. *Vita Activa*, the title of the German version of *The Human Condition*). Attending to historical shifts in the composition of such activities, and the ‘conditional structures’ they enact,

allows her to theorize paradigmatic shifts without relying on a ‘history of Being’ as Heidegger proposes. By framing every occurrence within such ontological frames, Heidegger is left with ‘a concept of the Self as the total opposite of man’ (Arendt, 2005, 181), devoid of all human characteristics that ‘arise from human spontaneity’ (Arendt, 2005, 178), or what she later called ‘natality’ (Arendt, 2018, 9). Still, Arendt’s project does not therefore also reject any ontological reflection. As Martin Braun remarks, there is more to Arendt’s analysis than ontic descriptions of ‘what we are doing’ (Arendt, 2018, 5): she ‘goes back to the ontological conditions through which these activities are made possible in the first place’ (Braun, 1994, 19).

Inserting this contingency as the basic condition of the relationship between politics and technology resulted for both in a more-than-instrumental conception of technology. As we already suggested in the previous section, Winner accounted for the non-neutrality of technologies by arguing how they correspond with certain ‘forms of life’. Arendt had already taken issue with the instrumentalist and anthropocentric views of technology that Winner was arguing against:

The discussion of the whole problem of technology, that is of the transformation and world through the introduction of the machine, has been strangely led astray through an all-too-exclusive concentration upon the service or disservice the machines render to men. The assumption here is that every tool and implement is primarily designed to make human life easier and human labor less painful. Their instrumentality is understood exclusively in this anthropocentric sense (Arendt, 2018, 151).

Later on, Winner similarly noted that ‘[j]udgments about technology have been made on narrow grounds, paying attention to such matters as whether a new device serves a particular need, performs more efficiently than its predecessor, makes a profit, or provides a convenient service’ (Winner, 2001, 11). Their responses are alike: where Winner writes that the world-making capacity is ‘the most important accomplishment of any new technology’ (Winner, 2001, 11), Arendt agrees that ‘homo faber, the toolmaker, invented tools and implements in order to erect a world, not—at least, not primarily—to help the human life process’ (Arendt, 2018, 151). Therefore, any major technological disruption results in ‘[v]ast transformations in the structure of our common world’ (Winner, 2001, 9).

Rereading Winner through an Arendtian lens helps to see how Winner continuously and productively moves between ontic and ontological ways of thinking. In putting in the center of philosophy of technology the question ‘what kind of world we are making’ whenever we ‘make things work’, noting how the everyday use of tools inevitably correlates with the ‘production of psychological, social, and political conditions as a part of any significant technological change’ (Winner, 2001, 17), ontic descriptions of what we are doing leads us automatically to the ontological task of analyzing how technologies become the transcendental conditions of our very existence, as well as how they themselves rely on other conditions like language, social relations, human bodies, and material infrastructure (Coeckelbergh, 2022).

1.5 How Artefacts Had/Have Politics: Changes in the Human Condition

By now it has become clear that Winner's overall concern in his philosophy of technology, in the legacy of Arendt, was the 'interesting puzzle [...] that we so willingly sleepwalk through the process of reconstituting the conditions of human existence' (Winner, 1980, 10). One of the major ways that technology plays a role in this is by not only changing our existing practices and 'forms of life', but by *adding* 'fundamentally new activities to the range of things human beings do' (Winner, 2001, 13). He mentions in this regard the changes that 'work' (as *poiesis*) is undergoing in modern society. As Marx taught us, being human is being 'homo faber': production is not just one of many activities that we can or cannot engage in, it is part of the fundamental ways of expressing life. And if Winner and Arendt jointly agree with Marx on one aspect, it is his claim that modern technologies have not only 'aided' how we do 'work' but also powerfully redefined what 'work' means (Winner, 2001, 6). Elsewhere, in an often-unnoticed paper, Winner (1969) has drawn attention to the political effects of cybernetics—a theme that Arendt (1964) also only addressed as an explicit theme in one conference paper but whose more fundamental concerns with the larger transformations of which cybernetics are only part were extensively discussed in *The Human Condition*. On these occasions, Winner refers to Arendt for further analysis, though did not seem to realize that a more elaborate reflection on this matter also has consequences for thinking the politics of artefacts as he did in 1980. This one but last section then wants to show that a more thorough awareness of the repercussions of Arendt's analysis might have given Winner reasons to expand his own framework of political technologies.

Arendt offers throughout *The Human Condition* a critical take on the changing relationship between politics and technology in the modern age. Her analysis rests on a particular appreciation of artefacts and their role in the political realm that so far has been underappreciated in Arendt scholarship (cf. Coeckelbergh, 2009; Longo, 2024). This neglect is mostly due to an *immaterialist reading* of her political theory, in which 'action' is ontologically separated from 'work' and 'labor', the two activities that are explicitly concerned with the material environment. However, this reading ignores how the 'web of human relationships', as Arendt calls it, is only formed through a constant intersubjective relation to the material world of objects or '*Dingwelt*': 'To live together in the world means essentially that a world of things is between those who have it in common' (Arendt, 2018, 52). This material environment acts as an 'objective in-between' that allows people to share words *about* some 'worldly objective reality,' something that literally is between people (*inter-est*) (Arendt, 2018, 182). The products of homo faber then, as we saw, are not just tools to serve human ends; they erect a world by enabling and structuring intersubjective encounters: 'as a table is located between those who sit around it; the world, like every in-between, relates and separates men at the same time' (Arendt, 2018, 52). As a result, there is a special role for homo faber in making the actions of *zoon politikon* in the public realm possible (or not).

As Ihde and Malafouris have pointed out, today we are witnessing a transformation of homo faber itself, as new ‘modes of making’ the *Umwelt* arise due to the advent of smart technology: we become embedded in ‘active technological environments’ (Ihde & Malafouris., 2019, 322). Although they embed the discussion in the recent technological developments, Arendt already early on identified these changing conditions with the rise of automation and cybernetics: ‘the present technology has changed the very worldliness of the human artifice’ (Arendt, 2018, 150). What ‘technology’ *is* changes along with the world it erects. It no longer appears as a stable objective in-between, but increasingly ‘like a biological development of mankind in which the innate structures of the human organism are transplanted in an ever-increasing measure into the environment of man’ (Heisenberg quoted in Arendt, 2018, 153). Arendt takes this transformation as a reason to re-evaluate the *vita activa* itself. In addition to labor, work and action—the basic activities with which we express human existence on earth—needs to be supplemented with a new activity.

Where Arendt calls this new activity in the English version of *The Human Condition* a form of ‘creating’ (*machen*), the German version adds the term ‘*technisch tun*’ ([1981] 2020, 175). For Arendt this has caused a rupture in the activity of ‘work’ itself, since the classical categories to describe the products of homo faber no longer seem to apply. While traditionally, fabrication involved a ‘series of separate steps’ in which the product was still clearly distinct from the process of making, technology has become ‘a continuous process’ that dissolves this very distinction (Arendt, 2018, 149). Again, this transformation does not just entail a change in ‘what we are doing’ (ontically) but has ontological implications as well: rather than conceiving of events, things and individuals in their singularity, this ‘process turn’ re-frames phenomena as (part of) autopoietic, self-organizing and all-encompassing processes (Hyvönen, 2016, 14). It would be shortsighted to conclude that the advent of automation has simply *distorted* human perception; rather, this process-framing became an intrinsic *part of* how we apprehend the common world, ‘bridging the gap between human subjectivity and nonhuman processes’ (Simbirski, 2016, 608). Arendt and Winner come together smoothly here: technologies do not just affect changes in the activities we engage in but also—perhaps more importantly—in the everyday conditions under which we engage in these activities, leading to transformations of the ‘basic commitments and projects of modern technological society’ (Winner, 1993, 375).

1.6 Back to Moses’ Bridge, and Moving on with Algorithms

Confronting this analysis with Winner’s framework suggests that there may be different *ways in which* artefacts can have politics. Here, again, the importance of a fruitful engagement with both the ontic and the ontological level of technological mediation becomes clear, as well as the role that Arendt can play in continuing

Winner's and Coeckelbergh's move from empirical to transcendental philosophy of technology.

To make this concrete, we revisit Winner's classic case of Moses' bridge from an ontological perspective. In Winner's ontic account of the politics of artefacts, Moses' bridges are political because they practically correspond with or 'require' certain political relationships (e.g. structural and racist patterns of equality). An ontological reading of this example, however, shows the bridges do more than just directly enabling and constraining certain actions for certain groups of people (or installing 'affordances', as Davis (2020) calls it). They also erect a 'world' in which the racist segregation is maintained and becomes part of a 'way of life'. As Coeckelbergh (2022) argued, such examples only be accounted for if we *assume* other conditions that make these influences possible. For example, the capacity to make a distinction between 'black' and 'white' rests on the fact that human existence is mediated by *language*. Moreover, the way human existence is ontologically always already *embodied* as well as embedded in *social relationships* with others are conditions of possibility for such 'ways of life' to emerge in the first place. Lastly, artefacts 'make worlds' because of their creation of and relation to *material and infrastructural environments* which we commonly relate to, as Arendt notes. In doing so, artefacts that make up public space (such as Moses' bridges) become an 'objective in-between'.

Yet, it is important to see that artefacts *can* gather, relate and separate us in certain ways only *because* their way of existing (or 'ontological constitution') enjoys stability and permanence. By transcending the cyclical temporality of nature and life processes, artefacts endow the human world with durability (Arendt, 2018, 137; Taminioux, 1997, 14). Bonnie Honig has expressed the importance of such objects in her book *Public Things: Democracy in Disrepair* (2017). At this level man-made things start to provide a so-called 'holding environment'. Stable artefacts allow political communities to cohere by extending a kind of magical envelope around us that forms people as a collective. Yet, importantly, they do so without determining in any way what a collective means or does. Good examples of this are public parks or other public meeting spaces. Such objects often provide the framework for shared practices that support a sense of community among people. This enables artefacts—as "in-between"—to become a matter of shared concern: '[m]ost action and speech is concerned with this in-between' (Arendt, 2018, 182). It allows us to talk about their meaning, as Winner himself exemplifies. Yet, at the same time, the robustness of material artefacts also enables them to discriminate consistently in line with certain political relationships, as Winner's examples illustrate. If Moses' bridges would not enjoy a durable and stable existence, as *thingly* in-between, it would not succeed in 'having politics' the way Winner describes.

It is therefore no exaggeration to say that social media algorithms are deeply transforming the structure of political relationships: the ontological status of algorithms fundamentally undermines the thingly stability that characterizes traditional artefacts like Moses' bridges. While material artefacts maintain a durable presence that persistently structures human movement and social access, the contemporary algorithmic infrastructures of social media are marked by a processual character

that resists fixity. This distinction is particularly evident in the shift from *static*, rule-based algorithms (also ‘symbolic AI’)—designed to consistently produce the same output for a given input—to *dynamic* machine learning systems that generate models from data and continuously recalibrate their behavior (also ‘sub-symbolic AI’) (Bucher, 2018, 24; Benjamin, 2023, 14). Their purpose is to find probabilistic models that can approximate patterns in the world (Benjamin, 2023, p. 223). Rather than executing a prescribed function or a set of rules, the purpose of ML is to *find*—perhaps even ‘diagnose’—a function to make sense of certain input.

Arendt already anticipated this shift in 1958, noting that modern technologies were undergoing as well as amplifying a ‘process turn’, in which the ‘product’ of homo faber can no longer be properly distinguished from the ‘process’ of making it (Arendt, 2018, 150). As Andreas Hepp has pointed out, digital media are not simply ‘there’ but always *emerging* in ongoing interactions between hardware, software and human activity: ‘based on algorithms and infrastructures, they are generated in narrow recursiveness loops and exist in a state of continuous “beta”’ (Hepp, 2020, 12). Therefore, it is nonsensical to say that we would ‘see’ or ‘use’ an algorithm (like we would see and use an artefact); enact the algorithm through human-computer interaction (Galloway, 2006, p. 19). Machine Learning (ML) algorithms are never pre-set but emerge as a ‘strategy, or plan of action—based on interactions with unfolding events’ (Chun, 2013, p. 126); any social media algorithm thus constantly evolves along with the data it draws from. This process of ‘finding’ predictive functions is not only an activity of ‘the algorithm’ itself. Also, the user is involved in helping the algorithm find a set of rules that fits their needs or desires. Its continuous ‘improvement’ is not a linear development based on automated inputs that eliminate human involvement but is always a *temporary* improvement serving a specific user-context. Algorithms are therefore better understood as ‘performative events’ dependent on the situatedness of their actions and responding to particular circumstances rather than stable and universal rules. Therefore, because algorithms have a different ‘way of existing’ compared to artefacts or things, the ‘forms of life’ that we engage in are also shaped by our ‘processual’ apprehension of individuals and events in the world. And this, in turn, causes algorithmic technologies to exemplify a different way of ‘having politics’: This means that algorithmic systems—whether filtering news feeds, curating content, or structuring visibility—do not simply embed pre-defined political logics into durable infrastructures. Rather, they enact an ongoing process of reconfiguring the contours of political agency through an evolving interaction between datafied inputs, user responses, and platform affordances. In such an environment, mediation itself is no longer a function of stable technological forms but a continuous negotiation between human intentionality and the predictive operations of AI systems.

This does not mean that social media environments lack stability entirely. As scholars within the growing field of platform studies have shown, platforms do maintain structural possibilities and constraints through, for instance, moderation policies and affordances that shape user behavior. Platforms such as Twitter (now: X) and TikTok establish socio-technical infrastructures that enable new ways of constructing collective narratives and identities (Longo, 2023). Decentralized

publishing, the interactivity of the medium, and the persistence and replicability of online content (Boyd, 2011, 46) all provide a level of infrastructural durability akin to traditional artefacts. For these reasons, Lucas Introna and David Wood (2004) have argued that digital technologies, such as facial recognition software, replicate the logic of Winner's analysis by embedding social and political biases into their design: each, 'by its very design, includes certain interests and excludes others' (Introna & Wood, 2004, 179). Bucher (2018) extends this analysis by explicitly likening social media algorithms to Winner's case of Moses' bridges: just as Moses' bridges physically regulated access to public infrastructure along racial and class lines, algorithms today 'explicitly decide, order, and filter the world in specific ways' (Bucher, 2018, 23).

However, we claim that the *transformative* political effects of such platforms arise less from these durable platform configurations and more from the processual character of social media algorithms as 'in-between'. That is, the instability and indeterminacy of algorithmic environments have become defining characteristics of contemporary social media platforms themselves, shaping how content appears and how users respond to it. Platforms like TikTok, Instagram, and YouTube operate through continuously evolving algorithmic infrastructures that transform user engagement into input for further recalibration. This means that what is 'common' in algorithmic environments—both in the sense of what gathers, relates, and separates users and in the sense of what is collectively experienced as a matter of concern—is not a stable, thingly in-between, but an indeterminate, *processual in-between*. Jurgita Imbrasaite (2022) similarly argues that TikTok's algorithmic infrastructure fosters an *emergent* public realm in which users 'act-with' the platform's algorithm, rather than merely 'acting in' a pre-existing environment. This is particularly evident in TikTok's For You Page (FYP), where users do not simply engage with a static social space but are continuously re-situated within a personalized, evolving media environment that reconfigures itself in response to their behaviors: 'Rather than being a pre-defined technological structure that determines political action, the algorithm emerges as an infrastructure that is itself shaped and reshaped through user interaction' (Imbrasaite, 2022, 15). This indeterminacy is then the new 'quasi-transcendental' condition under which political interaction in algorithmic environments come into being. Since we are still, as both scholars and as society-at-large, trying to grapple with the consequences of these changes, finding a language to adequately articulate this new mode of 'having politics' will remain a challenge for the coming years, if not decades. This preliminary analysis shows that much more research can be done within the framework that Winner and Arendt have helped us set up.

Taking Winner's approach to the politics of artefacts into the digital age means also seeing this ontological distinction. We cannot just project the structure of the 'politics of artefacts' onto the 'politics of algorithms'. Moreover, if we stick to a strict separation between ontic and ontological concerns with technology, we risk conflating different ways in which technologies *can be* political. As Heidegger had always intended it, and as Winner and Arendt support it, philosophers of technology now face the task of moving beyond the ontic/ontological *dichotomy* into a

productive *entwinement* between the two. The exploration of how artefacts have politics in this chapter reveals a nuanced relationship between the empirical level of human-technology relations and the transcendental conditions that they enact. By extending Winner's framework, informed by Arendt's analysis, we see that artefacts do more than merely influence, enable and constrain behavior; they help construct the very worlds we inhabit, shaping the structures of social and political life. As technologies evolve, particularly with the rise of algorithmic processes, the way these worlds are formed and maintained changes along and therefore fundamentally alters how politics is embedded within technological configurations. As we move further into the digital age, recognizing and philosophically analyzing these ontological shifts will be crucial for comprehending the new political relationships that Winner has managed to make us see.

References

- Achterhuis, H. (2001). *American philosophy of technology: The empirical turn* (R. P. Crease, Trans.). Indiana University Press.
- Arendt, H. (1964). *Hannah Arendt papers: Speeches and writings file, 1923-1975; Essays and lectures; "Cybernetics," lecture, 1964*. Manuscript/Mixed Material. MSS11056, Box 72. Library of Congress. <https://www.loc.gov/item/mss1105601187/>
- Arendt, H. (2005). What is existential philosophy? In J. Kohn (Ed.), *Essays in understanding, 1930-1954: formation, exile, and totalitarianism* (pp. 163–187). Schocken Books.
- Arendt, H. (2006). *Between past and future: eight exercises in political thought* (Penguin classics). Penguin Books.
- Arendt, H. (2018). *The human condition*. The University of Chicago Press.
- Arendt, H. (2020). *Vita activa oder Vom tätigen Leben*. T. Meyer (Ed.). Piper.
- Belu, D. S., & Feenberg, A. (2010). Heidegger's aporetic ontology of technology. *Inquiry*, 53(1), 1–19. <https://doi.org/10.1080/00201740903478376>
- Benjamin, J. J. (2023). *Machine horizons: Post-phenomenological AI studies*. PhD, University of Twente. <https://doi.org/10.3990/1.9789036555357>
- Borren, M. (2010). *Amor Mundi: Hannah Arendt's political phenomenology of world*. PhD, University of Amsterdam. <http://dare.uva.nl/record/346972>
- Boyd, D. (2011). Social network sites as networked publics: Affordances, dynamics, and implications. In Z. Papacharissi (Ed.), *A networked self: Identity, community and culture on social network sites* (pp. 39–58). Routledge.
- Braun, M. (1994). *Hannah Arendts transzendentaler Tätigkeitsbegriff*. Lang.
- Bucher, T. (2018). *If...then: algorithmic power and politics*. Oxford University Press.
- Chun, W. H. K. (2013). *Programmed visions: Software and memory*. MIT Press.
- Coeckelbergh, M. (2009). The public thing: On the idea of a politics of artefacts. *Techné: Research in Philosophy and Technology*, 13(3), 175–181.
- Coeckelbergh, M. (2017). *Using words and things: language and philosophy of technology*. Routledge.
- Coeckelbergh, M. (2018). Technology games: Using Wittgenstein for understanding and evaluating technology. *Science and Engineering Ethics*, 24(5), 1503–1519. <https://doi.org/10.1007/s11948-017-9953-8>
- Coeckelbergh, M. (2022). The grammars of AI: Towards a structuralist and transcendental hermeneutics of digital technologies. *Technology and Language*, 3(2), 148–161. <https://doi.org/10.48417/TECHNOLANG.2022.02.09>

- Davis, J. L. (2020). *How artefacts afford: the power and politics of everyday things*. MIT Press.
- Ellul, J. (2011). *The technological society: A penetrating analysis of our technical civilization and of the effect of an increasingly standardized culture on the future of man* (J. Wilkinson, Trans.). Vintage Books.
- Feenberg, A. (2010). *Between reason and experience: essays in technology and modernity*. MIT Press.
- Galloway, A. R. (2006). *Gaming: Essays on algorithmic culture*. University of Minnesota Press.
- Gertz, N. (2018). *Nihilism and technology*. Rowman & Littlefield International.
- Heidegger, M. (1977). *The question concerning technology, and other essays* (W. Lovitt, Trans.). Garland Publishing.
- Heidegger, M. (2007). *Being and time* (J. Macquarrie & E. Robinson, Trans.). Blackwell.
- Hepp, A. (2020). *Deep mediatization. Key ideas in media and cultural studies*. Routledge.
- Honig, B. (2017). *Public things: democracy in disrepair*. Fordham University Press.
- Horkheimer, M., & Adorno, T. W. (2016). *Dialectic of enlightenment* (J. Cumming, Trans.). Verso.
- Hyvönen, A.-E. (2016, November). Invisible streams: Process-thinking in Arendt. *European Journal of Social Theory*, 19(4), 538–555. <https://doi.org/10.1177/1368431016633572>
- Ihde, D. (1990). *Technology and the lifeworld: from garden to earth* (The Indiana series in the philosophy of technology). Indiana University Press.
- Ihde, D. (2010). Heidegger's Technologies: Postphenomenological Perspectives. Fordham University Press.
- Ihde, D., & Malafouris, L. (2019, June). Homo faber revisited: Postphenomenology and material engagement theory. *Philosophy & Technology*, 32(2), 195–214. <https://doi.org/10.1007/s13347-018-0321-7>
- Imbrasaitė, J. (2022). Acting-with: On the development of a public realm on TikTok during the pandemic and its potential to enable action. *Techné: Research in Philosophy and Technology*, 26(3), 504–522. <https://doi.org/10.5840/techne2023126171>
- Introna, L., & Wood, D. (2004). Picturing algorithmic surveillance: The politics of facial recognition systems. *Surveillance & Society*, 2(2/3). <https://doi.org/10.24908/ss.v2i2/3.3373>
- Lemmens, P. (2022, December). Technologizing the transcendental, not discarding it. *Foundations of Science*, 27(4), 1307–1315. <https://doi.org/10.1007/s10699-020-09742-5>
- Lemmens, P., Blok, V., & Zwier, J. (2017). Toward a terrestrial turn in philosophy of technology. *Techné: Research in Philosophy and Technology*, 21(2/3), 114–126. <https://doi.org/10.5840/techne2017212/363>
- Longo, A. (2023). Digital reconfigurations of collective identity on Twitter in advance: A narrative approach. *Techné: Research in Philosophy and Technology*, 27(1), 60–85. <https://doi.org/10.5840/techne2023317175>
- Longo, A. (2024). Reversing the primacy of political action: Thinking politics and technology with Arendt. *Arendt Studies*. <https://doi.org/10.5840/arendtstudies20248759>. Online first.
- Marcuse, H. (2003). *One-dimensional man: Studies in the ideology of advanced industrial society*. Routledge.
- Markell, P. (2011). Arendt's work: On the architecture of the human condition. *College Literature*, 38(1), 15–44. <https://doi.org/10.1353/lit.2011.a409860>
- McMullin, I. (2013). *Time and the shared world: Heidegger on social relations*. Northwestern University Press.
- Misa, T. J. (2009). Findings follow framings: Navigating the empirical turn. *Synthese*, 168(3), 357–375. <https://doi.org/10.1007/s11229-008-9447-y>
- Rosenberger, R. (2017). *Callous objects: Designs against the homeless*. Forerunners. University of Minnesota Press.
- Simbirski, B. (2016). Cybernetic muse: Hannah Arendt on automation, 1951–1958. *Journal of the History of Ideas*, 77(4), 589–613. <https://doi.org/10.1353/jhi.2016.0032>
- Slaby, J. (2021). Ontic (*Ontisch*). In M. A. Wrathall (Ed.), *The Cambridge Heidegger Lexicon* (pp. 542–546). Cambridge University Press. <https://doi.org/10.1017/9780511843778.147>

- Smits, M. (2001). Langdon Winner: Technology as a shadow constitution. In H. Achterhuis (Ed.), *American philosophy of technology: The empirical turn* (R. P. Crease, Trans.) (pp. 147–170). Indiana University Press.
- Taminiaux, J. (1997). *The Thracian maid and the professional thinker: Arendt and Heidegger* (SUNY series in contemporary continental philosophy. M. Gendre, Trans.). State University of New York Press.
- Undurraga, B. (2019). Historicizing distinctions: Hannah Arendt on science and technology. *Arendt Studies*, 3, 153–172. <https://doi.org/10.5840/arendtstudies201941518>
- Verbeek, P.-P. (2005). *What things do: Philosophical reflections on technology, agency, and design* (R. P. Crease, Trans.). Pennsylvania State University Press.
- Verbeek, P.-P. (2020). Politicizing postphenomenology. In G. Miller & A. Shew (Eds.), *Reimagining philosophy and technology, reinventing Ihde* (Philosophy of engineering and technology) (Vol. 33, pp. 141–155). Springer. https://doi.org/10.1007/978-3-030-35967-6_9
- Verbeek, P.-P. (2022). The empirical turn. In S. Vallor (Ed.), *The Oxford handbook of philosophy of technology* (pp. 34–54). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780190851187.013.4>
- Winner, L. (1969). Cybernetics and political language. *Berkeley Journal of Sociology*, 14, 1–17.
- Winner, L. (1977). *Autonomous technology: Technics-out-of-control as a theme in political thought*. 9. printing. MIT Press.
- Winner, L. (1980). Do artefacts have politics? *Daedalus*, 109(1), 121–136.
- Winner, L. (1993). Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology. *Science, Technology, & Human Values*, 18(3), 362–378. <https://doi.org/10.1177/016224399301800306>
- Winner, L. (2001). *The whale and the reactor: A search for limits in an age of high technology*. University of Chicago Press.
- Winner, L. (2018). Technological investigations: Wittgenstein's liberating presence. *Techné: Research in Philosophy and Technology*, 22(3), 296–313. <https://doi.org/10.5840/techne2018111485>
- Wittgenstein, L. (2009). *Philosophische Untersuchungen/Philosophical investigations* (G. E. M. Anscombe, P. M. S. Hacker, & J. Schulte, Trans.). Wiley-Blackwell.
- Zwier, J., Blok, V., & Lemmens, P. (2016). Phenomenology and the empirical turn: A phenomenological analysis of postphenomenology. *Philosophy & Technology*, 29(4), 313–333. <https://doi.org/10.1007/s13347-016-0221-7>