



Capitalism as a Species of Automation

Devin Wangert

ABSTRACT: For many decades, full automation has been treated as a possible outcome arising from the incessant transformation of the world's labour processes. The recent massification of ChatGPT and generative AI technologies has exacerbated the speculative tendency to move freely between the sense that this future is possible, on the one hand, and that it is proximate, on the other. Increasing confidence that this impending trajectory is already secured has incited both popular literature and funding-round proposals that put dates and concrete numbers on the temporal distance between our present and its fully automated future. While many critics have noted that full automation is not a new idea, what is more crucial is that its earlier precedents did not belong exclusively or even primarily to science-fiction: the genuine belief that full automation was and now is right around the corner is not new, either. In "Capitalism as a Species of Automation," I study how and why the notion of full automation has become a recurrent threshold state used to periodize the collective presents of capitalist development. What if full automation has always haunted capitalism's proximate futures because automation is itself an anachronism? In this article, I contend that while full automation appears as a technical antagonism that repeatedly restages the replacement of human labour, it relates to capitalist development as a temporal antagonism defining the replacement of *technology by technology*. In demonstrating how the contradictions internal to capitalist development come to be reformulated as temporal dynamics animating technological development, I focalize automation as a privileged interpretant of the mechanisms through which capitalism accumulates and disaccumulates value.

KEYWORDS: Automation, accumulation, disaccumulation, media studies, real subsumption.

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- *Correspondence:* Devin Wangert, University of Tyumen, *Russia*.
 - e-mail: d.wangert@utmn.ru
 - ORCID: -
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1. Enduring Automation

Sites of automation and automative technologies have become seductive metonyms for what is contemporary about the contemporary moment. The affordances and properties of these technologies have been used as prominent signifiers defining the boundaries inherent to our periodizations of capitalism: if, for example, the automation of motor function delimited late nineteenth and twentieth century capitalism from its preceding epochs, the automation of mental labour seems now to delimit the early twenty-first century. Accordingly, one popular interpretation of automation's relationship to capitalism today is the notion that the world's labour processes are on the precipice of *full automation*—that AI and machine learning technologies now herald the accumulative possibility of automating, in “real time,” “the mental processes that can be made to control automated manual processes” (May 2017, 22).

If what seems to determine the contemporary *qua* contemporary is this threshold state of full automation, the term's spatial logic implies that automation itself is not a unique determinant of twenty-first century capitalism. Full automation implies a progressive (albeit not necessarily continuous) logic in which a greater and greater amount of territory in the labour process is subsumed by automative technologies. Indeed, it is understandable as a threshold state because it defines itself against a limit after which there will be no further site or type of labour to automate. As Matteo Pasquinelli notes in *The Eye of the Master*, this does not necessarily imply that ‘subsumption’ is synonymous with ‘labour replacement,’ but it does lead to a notion of spatial conquest in which “AI [can be interpreted as] the *culmination* of the long evolution of labour automation and quantification of society” (Pasquinelli 2023, 247).¹ If full automation is a metonym for the contemporary, it is because it appears to realize and fulfill a process of automation that began centuries ago. Crossing this threshold would ostensibly see the long evolution of labour automation henceforth be what it was always becoming.

However, there are two reasons that any historiography of a contemporary defined by full automation must remain in the hypothetical. The first reason is that full automation has not (yet) happened. The second is that, more crucially, the threshold state of full automation—and not simply automation itself—has had two centuries of historical prece-

1. Italics mine.

dents. Summarizing the long history of what he terms “automation discourse,” Aaron Benanav observes the following in his book, *Automation and the Future of Work*:

Automation may be a constant feature of capitalist societies; the same is not true of the theory of a coming age of automation, which extrapolates from instances of technological change to a broader account of social transformation. On the contrary, its recurrence in modern history has been periodic. Excitement about a coming age of automation can be traced back to at least the mid nineteenth century, with the publication of Charles Babbage’s *On the Economy of Machinery and Manufactures* in 1832, John Adolphus Etzler’s *The Paradise within the Reach of All Men, Without Labour* in 1833, and Andrew Ure’s *The Philosophy of Manufactures* in 1835. These books presaged the imminent emergence of largely or fully automated factories, run with minimal or merely supervisory human labor. Their vision was a major influence on Marx, whose *Capital* argued that a complex world of interacting machines was in the process of displacing human labor from the center of economic life. Visions of automated factories appeared again in the 1930s, 1950s, and 1980s, before reemerging in the 2010s. Each time, they were accompanied or shortly followed by predictions of a coming age of ‘catastrophic unemployment and social breakdown.’ (Benanav 2020, 7–8)

The corpus that Benanav has assembled does not tell the story of a simple dialectic of forgetting and remembering that has characterized theories of social transformation accompanying the development of automative technologies since the nineteenth century. Rather, what he indicates is a more profound iterativity whereby the signal precedent of full automation is that, in each and every epoch that it emerges, it emerges *as unprecedented*. Paradoxically, because each of these epochs shares an image of full automation (rather than ‘more’ automation) as a precedent, they each appear as unique and unprecedented within the history of capitalist development. It is precisely this factor that makes automation an easy metonym not only for our contemporary, but the contemporary in aggregate: in 1832, society finds itself on a threshold after which the evolution of labour automation will finally culminate a process it had heretofore been becoming; in 1930, society finds itself on a threshold after which the evolution of labour automation will finally culminate a process it had heretofore been becoming; in our contemporary moment, society finds itself...

Are these past precipices of full automation wrong and is our present, AI-driven, precipice right? Conversely, should the repetition of these claims within an archive that can only be right once (if at all) lead us to moderate our emphasis on the exceptional character of *this* present? Are

these questions about full automation ultimately decidable from within a linear framework of progressive automation? If they are not, this might reveal something about automation itself and not only our collective trouble with correctly periodizing its development and theorizing its social implications. What interests me here is that the iterativity of this process describes the return not only of the specter of full automation, but its culminative relation to a process of past automation which it is on the precipice of fulfilling. A seemingly intuitive proposition about the *progressive* automation of the world's labour processes has as its verso a *subsumptive* proposition which holds that automation is, each and every time it reemerges, the full automation of those labour processes. Put differently, because a given contemporary moment (1930, 1950, 2025) is subsumptive in relation to each epoch it succeeds, the preceding epochs must be treated as interim states. Because each of those epochs now treated as interim states likewise originally understood itself to be in the position of a final, subsumptive relation with regards to the epochs it succeeded, these claims have an in-built corrective mechanism. Thought synthetically, this corrective mechanism leads to a polemical outcome. Each claim must simultaneously re-periodize the past by reiterating the exceptional, subsumptive character of the present, which will itself be open to this same corrective mechanism as the interim coordinates of a future epoch. It follows that subsumption is not, as common sense might tell us, the terminus of progressive automation: it rather operates according to an iterative logic that violates the logic of progressive automation even as it both concludes and incites it. As a limit-state, the subsumption implied by full automation is both final *and* mobile.

The relationship between the historical development of capitalism and the historical development of automative technologies *under* capitalism thus becomes a problem for thought. To the extent that the progressive history of labour automation is actually derived from the repeated restaging of labour's full automation, this coupling can only result in a contradiction which seems to prohibit recourse to that same linear, accumulative mode of development posited by the long history of labour automation. My general intervention in this article is to argue that this temporal contradiction between progressive automation and full automation does not need a resolution: it should be treated as a real, enduring contradiction that has been and continues to be borne across the stages of capitalist development. To that end, I explore how and why automation becomes a unique site of semantic and historiographical

confusion and correction within the historical span of capitalism. I argue that an analysis of this historiographical dynamic demonstrates that automation itself must be understood as an *anachronism*—a problem of time specific to the mode of development of capitalism. What appears like a polemical struggle over the periodization of a perpetually coming age of full automation is, when read cumulatively, an index of the temporal register proper to automation operations and their technological development within a capitalist mode of production.

In using this temporal problem to formalize the relationship between the historical development of automation and the historical development of capitalism, I sustain five main theses across this article. (1) The incessant restaging of full automation is a necessary outcome of the role that automative is a necessary outcome of the role that automative technologies play as vehicles for the accumulation. (2) This structural linkage between the historical development of automative technologies and the process of capitalist accumulation means that the primary dynamic of automation is not the eventual replacement of labour by technology but the perpetual replacement of technology by technology. (3) This dynamic effectively depends on restaging the *disappearance* of labour (without actually eliminating labour) because it uses labour as a metric for evaluating the performance of distinct automative technologies as vehicles for the accumulation of value. (4) The perpetual replacement of technology by technology defines an iterative trajectory of capitalist development in which capitalism must restage the process through which it *finally* but *repeatedly* realizes itself in successive forms of technological development. (5) We can consequently read the continual reiteration of the question of the full automation of labour as a cipher through which capitalism constantly restages its own accumulative dynamics.

I treat the long history of labour automation through what I call a media theory of labour. Instead of beginning from the supposition that automative technologies have innate technological properties that render them as obvious functional equivalents of human labour, and instead of supposing that these properties eventually accumulate so that there are (or will be) technological equivalents for all sites of human labour, I propose that the *work* done by a given automative technology is an outcome to be explained rather than an analytic point of departure. In my conception, what automation actually does in the production process would thus be the outcome of a temporal contradiction linking the historical development of capitalism to technological development un-

der capitalism. For this reason, I do not introduce an operative technological definition of automation—the idea, for example, that an automative technology is distinguished from other technologies because the former has a technological property that allows it to ‘move by itself’ or ‘work by itself.’ Instead, I derive what automation actually does or does not do from its linkage to the temporal organization of capitalist development: as we will see, when capitalist development seems to ‘move by itself’—that is precisely when the technologies of the production process come to ‘work by themselves.’ As a temporal contradiction, automation thus interlocks two critical desires: a desire within Marxist political economy to periodize the difference made by contemporary capitalism and a desire within media philosophy to formulate automative operations as performances of technological labour.

If I am correct that automative labour or work is the product of a mode of time rather than an intrinsic technological property, then the problem of full automation is not decidable on the basis of the idea that past epochs which understood themselves as tending towards full automation were incorrect because they were eventually found to be lacking a technological property that was introduced into labour processes in subsequent epochs. What stopped the automated factories of the 1930s from being fully automative was not a lack of AI technologies. To that end, an anachronistic temporal operation describes the condition for actually-existing automation, not a speculative future domain of automation. If what automative technologies actually do in the present is derived from the iterative introduction of *further threshold states* of full automation in the future, then *further automation* does not automate out a last remainder but recapitulates it anew.

Why should the anachronism I am describing come to define automation itself? Doesn’t what I have noted thus far merely demonstrate that we have repeatedly misinterpreted the future? After all, we tend to do that. The second section of this piece turns to a tension inherent in Karl Marx’s own understanding of the relationship between automative technologies and capitalist development. I do this to demonstrate that this problem of time is encoded in capitalism’s developmental logic, animating its future elaboration. Where Marx originally understood the accumulation of automative technologies to represent a crisis for capitalism as a system of production based on and measured by human labour, by the time of the publication of *Capital* he ‘resolves’ this crisis through the concept of “real subsumption.” This concept centralizes the perpetual replacement of technology by technology over and above the

potential replacement of labour by technology. This shift in emphasis also entails that Marx interpret automative technologies as vehicles for the accumulation of value under capitalism, thus creating a structural linkage between the development of automative technologies and the development of capitalism. I will show how it is precisely Marx's transformation of this prospective crisis into a perpetual process of replacement that entrenches automation as a real problem of time within the arc of capitalist development.

In the subsequent sections of this piece, I will study how the legacy of this temporal contradiction already authorized in and incited by Marx's own formalization of real subsumption is endured across an archive of attempts to periodize real subsumption according to automative technologies in the time after Marx. Methodologically speaking, this polemic becomes more than a polemic when read in aggregate: this archive is valuable because it *shows* something (cumulatively) that its theorists do not *describe* (individually). I therefore centralize a reception history that has been left to work out the legacy of this transformation of the crisis of fixed capital between *Grundrisse* and *Capital* not because I am primarily interested in who is right and who is wrong. Rather, I use this archive as an archaeological optic on both automative operations and the development of automative technologies under capitalism. I will demonstrate how this archive of (mis)readings and re-readings forms a protocol that seems to duplicate (or "perform"), on an intra- and paratextual level, the anachronistic operations proper to the capitalist conception of automation on a technological level. This archive does so by perpetually re-periodizing *Capital's* real subsumption and perpetually disinterring Marx's "Fragment on Machines" as an explanatory optic on the contemporary defining virtually every decade since the 1940s. In other words, I track the repeated re-periodizing of the epoch of real subsumption not because I believe a correct periodization of real subsumption *should be* synonymous with full automation. Rather, I will demonstrate how the historiographical treatment of real subsumption can become a register tracking the relationship between the development of automative technologies and the historical development of capitalism.

I organize and distinguish two orientations towards the problem of real subsumption's iterativity through two main arcs that structure the remainder of this article. The first set of readers, whom I will come to call "Cyclicists," believe that real subsumption is a concrete stage in the development of capitalism that is directly (but perpetually) in front of us—one that defines the contemporary of capitalism. The second set of

readers, whom I will come to call “Secularists,” believe that real subsumption was a concrete stage in the development of capitalism that is now behind us. As I will demonstrate, the stakes around which position is correct—in front or behind?—are more primarily the stakes of two different orientations towards the iterativity of real subsumption itself, responses to the anachronism of that concept.

My first arc formalizes automation’s relationship to this mechanism of correction and recapitulation that haunts the legacy of real subsumption. As I will demonstrate, Marxisms may not be interested in the iterativity of real subsumption, but it is interested in them—such that the very desire to displace this iterativity only entrenches it. Reading across the Cyclicist stratum of this archive demonstrate how the critique of real subsumption inherits the temporal pathology of that concept. Each critique of the concept becomes synonymous with its recapitulation, predicated as they are on a(nother) finally correct periodization of capitalism based on a(nother) finally correct reading of real subsumption, which is itself based on a(nother) finally *just* disinterment and contemporization of Marx’s “Fragment.” I call this dynamic, which couples the repeated finality of critique with the disinterment and contemporization of Marx’s “Fragment,” the *realer subsumption*. I use this arc to support two theses. First, I argue that the technological properties used to specify each period of real subsumption are in fact derived from the anachronistic logic of automation’s technological development. Second, I demonstrate how the notion of progressive automation (the idea that more and more sites of labour are automated under capitalism) actually defers a terminus after which there would be no labour to automate. I argue that it does this not because real subsumption resolves the question of the disappearance of labour but rather because it is driven by a more primary iterative mechanism that constantly restages labour’s disappearance.

My second arc looks at recent attempts to critique not real subsumption but the mechanism behind its successive correction and recapitulation. Aaron Benanav and Nathan Brown² propose cogent versions of this

2. See Brown (2018, 20–21). Benanav’s critique is indirect in that it is essentially lodged in a compliment that recognizes the prescience of the Cyclicists “social visions.” What we must remember is that the Cyclicists do not think they are Cyclicists. In reality the Cyclicists are, like Benanav, making *economic* arguments based on the way in which *social antagonisms* are *technologically borne*. The accounts that Benanav has in mind are primarily critiques of capitalist presents, not utopian speculations of post-capitalist futures—critiques which Benanav glosses as incorrect and untimely precisely in his praise of their imaginative capaciousness. Thus, when he notes that, “[t]he automation

solution by which there are empirically *incorrect* Marxisms that are analytically interesting because of the fleshiness of their errancy (what they tell us about culture in erring) and finally *correct* Marxisms, like their own, that are analytically correct because they correspond empirically to the actual historical development of capitalism and the actual processes of production that occur today.³ In this situation, the Cyclists (those undergoing critique; those read for the ‘unconscious cultural uptake’ of situations they consciously misrecognize) are interpolated as cultural Marxists, while the latter (those critiquing; those reading for the historical-empirical data that will let them correctly recognize capitalism’s secular development) could be called “Secularist” Marxists. Brown uses the “secular” as shorthand for an approach that grants “explanatory priority” to “capital’s totalizing structural dynamics,” periodizing capitalist development on the basis of how these dynamics or tendencies temporarily crystallize into specific structural coordinates. The Cyclicist, from the Secularist point of view, mistakes cyclical epiphenomena such as “the expansion of markets” or “periodic shifts of supply and demand” for secular, structural coordinates. This distinction allows the Secularists to simultaneously graft Cyclicist Marxisms onto cyclical trends within the development of capitalism and monopolize explanatory license over the linear thrust of capitalism’s secular development, which Brown formalizes as capitalism’s “secular dynamics of accumulation” (Brown 2018, 12). In this way, they really do get close to the ‘realist’ real subsumption, and they do this by periodizing it in such a way that it has (1) already happened globally and secularly and has, even more crucially, (2) ceased to happen by now only happening locally and cyclically.⁴

theorists are our late-capitalist utopians” (Benanav 2020, 11), this interpellative gesture is one of critical diplomacy.

3. “Rather than a theory of capitalist stages prioritizing cyclical dynamics and an order of explanation prioritizing markets and technological innovations, what the work of periodization requires is a unified framework for understanding capital’s secular dynamics, within which the tendential contradictions of accumulation are granted clear explanatory priority and constitute a consistent referent for periodizing transitions” (Brown 2018, 8). “The return of automation discourse has been a symptom of our era, as it was in times past: it has arisen when the gap between the supply and demand for jobs becomes so large, leaving so many individuals scrambling to find scraps of work, that people begin to question the viability of a market-regulated society. Even prior to the outbreak of COVID-19, the breakdown of the labor-market mechanism was more extreme than at any time in the past. This is because, over the past half century, a greater share of the world’s population than ever before came to depend on selling its labor...to survive in the context of weakening global economic growth rates” (Benanav 2020, 12).
4. “[T]he history of modernity continues as the movement of the *same* structural contradictions that necessitate the accomplishment of real subsumption in the first place. One

In maintaining that real subsumption is behind us, the Secularists would thus indirectly challenge my primary methodological proposition—that the iterativity of the concept of real subsumption indexes the temporal logic of automation under capitalism. If the Cyclicists are errant readers of real subsumption, does this not demonstrate that the anachronism I track in this article is proper to the application of the concept of real subsumption, but not proper to real automative operations or the development of automation technologies that real subsumption has been continually used to periodize? Indeed, with the exception of Benanav, the majority of the Secularist correctives I treat here have no overt interest in critiquing automation. Rather, what they respond to is the following question: if real subsumption describes the threshold after which capitalism properly becomes itself, how could we conceive of an epoch *after*? In maintaining that real subsumption is behind us, the Secularists must recapitulate a periodizing gesture by which another phase—alternately named the long downturn, the stationary state, stagnation, devalorization, and so forth⁵—explains how capitalism can fundamentally change itself (in ceasing to be a regime of real subsumption *par excellence*) without ceasing to *be itself*, without ceasing to be capitalism.

What I argue in this arc is that the same factors which the Secularists use to demonstrate that we have moved beyond real subsumption cause them to inadvertently conceive of the epoch after in terms of automation’s anachronistic temporal dynamics—even as and precisely because they are trying to periodize the present according to ostensibly unrelated categories. What each of these periodizing gestures has in common is the proposition that capitalism fails today by working as it always has. The Secularists thus commit to showing how the accumula-

sign that the accomplishment of real subsumption does not signal a radical break with the history of modernity is that the period of declining profitability following from it is attended by profit-seeking through the renewed expansion of absolute surplus value production...We do not exit modernity into a fully modernised world in which uneven development is eliminated, but we do enter into a late phase of modernity, correlated with a late phase of capitalism, during which the social and political consequences of real subsumption play out” (Brown 2018, 19).

5. While I will discuss each of these terms further in the body of this article, they align with the thinkers discussed here as follows. “The Stationary State” refers to the outer bounds of a stagnant capitalism, as formalized in Balakrishnan (2019). “Stagnation” is Benanav’s term for the contemporary moment. See Benanav (2020, 32). The “long downturn” is Robert Brenner’s name for the period and the structural dynamics accompanying the falling rate of profit since the 1970s. See Brenner (2006, 26). For “devalorization” see Aglietta (2015, 102–103).

tive mechanism used to periodize the historical ascendancy of capitalism is also the explanatory device behind the potential limits to economic growth capitalism encounters today (its prospective stagnation) and its tendency to disaccumulate already-created value. In this arc, I argue that if Marx resolves the crisis of fixed capital by reconceptualizing it as an asset enabling the ascendancy and expansion of capitalism, then the way in which this legacy is borne in the contemporary moment shows us how automation can be considered both as an optic on the temporal iterativity of disaccumulation as well as a major stage on which the real process of economic disaccumulation actually plays out. Today, disaccumulation describes the temporal mechanism through which the technologies of the production process can literally be said to be automa-
 tive.

In tracking two opposing orientations towards the temporal contradiction thrown off by Marx's sublimation of the crisis of fixed capital, what I ultimately aim to demonstrate is an involuntary point of consensus. When these theorists are explicitly speaking about automation or when they are inadvertently speaking about automation while trying to periodize capitalism according to ostensibly unrelated categories, they are speaking about automation as a problem of time proper to the dynamics of capitalist dis/accumulation. When these theorists are talking about what automative technologies actually *do* or how they operate in the present, they are talking about a technological property that is effectively derived from this same problem of time. Marx's displacement of the crisis of fixed capital ensures that, whenever we are thinking capitalism's past, present, or future—we are thinking about automation, all the time.

2. Crisis and Chronology: Capitalism as a Species of Automation

The frequency with which we understand change to capitalism as technological change renders the notion of full automation as a problematically intuitive idea that needs no further recourse to structural or schematic elaboration. Conversely and counter-intuitively, the mechanism behind our two centuries of unprecedented precedents of full automation—the cumulative anachronism of this notion—only makes sense as a product of the structural relation between the development of capitalism and the development of technology. This section turns to the problem of automation as it is formalized in the ten years between Marx's writing of the so-called "Fragment on Machines" in his *Grundrisse* and his concept of "real subsumption" in the publication of *Capital*. Where

Marx originally understood the accumulation of automative technologies to herald an eventual crisis of capitalism due to its decentralization of human labour, he comes to sublimate that crisis by understanding the accumulation of automative technologies as a vehicle for the accumulation of value under capitalism—a process through which capitalism effectively becomes itself. In this section, I will show how it is precisely Marx’s own solution to the accumulation of automative technologies that enables and incites the constant restaging of the threshold state of full automation.

Already in his *Grundrisse*, Marx intuited that a proposition about how machinery (as distinct from simple tools) actually works in a present production process was a synthetic proposition that linked the arcs of capitalism’s historical development and the technological development of automation. In the so-called “Fragment on Machines,” where he has frequently been interpreted as offering speculative remarks on a coming age of automation, Marx notes:

The production process has ceased to be a labour process in the sense of a process dominated by labour as its governing unity. Labour appears, rather, merely as a conscious organ, scattered among the individual living workers at numerous points of the mechanical system; subsumed under the total process of the machinery itself, as itself only a link of the system, whose unity exists not in the living workers, but rather in the living (active) machinery, which confronts his individual, insignificant doings as a mighty organism. In machinery, objectified labour confronts living labour within the labour process itself as the power which rules it; a power which, as the appropriation of living labour, is the form of capital. (Marx 1993, 693)

Marx thus narrates what this present production process actually *does* (how it operates) on the basis of “the form of capital” that it has historically come to embody. Marx continues, “Machinery appears, then, as the most adequate form of fixed capital, and fixed capital, in so far as capital’s relations with itself are concerned, appears as the most adequate form of capital as such” (Ibid., 694). Automative technologies make a difference to capitalism’s present (production process) because they appear to realize, some centuries after the origin of capitalist development, the form of capital and systematization of the labour process most adequate to capitalism. These technologies thus double as determinants of present production processes and interpretants which read the stratigraphy of capitalist development as technological development.

For Marx, there are two signal differences between machinery and simple tools. The first is the fact that machinery actively reshaped the

forms of labour involved in the production process. Early capitalism proceeded according to a process of proletarianization and enclosure, which created an ever-growing population of subjects who were required to pay to live and who had no means of satisfying the discipline of payments outside of selling their own labour. In appropriating already-extant forms of labour and reorienting them towards market-based production, it left those forms of labour largely intact. To that end, the introduction of machinery radically intervened in the form and content of labour processes themselves, altering them in ways that did not have clear precedents prior to the development of capitalism.

The second difference has to do with the diminishing role of those subjects who must sell their labour to satisfy the discipline of payments:

In machinery, objectified labour material confronts living labour as a ruling power and as an active subsumption of the latter under itself, not only by appropriating it, but in the real production process itself; the relation of capital as value which appropriates value-creating activity is, in fixed capital existing as machinery, posited at the same time as the relation of the use value of capital to the use value of labour capacity; further, the value objectified in machinery appears as a presupposition against which the value-creating power of the individual labour capacity is an infinitesimal, vanishing magnitude. (Ibid., 694)

As is well known, Marx's labour theory of value is predicated on the argument that the production of surplus value is explained by a mechanism that leverages the difference that exists between how much value an hourly wage can purchase and how much value an hour of labour time creates.⁶ In other words, in order to satisfy the discipline of payments, the worker exchanges his or her labour power over a given quantity of time for a wage, while only a fraction of the quantity of time actually worked (what Marx calls "necessary labour") is required to reproduce the capital initially outlaid for the wage payment. The remaining hours worked after this outlay is recouped are value-added (what Marx calls "surplus labour") that is captured by the capitalist. And Marx thus comes to define capitalism against other forms of social and economic organization by way of the mechanism through which *labour time* is linked to the production of profit. This definition is why Pasquinelli is able to succinctly summarize the qualitative shift that emerges in the initially quantitative adjustment of the ratio of capital outlaid on machinery (what Marx calls "fixed capital") vs. human labour as "a crisis

6. See Foley (1986, 14–15).

of capitalism due to the crisis of the centrality of labour, and therefore of the labour theory of value” (Pasquinelli 2023, 114).

But what, precisely, are the coordinates of the crisis brought on by the accumulation of machinery? Marx continues:

Capital itself is the moving contradiction, [in] that it presses to reduce labour time to a minimum, while it posits labour time, on the other side, as sole measure and source of wealth. Hence it diminishes labour time in the necessary form so as to increase it in the superfluous form; hence posits the superfluous in growing measure as a condition - question of life or death - for the necessary. On the one side, then, it calls to life all the powers of science and of nature, as of social combination and of social intercourse, in order to make the creation of wealth independent (relatively) of the labour time employed on it. On the other side, it wants to use labour time as the measuring rod for the giant social forces thereby created, and to confine them within the limits required to maintain the already created value as value. Forces of production and social relations - two different sides of the development of the social individual - appear to capital as mere means, and are merely means for it to produce on its limited foundation. In fact, however, they are the material conditions to blow this foundation sky-high. (Marx 1993, 706)

As I will explore in the third section of this article, this passage of Marx’s so-called “Fragment” has received extensive and successive theoretical treatment in almost every decade since the *Grundrisse*’s publication in 1941—resulting in often incommensurable theoretical conclusions. Marx claims that the “contradiction” in question is the “exchange of living labour for objectified labour – i.e. the positing of social labour in the form of the contradiction of capital and wage labour” (Ibid., 704). Does the crisis occur because of the fact that the relative magnitudes of capital outlaid on human labour and machinery now have a difference that is exponential? If labour time remains the “sole measure” of the creation of wealth, then the crisis would be the fact that the measuring stick used has become “infinitesimal” in relation to the object it is attempting to measure—like attempting to measure a skyscraper with a hand ruler.

What if the measure itself had not only *become* “infinitesimal,” but was *now* “vanishing”? Marx notes that “machinery inserts itself to replace labour only when there is an overflow of labour powers...It enters not in order to replace labour power where this is lacking, but rather in order to reduce massively available labour power to its necessary measure” (Ibid., 702). Here, the crisis would rather be that the creation of wealth now relatively independent of labour time would cross a threshold after which labour time would be irrelevant. In this account, machinery turns what was formerly necessary labour into excess labour—

workers without work who could only be reabsorbed by capitalism and reemployed if production was capable of expanding. Given that further investment in production would be predicated on expectations of satisfactory demand for the goods produced, and given that the massively available labour power machinery had already rendered superfluous would have no income to support increased demand, the crisis of the accumulation of fixed capital could be read as an absolute limit to expansion, a falling rate of profit that would lower the price of goods without generating more wealth.⁷

This popular interpretation of Marx’s “Fragment” hinges on reading the conjunction “infinitesimal, vanishing” literally and linearly: the infinitesimal status of living labour is, in this logic, what indicates that it is now vanishing and, eventually, will have vanished. It thus becomes the site of projection for two contradictory reception histories which both interpret Marx as writing a prophetic passage in the *Grundrisse* that seems to ultimately contradict the labour theory of value. The utopian interpretation understands Marx as saying that capitalism will drive technological development to the point that it will eventually automate *itself* out, creating a form of post-scarcity socialism where a minimal amount of necessary labour would be sufficient to sustain humanity, while transmuting surplus labour into free time that could be exercised how one sees fit. The dystopian interpretation understands Marx as saying that capitalism will drive technological development to the point that it will eventually automate the bulk of the world’s working populations out while still enforcing the discipline of payments on those subjects—creating a world of work done without workers and a growing population who must pay to live but have no capacity to generate means of payment.⁸ What is striking is that these antimonious readings are derived from the same point of consensus—that technological development will eventually pass a threshold after which capitalism will cease to be capitalism, either by violating its surplus-producing principle or by displacing labour as the producer of surplus value.⁹

7. See Meister (2021, 18).

8. Many different variations of these two interpretations are collected in the journal *e-flux*’s special issue 46, organized around the theme of “accelerationism.”

9. There are many different paths that, taken to their most extended points, could demonstrate this fundamental violation of capitalism’s logic in both the utopian and dystopian valences outlined above. For the sake of illustration, I will give an example using the distinction between necessary labour and surplus labour. In its utopian valence, technological development is thought to eventually violate the structural relationship between necessary labour and surplus labour, given that after necessary labour is recouped a quantity of time would no longer be dedicated to surplus-production *by right*.

Between the writing of his “Fragment” in 1857 and the publication of *Capital* in 1867, scholars of Marx have remarked that this sense that the accumulation of automative technologies will necessarily reach a threshold after which capitalism will cease to be capitalism largely disappears from his theory.¹⁰ Indeed, when Marx introduces the concept of “real subsumption” in *Capital* to describe the process of accumulation of automative technologies analogous to the one glossed in his “Fragment,” he understands it as a modality proper to capitalism—not the forebearer of its downfall.¹¹ I will now discuss how Marx’s resolution of this crisis transforms the accumulation of automative technologies into a temporal problem.

“Free time” untethers necessary labour from surplus labour and makes the production of surplus merely one option among others. Put differently, while it is correct that there is necessary labour in all organizations of society, there is also a specific valence through which “necessity” is defined under the capitalist mode of production. It is defined against surplus as the minimal cost necessary to maintain and reproduce the worker such that this subject can live to produce surplus again the following day. The definition of necessary labour is derived from capitalism’s surplus-producing necessity, in other words—not from workers’ own sense of their needs. A post-scarcity society that does not maintain and reproduce the worker precisely to produce surplus (capitalism’s definition of necessity), and does not price the existence of that subject against surplus-production, is no longer a capitalist society. The dystopian valence—the idea that automative technologies develop to such a point that they now produce surplus value entirely without human labour—is likewise untenable within the capitalist mode of production. Marx privileges labour time as his measure of value precisely because labour couples exchange and production. As we have already seen, surplus value is derived from the distinction between how much value an hourly wage can purchase and how much value an hour of labour time creates—this double-status of labour is elsewhere what he singles out as labour’s “value-creating possibility” (Marx 1993, 452). If technology develops to the point that it produces surplus value without any intervention of human labour, the crisis is not simply that Marx’s labour theory of value no longer explains capitalism (because labour no longer measures the production of value), but that the mode of production that needs to be explained is no longer capitalism. While it is correct that there is surplus production in other organizations of society, there is likewise a specific valence through which “surplus” is defined under the capitalist mode of production. Here surplus does not simply mean that technology can produce more than is necessary for the survival of a society, but describes instead how an unprecedented magnitude of value emerges out of exchange. Put differently, in paying a wage rather than reimbursing the worker for the full value produced by an hour of labour time, the capitalist is able to appropriate the difference, and thus appropriate value that was not originally exchanged. If automative technologies could by themselves guarantee the generation of a certain amount of surplus value, as defined above, this guarantee would already be priced into exchange: such technologies would be *worth* the sum total of this guarantee, less a premium for the time it takes to fulfill the guarantee. In other words, surplus—an unprecedented magnitude of value—would not emerge through exchange, and any gains would be due to the accumulation of *interest*. If technology really can be said to produce surplus here, it is thus not the type of surplus that defines capitalist production.

10. See Heinrich (2013, 197). See also Spence (2019, 327–339).

11. See Marx (1990, 643–667).

In his article, “The Capitalist Use of Machinery: Marx Versus the Objectivists,” Raniero Panzieri formalizes the impetus through which capitalism *necessarily* arrives at the stage of real subsumption by noting that, “[t]echnological progress itself thus appears as the mode of existence of capital, as its development” (Panzieri 1980, 46). That Panzieri was, like Marx, effectively attempting to offer a single, synthetic proposition about present automative operations and the historical development of automative technologies under capitalism is evident from his formulation, which defines what capitalism is (its mode of existence) by what it was and will be (technological progress). This synthetic principle not only implies that capitalism can be used as a register to understand the development of automative technologies. Rather, in understanding capitalism as a mode of existence defined by an impetus to realize the technical composition specific to it, Panzieri comes to posit capitalism itself as a species of automation which exists prior to, actively incites the development of, and is finally fulfilled in automative technologies. The circularity of Panzieri’s phrase (mode of existence = development) narrates real subsumption as a process of self-realization in which capitalism must become what it is—in which the automative development of capitalism fulfills itself in automative technologies.

Does this entail that capitalism’s self-realization is also the realization of *full* automation? Marx and his contemporaries often spoke metaphorically about capitalism as a gigantic machine. Is Panzieri reiterating this metaphor once more? I will show how this interpretation of capitalism itself as a species of automation that *necessarily* tends towards a greater and greater expansion of automative technologies is rather inherent to how the prospective crisis of fixed capital that Marx wrote about in *Grundrisse* is sublimated by the concept of “relative surplus value” in *Capital*. By “sublimated,” I mean that the contradiction animating this crisis is transformed—it no longer appears as a crisis of fixed capital accumulation—but it is not overcome. While there is, in Marx’s “Fragment,” an empirical propensity towards the accumulation of machinery, there is not yet a structural mechanism that explains why this must be the case. Capitalism could tend towards the development of automative technologies, and these technologies might realize a specific organization of labour that did not exist prior to capitalism, but this dynamic was not understood to be self-realizing. Likewise, the specter of overproduction already discussed seemed to present an absolute limit to the benefits derived from the expansion of automative technologies which might even make such a trajectory undesirable. Marx’s concept

of relative surplus value addressed the crisis of fixed capital by reimagining the relation between technology and labour in terms of what are now called productivity gradients.¹² As Pasquinelli summarizes it, “real subsumption” employs the concept of relative surplus value to critique Marx’s earlier notion of crisis in the “Fragment,” positing that “surplus value can be augmented not just by reducing wages and material costs but also by increasing the productivity of labour in general” (Pasquinelli 2023, 118). Investment in technology would provide a capitalist with the possibility of selling goods at the prevailing price while also decreasing the overall cost of production, since it would decrease the quantity of labour required to produce those goods. Marx saw that technological development thus opened up the possibility for the *relative* capture of surplus value before intra-capitalist competition would eventually lower the price of the goods in question. As Robert Meister notes in *Justice is an Option*, while this reformulation ostensibly resolves one facet of the crisis of fixed capital—since it explains how the accumulation of machinery can continue to generate wealth while indirectly lowering the price of goods—it does so by entrenching the accumulation of automata technologies as a structural dynamic of capitalist accumulation:

[P]roducer goods—new machinery and raw materials—become core vehicles for preserving and accumulating surplus value by allowing investors to benefit from the arbitrage opportunities that are opened by the steeper productivity gradients that relative surplus value reflects. Because of its need to accumulate previously created surplus value by investing in producer goods, industrial capitalism simultaneously commits itself to constantly expanding production. (Meister 2021, 20)

If the notion that capitalism preserves its past gains through future-oriented investment in machinery leads to the proposition that capitalism itself is a species of automation, why should real subsumption not eventually come to mean full automation? How does the concept of relative surplus value sustain both the logic of progressive automation, as we can now see above, and the iterativity of the subsumptive limit of full automation? Because Marx understands the creation of relative surplus value to be predicated on the capture of the value thrown off by the spread between different costs of production of a given commodity that

12. “Using as data the gradients of the relevant functions evaluated at the current point of operation, the procedure calculates the direction of change from the status quo that yields the greatest feasible local rate of increase in the objective function of the decision maker...the procedure can also be used to obtain an upper bound on the gain from effecting any particular (non-local) set of feasible changes in the decision variables” (Wilig and Bailey 1979, 96).

will be sold for the same price—a spread that will eventually close when intra-capitalist competition causes the entire industry to adopt the more productive method of production—the Fragment’s problem of the *replacement of human labour by technology* is both systematically attached to and made secondary to the problem of the *replacement of technology by technology*.¹³ Relative surplus value reinterprets the “infini-

13. Pasquinelli treats this transformation of the concept of fixed capital between *Grundrisse* and *Capital* in a 2019 article published in *Radical Philosophy*, “On the origins of Marx’s general intellect,” which was later updated for his book, *The Eye of the Master*. He offers a different account of why the crisis of fixed capital accumulation is a crisis, as well as how it is resolved. According to Pasquinelli, who follows the emphasis of readers of Marx’s “Fragment” such as Paulo Virno, the main problematic term in the accumulation of fixed capital is not fixed capital *per se* but the tension it exacerbates between two modalities of knowledge. He consequently maps this problematic according to “an unresolved tension between *knowledge objectified in machinery* (as ‘development of fixed capital’) and *knowledge expressed by social production* (as ‘development of the social individual’)” (Pasquinelli 2023, 112). He then tracks the resolution of this crisis by emphasizing Marx’s replacement of his concept of the “general intellect” with that of the “collective worker” in the time between the writing of *Grundrisse* and publication of *Capital*. According to Pasquinelli, *Capital*’s direct references to the work of Charles Babbage can be used to reconstruct how Marx now imagines the extraction of relative surplus value as part of a “machine theory of value,” which describes how fixed capital mobilizes the knowledge it appropriates to redesign “the division of labour and machines.” Pasquinelli continues, “if, according to Babbage’s principle, the division of labour is an apparatus to modulate regimes of skill and therefore different regimes of salary according to skill, the division of labour becomes a modulation of relative surplus value. Being itself an embodiment of the division of labour, the machine then becomes the apparatus to discipline labour and regulate the extraction of relative surplus value” (Pasquinelli 2023, 118). In my view, Pasquinelli offers a compelling and correct account of how the technologies of the production process can be used as a means not only to increase the spread between productivity gradients but also as a means of segmentizing formerly continuous labour processes. They can therefore increase the spread in the gradients of empirical wages on the basis of the level of skill required for a certain aspect of the newly-segmented labour process. By contrast, in an unsegmented labour process a skilled worker will still command the higher wage determined by the skill used for only a fraction of the labour process, even when executing parts of this process that require less skill. However, I do not believe Pasquinelli’s machine theory of value is a direct account of the *resolution* of the crisis of fixed capital accumulation. In both *Grundrisse* and *Capital*, Marx offers a series of propositions which certainly did not correspond to nineteenth century capitalism as an *empirical* object of study. The fact that workers are paid in advance rather than arrears, or that labour time is always exchanged for a *monetary* wage are two such propositions which clearly do not function as empirical descriptions but rather belong to a tendential and structural account of capitalism as a system of production and exchange. Another one of these propositions is Marx’s derivation of the value of the wage of the worker from the cost of the worker’s maintenance and reproduction. See, for example Marx (1993, 286). Marx makes this derivation of the price of the minimal wage quite literal in another passage of his *Grundrisse*: “If...only half a working day is necessary in order to keep one worker alive one whole day, then the surplus value of the product is self-evident, because the capitalist has paid the price of only half a working day but has obtained a whole day objectified in the product; thus

tesimal” magnitude of living labour not according to the integral definition of a very small magnitude that could one day be removed. Rather, it is likely that Marx implicitly understood “infinitesimal” in a directional, derivative sense—as a function that is perpetually tending towards a limit of 0, without ever reaching that limit. In this logic, living labour is both progressively *and* perpetually vanishing without arriving at a terminus after which it will have actually vanished. Labour’s tendential relation to this limit is precisely why it could become a measure of the difference in possible spreads between productivity gradients that could be opened up by the replacement of technology with technology, which is the tacit condition for the capture of relative surplus value in the first place. Put differently, human labour can measure the spread in productivity of two or more different technologies used to produce a commodity sold at the same price because each combination will yield a different position of that magnitude of labour relative to 0. In placing these productivity gradients on a continuum where they can be compared against each other (a spread), human labour is treated as an “infinitesimal” measure or directional derivative that tends towards 0. Conversely, if human labour was treated as an integer (0), the measurement would become undefined and could no longer compare the possible spreads between productivity gradients which informs the replacement of technology by technology.

Relative surplus value implies that living labour could only function as a measure for productivity gradients to the extent that it is retained, of course—but what we see here is that it is retained *as* vanishing. Because the replacement of technology with technology is essentially based

has exchanged *nothing* for the second half of the work day” (Marx 1993, 324). In deriving the price of labour from the cost of labour’s maintenance and reproduction, Marx is assuming in his structural account that wages had *already* been optimally allocated. While this ideal proposition would need to be embodied in empirical mechanisms which could only ever approximate it (a legal minimum wage, Pasquinelli’s machine theory of labour, and so forth), it is important to note that the accumulation of fixed capital is a crisis in Marx’s *structural* account, while the optimal allocation of wages is not (or is only a problem in the translation between a structural and an empirical account). I therefore hesitate to think that this structural crisis could be resolved by understanding the technologies of the production process in terms of their optimization of *wage gradients* which had, as part of the schematic assumptions of Marx’s early conceptions of surplus value, already been treated as if they were optimally allocated. For this reason, I think that, while Pasquinelli is correct about how the machine theory of value functions on an empirical level, the emphasis on Marx’s resolution of the crisis attending fixed capital accumulation should remain with productivity gradients over wage gradients and thus privilege the replacement of technology by technology rather than the stratification of labour on the basis of skill.

on investment and thus the outward expansion of capitalism, this internal limit which living labour tends towards is, as Gilles Deleuze and Felix Guattari have argued, perpetually displaced.¹⁴ In this way, the sublimation of the problem of labour replacement itself creates the possibility of repeatedly revisiting that problem anew in successive epochs. It does so by repeatedly restaging the moving limit against which living labour is an infinitesimal, vanishing magnitude. Labour is perpetually disappearing, again and for the first time.

In sum, we can see that the crisis of the accumulation of fixed capital found in Marx's "Fragment" is transformed in *Capital* according to the following logic. (1) Marx's real subsumption describes a process through which the prospective crisis of fixed capital is sublimated by the introduction of relative surplus value, which reimagines technology as a vehicle for capitalist accumulation (an asset) because it allows machinery to capture the relative value in the spread between differing costs of production for a commodity sold at the same price. (2) If real subsumption thus reconceives the accumulation of fixed capital in terms of capitalist accumulation, the development of the technologies of the production process appears to embody the self-realizing development of capitalism itself, validating Panzieri's synthetic proposition linking capital's mode of existence and its technological development. (3) Reconceiving the technologies of the production process as assets that capture relative surplus value requires reconceiving labour as a differential magnitude that tends towards but does not reach 0. (4) Its derivative status is now why labour time *can* be used as the measure of productivity gradients opened up by the replacement of technology by technology. (5) The differential relationship linking the replacement of labour by technology to the replacement of technology by technology thus sustains both a progressive logic in which capitalism is figured as a species of automation that realizes itself in automative technologies and an iterative logic which sees the recurrence of real subsumption as an absolute *and* mobile limit after which capitalism will, again and for the first time, finally have realized itself.

The distance between the crisis of fixed capital in Marx's "Fragment" and the concept of relative surplus value in *Capital* thus both shows us why the threshold state of full automation cannot be a real state within capitalist development (because it is an iterative series of states) *and* why it is repeatedly read as a state (because it must be understood in

14. See Deleuze and Guattari (1987, 463).

relation to a limit that it displaces and recapitulates). While automation is bound up with the question of labour replacement, we can see now that the same subsumptive logic which incites us to think about automation as an explanatory mechanism behind the disappearance of labour is paradoxically the logic that renders an integral, linear understanding of labour's eventual disappearance as an insufficient explanatory device to conceptualize the relationship between technological development and the historical development of capitalism. If Marx thus diffuses the crisis of fixed capital quantitatively—in terms of its ratio to human labour—he does not overcome the contradiction on which it is based. Instead, he reformulates it as a temporal contradiction animating automation itself. Marx's sublimation of the crisis of fixed capital retains the synthetic proposition understanding what automative operations actually do in the production process on the basis of "the form of capital" that they have historically come to embody but does not understand that form as unfolding within a lateral, linear mode of time.

3. The Realer Subsumption: Defining Capitalism's Contemporaries Through Automation

In a passage of "Notes on the 'General Intellect'" that seems now to have a reception history isomorphic to the one it was actually meant to describe, Paulo Virno writes:

Often in westerns the hero, when faced by the most concrete of dilemmas, cites a passage from the Old Testament... This is how Karl Marx's 'Fragment on machines' has been read and cited from the early 1960s onwards. We have referred back many times to these pages... The history of the 'Fragment's' successive interpretations is a history of crises and of new beginnings. (Virno 1996, 265)

Indeed, as Virno noted already in 1990, it was (and is) a rather ubiquitous gesture to invoke Marx's "Fragment on Machines" as both a prophetic and frankly interruptive moment in his writing on the labour theory of value in the *Grundrisse* and as an analytic adequate to contemporary automative operations. More than the frequency of citation alone, what is important is the fact that the "Fragment" is often the only part of the *Grundrisse* that such conceptualizations deem adequate to descriptions of contemporary instances of automation. For example, Yuk Hui's recent piece, "On Automation and Free Time," notes that in his "Fragment":

Marx made the case that with investment in automative technology, which he called fixed capital, capitalism is able to reduce necessary labor time and

increase both surplus labor and value. Marx then speaks of the possibility of subsuming surplus labor to free time...*This speculation, in which the type of labor corresponding to a capitalist mode of production disappears, is predicated on new technological developments.* (Hui 2018)

Hui also avails himself of other passages in the *Grundrisse* in order to demonstrate the difference that the “Fragment” makes to their mode of theorization and the conditions they theorize: in light of automative technologies, according to Hui, Marx now speaks speculatively of the disappearance of the very form of labour that the bulk of the *Grundrisse* analyzes. Still other citations of the “Fragment” do not acknowledge its place in the *Grundrisse* at all, treating it as a standalone piece.¹⁵

Inasmuch as the point of these repeated returns to Marx’s “Fragment” is to theorize the differences that contemporary technological life makes, one should not necessarily expect such articles to theorize that (supposedly) no longer extant state which we differ from. While the aim of disinterring and contemporizing the “Fragment” is common-sensical, it renders the return itself counterintuitive: in reading the “Fragment on Machines” as a speculative text about automation, such theoretical attempts effectively import all of the baggage of the labour theory of value in order to posit ritualistically (and, if they are correct, redundantly) that this theory’s attendant mode of production is no longer operative in contemporary instances of automation. Reformulating Hui’s statement in positive terms, this new type of labour corresponding to new automative technology emerges out of (and not simply *after*) the disappearance of the concept of human labour theorized in Marx’s labour theory of value.¹⁶

Clearly, the passage in the context of the *Grundrisse*’s labour theory of value leads a different life than the existence of the passage as a fragment in the sense that I have described above—and this difference is both the condition and conceit of many attempts to theorize automative technologies.¹⁷ But attention to this strategy of citation demonstrates

15. See, for example: (Terranova 2014, 379–400).

16. Put differently, inasmuch as the labour theory of value does not understand technology itself as labouring (when a capitalist pays for labour, it is human labour) this disappearance could be understood as the way in which “the production process has ceased to be a labour process” (Marx 1993, 693).

17. *Karl Marx’s Grundrisse: Foundations of the critique of political economy 150 years later*, an anthology compiled by Marcello Musto, provides an extensive publication history of both Marx’s “Fragment” and the *Grundrisse* more generally. The *Grundrisse* consists of eight notebooks which were not published in full until the 1940s, when the Moscow-based Marx-Engels-Lenin Institute released a Russian translation. A full German edition did not circulate until 1953. The first full English translation was released

that, before these theoretical attempts read or misread what Marx supposedly claims in this passage, it is first the performative fragmentation of the “Fragment on Machines” from the rest of the *Grundrisse* which renders the former adequate to contemporary automative technologies. The interpretation that Marx writes a prophetic passage incidentally included in *Grundrisse* is a product of the intra- and paratextual fragmentation of the “Fragment” from the *Grundrisse*. This shared protocol of reciting the “Fragment” indicates not simply the positing that contemporary instances of automation and their technologies are different from or problematize the labour theory of value. Rather, this protocol demonstrates that this difference must be *produced* in running through the trajectory of technological development enabled by the labour theory of value and fulfilling it. It is only after the fact that the content of the “Fragment” becomes radically incommensurable with what existed prior to it, just as it is only after the publication of the *Grundrisse* that Marx’s “Fragment” becomes properly fragmentary.

The repertoire of fragmenting the “Fragment on Machines” and the idiom of self-realization that repertoire shares is not particular to the contemporary moment or its instances of automation. When the concept of real subsumption is introduced by the Cyclicists, it is not introduced, following Marx, as a salve for the crisis of the accumulation of fixed capital. Rather, in the time after Marx, real subsumption becomes an emblem of the repetition-compulsion of capitalism’s self-realization in automative technologies—a logic that, as I have shown, Marx’s own solu-

twenty years later, in 1973. Still, excerpts and fragments of the *Grundrisse* had circulated since 1903, when the “Introduction to a Critique of Political Economy” was released in Germany. An English translation of this fragment was published the next year and another English-language fragment, “Forms which Precede Capitalist Production,” was released around the time of the full German translation. Now, there are only three instances prior to the twenty-first century in which the “Fragment on Machines” appears as that—a fragment. Raniero Panzieri was first to occasion its Italian translation in 1964 for his journal, *Quaderni Rossi*. In 1966, Ben Brewster excerpted and translated this passage from the full German edition of the *Grundrisse*, titling it “On Machines.” The passage was also included in a collection of excerpts from the *Grundrisse* in David McLellan’s 1971 book, *Marx’s Grundrisse*, where, ironically, its author understood it as a functional component of (rather than a break with) a more complete theory of the production process than was presented in Marx’s *Capital*. For my purposes, what is particularly salient about this history is that the “Fragment on Machines” did not lead a preliminary existence outside of the *Grundrisse* as either an autonomous text or a remnant of an already published work. Its fragmentation was rather predicated on the existence of a ‘completed’ text from which it was then excerpted and translated. See Musto (2008).

tion already authorizes and incites. When we read across these accounts, the archive itself issues out of anachronism: the iterativity of the Cyclicists critique becomes abyssal—always penultimate and finally fulfilled. We have inherited a century of real subsumptions in which multiple, equally unprecedented stages in the development of capitalism finally realize it again, and for the first time. This dynamic, which I have called “the realer subsumption,” describes a temporal rather than a technical antagonism.

Panzieri mobilizes real subsumption in order to demonstrate that, at the turn of the twentieth century, the simple coordination of workers is a nascent mode of automation characterizing the machinery *that is* capitalism, even in the absence of machinery in the production process, the machinery *within* capitalism.¹⁸ Antonio Negri sees real subsumption’s fulfillment in automation’s ‘further’ retrenchment in the (re)production of capitalist social relations—what he calls the “social factory.”¹⁹ Jonathan Beller begins precisely at the site of the social factory, arguing that real subsumption entails a new, “world-historical” prolongation of work that occurs at the level of the sensorium: “to look is to labour.”²⁰ After the sensorium, what Andrea Fumagalli dubs “life subsumption” indicates an unprecedented stage entailing the automation of cognition—a final development of production under capitalism, once again.²¹

As we can now see, the iterativity of these (re-)readings is an historiographical proposition that recites, in turn, an argument about the progressive intensification of automation from simple coordination, through mechanization, through the automation of social relations, sensoria, and cognition. The technological development of automation is given here as a process of *progressive subsumption*.

18. See Panzieri (1980, 47).

19. See Negri (1991, 114).

20. “To look is to labor” (Beller 2006, 2, 4, 78). To the degree that this unprecedented development “automates” the subject of capital, it does not extract more work from the worker but posits the sensorium itself as that which labours. See Beller (2006, 66–68).

21. See Fumagalli (2015, 231).

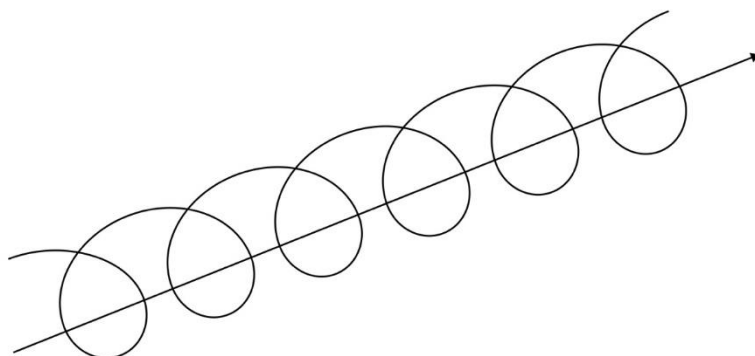
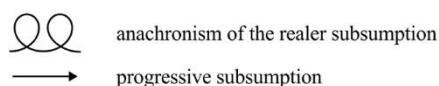


Figure 1. Automation's accumulative conquest of more and more functions in the labour process is derived from the repeated restaging of a real(er) subsumption.

This historical and technological continuity is only possible to the extent that real subsumption operates in relation to a limit or threshold state that is constantly restaged. In that relation, capitalism perpetually realizes itself in instances of automation that it simultaneously yearns for, has been, and already is. Accordingly, we can maintain that real subsumption represents a concrete stage in the development of capitalism only on the basis of an enduring anachronism in which that unprecedented stage is incessantly disinterred and contemporized—for the first time, each and every time. In this sense, *real subsumption has no purely technological content* but refers instead to an anachronism recurring within and between almost every technological development throughout the last century. Real subsumption names a process that is, paradoxically, realer and more subsumptive with each repetition: it is a properly temporal contradiction because the incessant restaging of real subsumption as a final and absolute state is precisely why labour's subsumption by technological development is rendered progressive, partial, and mobile.

We could multiply theories of the technological enclosure and foreclosure of the human labourer indefinitely. Such theories are indices attaching the constantly final and therefore always penultimate ‘catching-up’ of real subsumption to the disinterment and contemporization of a state that had, according to each theory of automation, *really subsumed* the worker. The problem with this logic is that it can posit that living labour really does vanish only on the basis that this disappearance and supersession is incessantly restaged. This dynamic between retention and disappearance is thus not the result of the “functional equivalence” of any given machine system. For the same reason, we should not expect the solution to this logic to be that new technological developments would introduce final functional equivalents to mimic the complete spectrum of human labour, as in the discourse of full automation. Rather, what this dynamic comes to indicate is labour’s *indefinite* potential for narratives of progressive subsumption: living labour is always vanishing, again and for the first time.

4. The Epoch After: A Symmetrical Dynamic of Accumulation and Disaccumulation

In “2. Crisis and Chronology,” I showed how technological development came to be defined as capitalism’s mode of existence through the way in which Marx sublimated the crisis of the accumulation of machinery by understanding it as a vehicle for capitalist accumulation. In “3. The Realer Subsumption,” we saw that once the accumulative dynamic of capitalism is understood according to the accumulation of automative technologies—once the question of the replacement of labour by technology is systematically attached to but made secondary to the question of the replacement of technology by technology—these periodizations of real subsumption iteratively disinter and contemporize *the same epoch* to describe the repeated and further subsumption of human labour. In the Cyclicist archive, the story of capitalist development is thus both self-realizing and accumulative—the intuitive proposition this article began with—but only *because* it is anachronistic—the counter-intuitive proposition I have been elaborating thus far.

My next section introduces the Secularist attempt to critique the mechanism I have called “the realer subsumption.” Here I show how the Secularists attempt to overcome this legacy attending Marx’s sublimation of the crisis of fixed capital accumulation. I first follow the re-periodizing gesture of the Secularists as it disarticulates the identification of real subsumption, relative surplus value, and automative technolo-

gies. The Secularists argue that we are living in a time after real subsumption because we are living in a time of capitalism's descendancy. Do they thereby also decentralize the explanatory privilege that the Cyclicists give to automative technologies? Is technological development not, in fact, capitalism's mode of existence but only a conjunctural period whose connections cease to define capitalism today? The Secularists base their critique on the fact that a symmetrical dynamic animates capitalism in its ascendancy and its descendancy—a claim that capitalism fails, today, in working as it always has. To that end, I focus here on the dynamics of accumulation in the phase of capitalism's ascendancy before turning, in my subsequent sections, to the dynamics of disaccumulation that the Secularists use to describe capitalism's descendancy. In this section, I show how the interpretation of real subsumption as a stage in an accumulative *past* of capitalism actually further centralizes the place of automative technologies as an explanatory optic on the temporal logic of capitalist accumulation.

There is a parallel impetus uniting how the Cyclicists (mis)read real subsumption and how the Secularists correct the iterativity of this reading: namely, the critical burden of talking about how contemporary capitalism defines an *epochal difference* without, because of that same difference, ceasing to define capitalism as the present mode of production. Inasmuch as their corrective is based on an operation that places real subsumption in the past by re-periodizing the present, the Secularist account of capitalist development entails a methodological commitment to a two-fold proposition: a claim about the difference that contemporary capitalism makes (while still remaining capitalism) is the verso of a historiographical claim about the secular development of capitalism up until that point. The Secularists must thus treat two problems. (1) if capitalism fails today, how does it remain capitalism? (2) If capitalism works as it always has today, why is this period distinct from real subsumption? Put differently, in committing to a two-fold proposition that defines the contemporary moment as an epochal difference *within* the span of capitalist development, the Secularists attempt to avoid both the argument that the contemporary epoch is distinguished from real subsumption because it is no longer an epoch of capitalism *and* the argument that, in remaining within capitalism, the contemporary moment is not an epoch distinct from real subsumption.²²

22. "This is also a 'late' phase of modernity, during which the modern growth of the industrial proletariat and the technological dynamism of a transformed process of production traverses the arc of real subsumption and passes into a period of relative decline

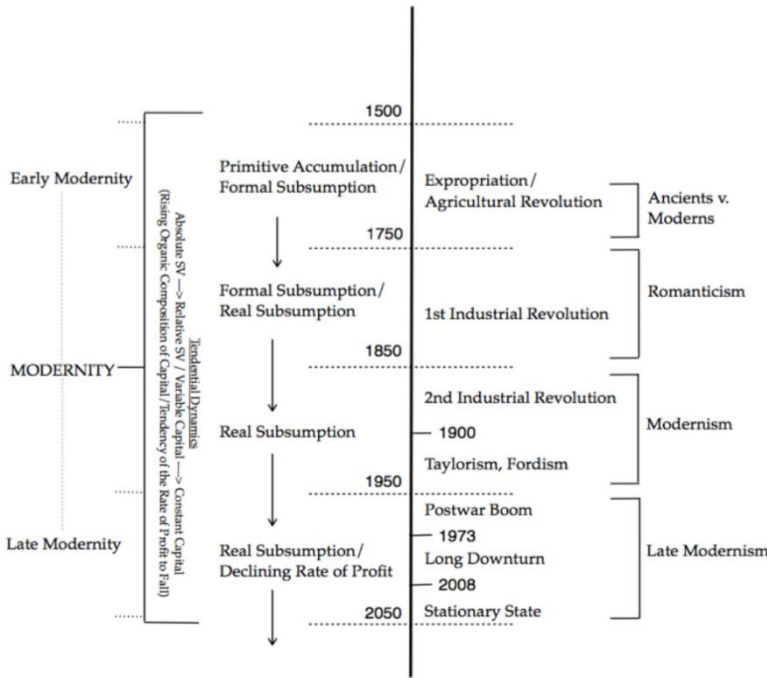


Figure 2: Nathan Brown, “Postmodernity, not yet: Toward a new periodisation”

and stagnation, thus transforming the social dynamics and lived class structure of recent history without thereby breaking its continuity with the structural determinations that brought us to this point. Indeed, the continuing legibility of those structural determinations depends upon our capacity to situate them within the continuing history of modernity, rather than as a radical break with or termination of the latter” (Brown 2018, 20). Benanav’s argument turns on the same point but explains its dynamics negatively, by way of historical narrative. He pursues this strategy in order to interpellate Cyclicists (automation theorists) as utopian futurists responding to a dystopian present: “Pointing with one hand to the homeless and jobless masses in Oakland, California, and with the other to the robots staffing the Tesla production plant just a few miles away in Fremont, it is easy to believe that the automation theorists must be right. However, the explanation they offer—that runaway technological change is destroying jobs—is simply false” (Benanav 2020, x). According to Benanav, the present which automation theorists incorrectly explain is dystopian precisely because it has ceased to describe capitalism in its ascendancy, while not ceasing to describe capitalism. “In reality, rates of labor-productivity growth are slowing down, not speeding up...Decades of industrial overcapacity killed the manufacturing growth engine, and no alternative to it has been found, least of all in the slow-growing, low-productivity activities that make up the bulk of the service sector. As economic growth decelerates, rates of job creation slow, and it is this, not technology-induced job destruction, that has depressed the global demand for labor” (Ibid., x).

Brown's article, "Postmodernity, not yet: Toward a new Periodisation" exemplifies this methodological commitment:

We can only grasp the history of modernity through the moving contradiction of capitalist accumulation if we are willing to think the structural determinations of that history through to the end of capital's tumultuous dynamics, rather than canceling the history of modernity as it moves into a late phase characterized by the achievement of real subsumption: a phase which, we must note, Marx had already predicted within the same historical conjuncture in which he identified modernity with capitalism. The consequences of real subsumption are as much a part of modernity as the process of real subsumption itself, precisely because both result from and inhere within the history of capitalism. (Brown 2018, 14)

Brown's first proposition is that we must understand the contemporary moment as belonging to an arc *within* the history of capitalism and its secular development. Brown then proceeds with a second proposition that periodizes the present in the *time after* of real subsumption. The contemporary period "results in the inception of the long downturn" (Ibid., 22), a period that, according to Brown, will itself terminate in another epoch that he follows Gopal Balakrishnan in naming "the stationary state" (Ibid., 1). Such a state would ostensibly signal "the end of capital's tumultuous dynamics." Here I am not attempting to manufacture a consensus about the exact contours or contents of the epoch(s) that the Secularists place after real subsumption. Rather, what I would like to emphasize is a point of convergence among these efforts of re-periodization: "the long downturn," "the stationary state," "stagnation," and so forth negotiate the difference that contemporary capitalism makes in remaining capitalism through an account of how capitalism *fails to produce profit* by functioning as it always has. Thus, if each Secularist "grants explanatory priority" to the "[secular] movement of capitalist accumulation" (Ibid., 15) in order to periodize real subsumption in the past, what they are required to explain is how that dynamic of accumulation becomes a structural dynamic of disaccumulation. In other words, what aligns Secularists like Benanav, Brown, Balakrishnan, as well as Michel Aglietta and Robert Brenner is a synthesis of the double-proposition: capitalism remains capitalism (thus fulfilling proposition one) *because* the same mechanisms which produced profit in its ascendancy, from 1970 onwards, fail to produce profit precisely by continuing to work as they always have (thus fulfilling proposition two). This allows Brown to re-periodize real subsumption as a definitive event within the global history of capitalism that is essentially "accomplished"

in the 1960s.²³ Thus if Brown is correct, he proves that *contra* the iterativity of the *realer subsumption*, any account which mobilizes real subsumption to describe an epoch occurring after 1970 is essentially confusing cyclical phenomena for secular noumena.²⁴

Benanav follows the same choreography as Brown but, as I have noted above, takes aim at automation specifically. Benanav argues that automation discourse is only the cyclical, cultural uptake of a present period of stagnation—defined here as a combination of overproduction and underemployment—which occurs in the time after real subsumption.²⁵ He explains the conflation of automation and overproduction through an analysis of what happens when productivity increases outpace demand for output. According to him, introducing more efficient machinery into a production process will necessarily displace labour if a firm cannot simultaneously increase the output of that same process (as, logically, less labour will be required to reproduce the *status quo* output).²⁶ Consequently, the recurring notion that automative technol-

23. See Brown (2018, 13).

24. After the 1970s, the regional oscillation between the extension of the working day and technological advancement plays out the formal and real subsumption of domestic capitalisms *cyclically*. “Here we see the importance of understanding ‘formal’ and ‘real’ subsumption not as wholly discrete periods but rather as overlapping processes responsive to the contradictions of accumulation whose movement is neither cyclical or linear but rather tendential, and thus requiring an account fundamentally grounded in the secular dynamics of capitalism” (Ibid., 11).

25. For the first epochal determinant, overproduction, see Benanav (2020, 36–39). For the second epochal determinant, underemployment, see (Ibid., 53–59). “The tendency to economy-wide stagnation, associated with the decline in manufacturing dynamism, then explains the system-wide decline in the demand for labor, and so also the problems that the automation theorists cite: stagnant real wages, falling labor shares of income, and so on. The economy-wide pattern of declining labor demand has not been the result of rising productivity growth rates, associated with automation in the service sector. On the contrary, productivity has grown even more slowly outside of the manufacturing sector than inside of it” (Ibid., 36).

26. “*Employment*, as I use it here, is a measure of the number of workers rather than of hours worked...while *productivity* is the ratio of output to employment. The more output is produced per worker, the higher that worker’s productivity level. For any economic sector, the rate of growth of output (ΔO) minus the rate of growth of labor productivity (ΔP) equals the rate of growth of unemployment (ΔE). Thus, $\Delta O - \Delta P = \Delta E$. This equation is true by definition. If the output of automobiles grows by 3 percent per year, and productivity in the automative industry grows by 2 percent per year, then employment in that industry must have risen by once percent per year ($3 - 2 = 1$). Contrariwise, if output grows by 3 percent per year and productivity grows by 4 percent per year, employment will have contracted by 1 percent per year ($3 - 4 = -1$). Since 1973, both output and productivity growth rates have declined, but output growth rates fell much more sharply than productivity growth rates. By the early years of the twenty-first century, productivity was rising at a much less rapid pace than it had during the postwar era” (Ibid., 19).

ogies are directly responsible for replacing human jobs is only a symptom of a more primary secular process whereby increases in productivity are not balanced by equivalent or greater increases in demand for output. Benanav thus shows us why there is no necessary polarity in the correlation between the adoption of automative technologies and the replacement of labour: if the rate of output grows at a pace equivalent to or faster than the rate of productivity, either no labour replacement will occur or employment will actually grow. Conversely, in a period of capitalism defined by stagnation (a period where demand cannot keep up with productivity increases), the surplus labouring populations thrown off by this process are then absorbed into various forms of underemployment: work that does not maintain and reproduce the worker.²⁷

In “1. Enduring Automation,” I noted that these propositions are, potentially, an indirect critique of my own methodological commitment, which tracks the iterativity of real subsumption as an index of the temporal logic linking automation to capitalism. I said that Marx’s introduction of the concept of relative surplus value is precisely what makes it possible to constantly restage real subsumption as an epoch and, as the auxiliary of this possibility, to constantly restage labour’s disappearance. In interpreting this legacy, Brown’s re-periodizing gesture severs precisely that connection by arguing both that real subsumption is a *phase* that can and has been “accomplished,” but likewise that the extraction of relative surplus value is a *dynamic* which can and does continue after real subsumption.²⁸ Does this imply that automation is understood as a temporal problem only when real subsumption and relative surplus value extraction are mistakenly interpreted as synonyms, thereby erroneously understanding relative surplus value extraction as an epoch rather than a dynamic? This would mean that what I understand as a temporal dynamic proper to automation is merely an historiographical tendency proper to readers who likewise fail to discriminate

27. “[A]s the rate of overall economic growth slows with the dilapidation of the industrial growth engine, the pace of service sector employment growth should slacken, too...It is precisely at this point that the logics of underemployment come into play. It turns out to be possible to lower the prices of some services, and so to expand demand for them in spite of overall economic stagnation, without raising corresponding levels of productivity—that is, by paying workers less, or by suppressing the growth of their wages relative to whatever meager increases in their productivity are achieved over time...The extent to which firms are allowed to take advantage of income-insecure workers to generate immiserating forms of work, then, depends on the strength of each country’s labor-protection laws” (Ibid., 60–61).

28. See Brown (2018, 13–14).

between the epoch of real subsumption and the dynamic of relative surplus value extraction. Indeed, that is precisely Benanav's point in describing these collective readings as "automation discourse": because the usage of real subsumption discussed in my previous section would index only the cultural uptake of a given moment's historical conditions without accurately stating those conditions, such commentary would become exemplary, cyclical, and interchangeable.²⁹ To that end, recourse to the concept of real subsumption outside of these historical bounds is simply inaccurate historiographical work—a theoretical problem with the usage of the concept, not a temporal problem proper to capitalist development.

I explicitly formalize this tacit critique against my own argument as an opportunity to show the stakes of my claim across the subsequent sections of this piece: the Secularists do overcome the realer subsumption but they do not overcome its iterativity. If Brown is able to mobilize the continuation of relative surplus value extraction in order to demonstrate that we have moved *beyond* real subsumption but remain *within* the historical span of capitalism, I will show how my own formulation of that dynamic—the replacement of technology by technology—becomes a symmetrical mechanism that describes capitalism in its descendancy. My argument therefore adopts the periodization of the Secularists but emphasizes that this periodization retains the temporal problem first indexed by the realer subsumption. It retains this problem because the replacement of technology by technology still animates the logic through which capitalist development is periodized after real subsumption. In the subsequent sections of this piece, I will thus argue that the anachronism proper to automation is itself what lets us move beyond the historiographical anachronism animating real subsumption's reiteration. The endurance of this anachronism in the time after real subsumption repeatedly stages the disappearance of labour today as an avatar of capitalist disaccumulation rather than accumulation.

29. See Benanav (2020, 1–13). Of particular interest here is Benanav's claim about the iterativity of automation discourse. For Benanav, "automation discourse" represents a cyclical, repetitious phenomenon—a "symptom" of a real, secular process of stagnation that it discloses as part of a utopian imaginary. Just as Benanav is not particularly concerned with the specific temporal content of future utopias (which are definitionally "timeless"), the specificity of any one *past* future utopia also does not matter vis-à-vis its contiguous claimants. Put differently, temporal distinctions in automation discourse are *discursive*, not historical. See Benanav (*Ibid.*, 5–7).

While Brown and Benanav differently name and hold slightly different ideas of how capitalism ceases to produce value in working as it always has, they make isomorphic arguments about the status of the contemporary moment (as a period operating in the time after real subsumption and a period failing to produce value in operating as it has historically) and they both use isomorphic periodizations until they arrive at that moment (which essentially locate the accomplishment of real subsumption in the 1960s), based as they are on Robert Brenner's book *The Economics of Global Turbulence*.³⁰ What we might call the Secularists' 'same-difference' approach thus elegantly links the current period of capitalism to its historical development, but it is able to do so because it centralizes the symmetry of the mechanism through which past capitalism produced and accumulated value and through which present capitalism fails to produce and accumulate value.

What, then, is this mechanism of accumulation that, during the 1970s, becomes a mechanism of disaccumulation? We have already seen how Marx used the concept of relative surplus value to transform the accumulation of automative technologies into a dynamic of capitalist accumulation, and later how this transformed real subsumption into an epoch that was *both* accumulative and anachronistic. What happens when, conversely, that same dynamic of capitalist accumulation is used to periodize a time after real subsumption and thus used as an attempt to overcome the iterativity of that concept? To answer this question, it is necessary for me to outline a single principle which would connect the following relationships: (1) what it is about capitalist accumulation in its specificity that permits temporality to become a primary register of its dynamics; (2) why the dynamics of capitalist accumulation seem to play out across a particular order of time; (3) and why the technologies of the production process come to structure the temporal order of capitalist development. To understand these relationships, we must understand the role of automative technologies in transubstantiating the capture of profit into a dynamic of accumulation.³¹

30. See Brown (2018, 12). In the two articles that were published in advance of Benanav's book (which is essentially a combination of those two articles, plus a new introduction and an updated conclusion) in the *New Left Review*, Benanav cited Brenner's text but did not emphasize the identity of their historiographical accounts up until the time after "the long downturn." In Benanav's book, this shared lineage is made overt and explicit in his introduction. See Benanav (2020, x, 36).

31. In an analysis of "Say's Law" of supply and demand, Robert Meister notes that "profit" in itself does not secure the "profitability" of the next cycle of the production process—thus threatening to turn each cycle into a "new gamble." And yet, of course, we know

As we have seen, capitalism produces surplus by leveraging the distinction between how much value an hourly wage can purchase and how much value an hour of labour time produces. This implies leveraging a systematic connection and a systemic difference between (1) the moment of exchange, where the worker's labour power over a given quantity of time is exchanged for a wage and (2) the moment of production, where that labour power is employed—thus Marx's insistence that the real contradiction animating capitalism is predicated on the *relation* between production and exchange, rather than being located in one sphere or the other.³² Profit describes the *unprecedented* value produced during the time after exchange—produced, in other words, when the worker works past the time necessary to maintain and reproduce that subject. This unprecedented value is no less eminently *exchangeable* and indeed must actually be exchanged to be realized: surplus value is unprecedented value that will have had an equivalent. The real contradiction between capitalist exchange and production is thus that capitalism is a system of equivalence and commensuration whose mode of existence is defined by the production of equivalence-violating surplus. This means that, if it is to be realized, the surplus produced must find commensuration in a future production process and thus displace the internal limit of its past equilibrium.³³ The distinction between how much value an hourly wage can purchase and how much value an hour of labour time produces is thus the distinction between an *actual* quantity (a wage)

that capitalism does accumulate value and that this describes the way in which capitalism works in its ascendancy—in its self-positing self-realization. “By assuming that increased production is motivated by the desire of individual producers to reap windfall profits if prices do not fall, Say's Law merely proves that if prices fall far enough there cannot be overproduction in the market as a whole. Such an argument implies, however, *that profits for reinvestment and growth are not necessary at the point of market equilibrium...* Say's Law is largely circular insofar as levels of both supply and demand see themselves to be determined by price. Say's Law does not explain the levels of supply, demand, or price, but rather assumes these and explains their interaction at given levels; it does not have explain the cumulative economic value of the national product, but rather assumed this and describes the physics composition of that product at equilibrium. It does not explain how economic demands are themselves created (or changed) through the process of production, but rather assumes this and explains what people want as a response to what they can get, and what they can get as a response to what they want; it does not explain how economic value is accumulated at the end of each production cycle so as to reproduce and expand the market, but rather assumes that each cycle is a new gamble on the level of consumer and producer preferences” (Meister 1990, 257 n. 52).

32. See Marx (1990, 247–269).

33. Therefore, the reason why Say's Law is inadequate here is because it is a theory of homeostasis, not a theory of meta-stable states that crystallize around the *disequilibrium* of the valorization process.

and a *virtual* quantity (how much value a unit of labour time *can* produce, *after* it will have been realized in the future). In the capitalist mode of production, the arbitrage opportunity that exists between what value the wage can purchase and the value a unit of labour time can create is perpetually held open through a temporal distinction between what we currently have (exchange) and what the future owes us (production). This is why temporality becomes a primary register on which the contradiction animating accumulation plays out.

What we can see already is that, inasmuch as the production process is a valorization process (inasmuch as it produces surplus), its temporal logic necessitates that it is already has an accumulative dynamic, not that it is afterwards subject to a distinct or separate accumulative dynamic: surplus value does not become actual value until it enters into exchange again. For Marx, the story of capitalism's accumulative ascendancy is the story of how this futural orientation of the production process links the reproduction of already-created value to the creation of new or unprecedented value that will have been given an equivalent in a later production process. The technologies of the production process are a privileged point of passage between the virtual and the actual because they link the actualization of the unprecedented value that capitalism has produced with the virtualization of the already-extant value which it reproduces. My introduction of these temporal terms certainly does not cohere with the terminology that Marx himself offers, but I will demonstrate why it does cohere with his logic. For Marx, the storage of present value cannot explain capitalist accumulation. The phenomenon of removing capital from circulation—what he calls hoarding—is literally counterproductive.³⁴ How can we understand the accumulation of past value if it is not removed from circulation? If accumulation is instead predicated on the utilization of present value in a future-oriented production process, then the problem of what I am calling its virtualization emerges: if one can only *preserve* already-created value by consuming and reproducing it in a future production process, how could this magnitude be understood as having a value *now* rather than *later* (and thus potentially not at all)? Because Marx does not understand already-created value to be accumulated through storage but rather through its consumption and reproduction, the dynamics of capitalist accumulation play out across an order of time particular to it.

34. See Marx (1990, 227–231).

In answering how already-created value virtualized in the production process can have an actual value *now* rather than *later*, Marx emphasizes the double-status of the technologies of the production process. On the one hand, these technologies can be sold (albeit likely for a loss) to satisfy the discipline of payments *now*. On the other hand, machinery can be actively consumed or used in the production process. This incremental consumption of machinery (its incremental destruction) fractionally reproduces the value outlaid on it plus the relative surplus value captured by existing productivity gradients *later*.³⁵ Since Marx understands the production process to be a reproduction process, machinery has a privileged place in the dynamics of accumulation because it doubles as an actual value now and a futural claim on a virtual value. Thought across many cycles of the production process, the surplus created *then* is realized through exchange for machinery which has an actual value *now*, and which will, through leveraging productivity gradients, throw off a greater amount of value *later* (*then* realized in machinery, repeating the series). This futural mechanism of accumulation is thus properly ecstatic: it proceeds *through* itself to go *outside of* itself.

35. Meister's work in conceptualizing an implicit theory of *assets* in Marx's commodity-based labour theory of value has been important for my purpose in demonstrating how the accumulation of automative technologies can be understood as a vehicle for capitalist accumulation. See Meister (2021, 15–44). In using Meister's work to privilege the technologies of the production process as assets in my own argument, an ambivalence arises: to the extent that Marx resolves the crisis of the accumulation of fixed capital by showing how the technologies of the production process do double-duty as assets and commodities, why privilege the technologies of the production process once this asset logic is established? For Meister, the technologies of the production process are just one form of asset among others that could be used as vehicles of capitalist accumulation. See Meister (2021, 23–29). His account thus differs from mine because he understands the privileged place of the technologies of the production process to be a *conjunctural* aspect of accumulation that "could not last" (Meister 2021, 21). Put differently, an emphasis on the technologies of the production process would be an *outcome* of the secular dynamic of capitalist accumulation (since the conjuncture actually existed and, according to Meister, later ceased to exist) but it would not understand the accumulation of automative technologies to be the dynamic itself. Following Meister, disaccumulation could then be interpreted, in part, as the unraveling of this conjunctural relation between the accumulation of capital and the accumulation of automative technologies. In tracking how automative operations are derived from a symmetrical mechanism of capital accumulation and disaccumulation, I depart from Meister not because I disagree that other assets can act as vehicles of capitalist accumulation but because I do not understand the inversion of these two dynamics as indicating a conjunctural relation and its later dissolution. I discuss my own understanding of this inversion *viz.* the declining rate of profit in the final two sections of my text, highlighting how disaccumulation presupposes the same entrenchment of automative technologies within the production process.

The technologies of the production process are thus temporal loci which, in holding the past, present, and future of capitalism together, ensure that its productive mechanism is a reproductive mechanism—and, thus coupled, a dynamic of accumulation. The replacement of technology by technology secures the Secularists' double-proposition in the period of capitalist ascendancy—why we can think of primitive accumulation, formal subsumption, and real subsumption as phases distinct from each other but not distinct from capitalism.³⁶ There is thus a very good reason to mobilize the technologies of the production process as optics on capitalist dynamic of accumulation, a gesture that is compatible with the Secularist periodization up to and including the point of real subsumption. Inasmuch as the Secularists use the dynamics of capitalist accumulation to periodize an arc of capitalist descendancy in which those same dynamics become mechanisms for disaccumulation, it is clear that this latter story must also include the automative technologies of the production process.

5. Angels of Devalorization: The Automation of Disaccumulation

In “2. Crisis and Chronology,” I showed how Marx sublimated the crisis of the accumulation of automative technologies by introducing the concept of relative surplus value. Marx's concept effectively transformed these technologies into vehicles for capitalist accumulation by demonstrating how value could be extracted from the spread between productivity gradients which specified different costs of production for a commodity sold at the same price. I then argued that this reformulated the stakes of automation: relative surplus value extraction rendered the

36. This is not to say that the replacement of technology by technology is equally important in every phase of capitalist development. In the phases of primitive accumulation and formal subsumption, a capitalist looking to actualize the unprecedented value produced in earlier rounds of production might extend total working hours or hire further workers and thus, inasmuch as there is still a further population to proletarianize, indirectly expand capitalism. On the one hand, this does represent a real movement of accumulation as it describes the further capture of what Marx calls absolute surplus value. It does result in an expansion of the total value circulating in exchange. See Marx (1990, 643–668). On the other hand, inasmuch as these periods still understand the reproduction of already-created value to be predicated on its virtualization within a future production process, primitive accumulation and formal subsumption differ from real subsumption to the degree that only a marginal magnitude of the already-created value thus virtualized can also be understood as having actual value *now* rather than *later*. In other words, to the extent that capital accumulates on the basis of the extension of the working day and the proletarianization of further populations, only a marginal amount of that capital would have a value that could be used to satisfy the discipline of payments now because only a marginal amount would be outlaid on machinery.

process of the replacement of labour by technology secondary to the process through which technology is replaced by technology. In “3. The Realer Subsumption,” I showed how this legacy likewise reformulated the quantitative problem of the ratio between human labour and machinery as a temporal problem: the iterative occurrence of “full automation” posited capitalism as a species of automation that realized itself in automative technologies. If the technologies of the production process are vehicles of accumulation that attend the historical development of capitalism in its ascendancy, can the process through which technology is replaced by technology also be used to periodize an epoch after real subsumption? Can the replacement of technology by technology also be understood as a self-realizing dynamic of disaccumulation and thus fulfill the symmetrical requirement entailed by the Secularists’ double-proposition?

In the diagram I reproduced earlier, Brown calls the period following real subsumption “the Long Downturn,” and notes that it is characterized by a tendency towards a “Declining Rate of Profit.” I have said that the point of convergence among the Secularists is not a critique of automation specifically but an historiographical gesture which derives a time after real subsumption through recourse to the fact that today capitalism fails to produce profit in working as it always has. A series of distinctions must be introduced here if we are going to transform that empirical fact into a secular dynamic and accordingly formulate disaccumulation as a concept. First, is this failure extrinsic or intrinsic? An extrinsic failure would describe a barrier to capitalist development that affects but is not engendered by its secular dynamics. This conception would propose that capitalism *remains* an accumulative mechanism which today is truncated by the inertia of external forces. I emphasized the symmetry of the Secularist argument in my last section to demonstrate that the declining rate of profit cannot be understood in a classical sense: understood extrinsically, what would periodize the difference that the contemporary moment makes to capitalist development would precisely be something other than the secular dynamics of capitalism. The Secularists thus commit to an understanding of disaccumulation that is intrinsic: if the mechanism of accumulation becomes a mechanism of disaccumulation, it is because it must *actively produce* a declining rate of profit.

This criterion also requires a set of distinctions that will shed light on an ambivalence in the Secularist convergence around capitalism’s tendential failure to produce profit in the contemporary moment. For

example, when Benanav identifies the contemporary period with an intrinsic tendency towards stagnation, this could mean two things. Stagnation could be a counterfactual proposition about the *production* of value, which says that more profit could have been produced than was produced, were it not for certain factors internal to capitalist development today. Conversely, to the extent that Benanav uses stagnation to describe not only the hypothetical profit that could have been captured would capitalism have been otherwise but a real loss—that tendency aligns him with Secularists such as Brenner and Aglietta, for whom the declining rate of profit is also based on a proposition about the failed *reproduction* of already-created value.³⁷

In this section, I will demonstrate that the replacement of technology by technology becomes a dynamic of disaccumulation and thus a symmetrical means for periodizing the time after real subsumption because it understands the declining rate of profit as a problem with how capitalism’s productive mechanism functions as a reproductive mechanism. The replacement of technology by technology describes how capitalism becomes a species of automation that *disaccumulates itself* in and through automative technologies. I thus use “disaccumulation” to formalize the process through which the declining rate of profit plays out between reproduction and production. In the time after real subsumption, automation shows us how the failure to *reproduce* past value becomes an internally *produced* limit on the scope of future value.

Understanding the declining rate of profit as the product of an internal dynamic requires an explanation based on production and the desire for profit, rather than reversion to an explanation which understands the declining rate of profit according to increased costs of production. For Brenner, these internal, vicious cycles are empirical products of the replacement of technology by technology in the period after real subsumption:

I shall present an account of the long downturn which finds the source of the profitability decline, schematically speaking, in the tendency of producers to develop the productive forces...without regard for existing investments and

37. Benanav’s three key coordinates here are underdemand for labour, which he explains through the relationship between global overcapacity and depressed investment. See Benanav (2020, 78). As I will show below, to the extent that Brenner demonstrates that global overcapacity is an interpretive optic on how the replacement of technology by technology necessitates either lowering the expected rate of return on still-competitive technologies of the production process, prematurely scrapping those extant technologies and adopting more cost-effective technologies, or leaving the industrial line entirely, it seems clear that Benanav’s notion of stagnation also implies this second valence in which already-created value is not reproduced.

their requirements for realization, with the result that aggregate profitability is squeezed by reduced prices in the face of downwardly inflexible costs. I shall explain the perpetuation of the crisis by demonstrating that the profit-maximizing steps capitalists find it rational to take in response to the reduction in their profitability not only fail to resolve the problem that brought down profitability in the first place, but have the effect, in aggregate, of making necessary and rational additional responses which further undercut aggregate profitability. (Brenner 2006, 26)

Where relative surplus value allowed for the capture of the value thrown off by the spread between different costs of production of a commodity sold for the same price, Brenner demonstrates what happens when intra-capitalist competition forces the entire industrial line to recalibrate their expected profits based on the introduction of a more efficient technology widening the spread, and to ultimately converge on a lower commodity price:

Rather than merely replacing, at the established price, the output hitherto but no longer produced by a higher-cost firm which has used up some of its means of production...real-world cost-cutting firms, by virtue of their reduced costs, will reduce the price of their output and expand their output and market share *at the expense* of the higher-cost competitors, while still maintaining for themselves the established rate of profit. (Ibid., 28)

At the sectoral level, Brenner outlines three rational, profit-maximizing responses to the introduction of cost-cutting technology. (1) The established capitalists can scrap their existing technologies and adopt those of the “cost-cutter.” (2) The established capitalist can choose to keep their current technologies, write them off as “sunk” value, and profit only from the capital they have in circulation.³⁸ (3) The established capitalist can leave the industrial line entirely.³⁹ Because, in each of these scenarios, only the cost-cutting firm can produce the given commodity at a new, lower price while maintaining the *prior* rate of profit (which higher-cost producers could enjoy only before price of the commodity was lowered), “the outcome is an aggregate reduction of the rate of profit in the line” that is not offset by the gains of the cost-cutter.⁴⁰ This sec-

38. See Brenner (2006, 29).

39. See Brenner (Ibid., 28).

40. “The line’s output now has the lower price imposed by the cost-cutting entrant. Its population consists of the cost-cutting firm making the old rate of profit on the basis of its reduced production costs plus the firms that have failed to cut costs having to take a reduced rate of profit...The outcome is that, rather than leading to a higher rate of profit, the entry of a lower-cost, lower-price producer brings about a lower rate of profit in the line. The line is nonetheless ‘in equilibrium’ and no further transition can be

toral, internal limit on future profits will iteratively intensify when rational, profit-maximizing competition initiates the cost-cutting replacement of technology by technology once more.

If the replacement of technology by technology secures capitalism's secular ascendance, it does not function otherwise in Brenner's account of the long downturn in the time after real subsumption. His account of the long downturn through the lowering of the average rate of profit is an account of capitalism functioning rationally, capitalism functioning as it always has in its ascendancy. The accumulative dynamic animating the replacement of technology by technology can thus actively produce intrinsic limits to and downward pressure on the rate of profit. Conceived this way, stagnation would describe intrinsic limits to future growth. However, establishing that the dynamic of accumulation can produce limits does not yet establish it as a dynamic that fails to reproduce already-created value. What Brenner's argument narrates from the point of view of the production of new value can also be understood according to changing sectoral expectations about whether its current technologies will still be able to reproduce already-created value. Scraping existing machinery, treating it as "sunk" value, or abandoning the sector entirely all entail interruptions during which the production process does not reproduce already-created value. Aglietta notes that these potential interruptions are not violations of the logic of capitalism but another valence of the same contradiction between exchange and production that had always enabled it:

[C]apitalist production is founded on the transformation of conditions of production, whose origin is the creation of new means of production...But there is no reason why the pace of transformation of the productive forces should be adapted to the pace of replacement of fixed capital which satisfies the conservation of the value of constant capital. We are faced here with a contradiction in the most rigorous sense of this term. This is a real contradiction in the process of accumulation, for which there does not exist any 'synthesis'. On the one hand, as capitalism is a commodity-producing society, the reproduction of the conditions of production implies conservation of the value of all commodities in exchange; on the other hand, as capitalism is based on the antagonism of the wage relation, it cannot produce its constitutive relation except by revolutionizing the conditions of production. A contradiction of this kind cannot endure; one of its terms must necessarily destroy the other. It is thus the capitalist relation of production itself which causes the non-conservation of the value of fixed capital. There results a *devalorization of capital*. (Aglietta 2015, 102–103)

expected to take place for the time being since all of its incumbents are presumably making the best profit rate they can" (Ibid., 30).

In “4. The Epoch After,” we saw that the relationship between exchange and production was formalized as a real contradiction in which capitalism was figured as a system of equivalence whose mode of existence was defined by the production of equivalence-violating surplus. The replacement of technology by technology became a dynamic of accumulation because it acted as a temporal locus for *both* the actualization of a virtual magnitude—how much value a unit of labour time *can* produce, *after* it will have been realized in the future—and the virtualization of an actual magnitude—how the value we have *now* is preserved through its consumption and reproduction in a *later* production process. This dynamic thus specified the production process as a reproduction process. Aglietta’s complex intervention starts from the fact that, because the reproduction of already-created value is incremental, it must occur across *many* production processes. It is subject to a certain rhythm. Simply put, a certain amount of time (and output over time) is required for a newly-installed technology to both recoup the capital outlaid on it and capture the relative surplus value of existing productivity gradients. This is the colloquial sense in which technology is understood as an investment vehicle, even when it is not directly financed. If the technology in question is not replaced during this time, and if the productivity gradients remain the same, then it will have facilitated the accumulation of capital through the reproduction of already-created value and the production of new value. This is what Aglietta refers to as the “amortization” of the technology in question.⁴¹

What Aglietta argues is that, although the dynamic of accumulation can be understood according to the replacement of technology by technology, there is no necessary reason why these processes should have the same rhythm. The replacement of extant technology by new technology *before* it has reproduced already-created value is accordingly not an added cost of production but a loss of value that should have, by definition, been conserved. This contradiction is what Aglietta refers to as the “devalorization” of the technology in question.⁴² The very fact that

41. See Aglietta (2015, 108).

42. We could call devalorization a type of “realization problem,” as Brenner occasionally does in his text. See Brenner (2006, 27, 137). I choose not to use this notion for a few reasons. The first is that its structural relationship to the declining rate of profit is, in my view, unclear across many conflicting interpretations. Because the realization problem is typically thought to occur in the time-lag between when capital is outlaid for production and when the commodities thus produced are (or are not) sold for the assumed monetary value necessary to ratify the expected rate of return on the capital outlaid, the realization problem tends to suppose that profits are indeed *secure* after this problem has been overcome. Because I am interested here in accumulation rather than

the pace of the replacement of technology by technology can match the pace of the reproduction of already-created value—thus becoming a dynamic of accumulation—is also why, when the replacement of technology by technology outpaces the reproduction of already-created value, it becomes a dynamic of disaccumulation. The Secularists maintain a same-difference strategy to the extent that the same temporal loci (the technologies of the production process) are themselves what enable a different temporal relationship between the actualization of newly-created value and the virtualization of already-created value (production and reproduction). Past value virtualized in the production process is not actualized (reproduced) by a future production process. What Aglietta calls “non-conservation” and what I am calling the failure to reproduce this already-created value becomes a limit to the scope of virtual value that can be actualized (produced) in the following production processes. Because of the symmetry of this mechanism, it would be more accurate to speak of ‘dis/accumulation’ as a pivot that indicates a shift in the modality of capitalist development rather than a shift towards a different system of production.

We have now seen that the replacement of technology by technology is precisely what synthesizes the declining rate of profit both as an internally produced limit to growth and as an internally produced loss of already-created value.⁴³ How does this possibility secure its own repetition and compounding? Where the replacement of technology by technology posited capitalism as a species of automation that realizes itself in automative technologies, how does the replacement of technology by technology posit capitalism as a species of automation that *devalorizes* itself in automative technologies?

Crucially, Aglietta argues that accumulation is only one of two polarities belonging to the same dynamic, but *not* that the accumulation of capital through the accumulation of automative technologies was only

a successful cycle of the production process, I emphasize that these realized profits must, if they are going to be the basis of future exchange and thus actually enlarge the system of equivalence implied by exchange, support further production. I believe that devalorization is a better explanatory mechanism for the declining rate of profit because it shows how the replacement of technology by technology can generate an *internal* and *particular* realization problem, and it synthesizes this with an account of how the value already realized in the technologies of the production process can later be subject to disaccumulation.

43. “[Devalorization] is incorporated *a priori* into cost prices. As a result, *an intensification in the pace of obsolescence is translated into a growth of the share of depreciation allowances in overall cash flow*, and correlatively into a relative decline in net profit” (Aglietta 2015, 108).

a conjunctural logic which is now beginning to fracture. This is why the relationship between the development of capitalism and the development of technology is predicated on a “real contradiction.” In other words, we are not describing how a mechanism of accumulation that once held the past, present, and future of capitalist development together now begins to unravel. We are describing a mechanism of disaccumulation that holds the past, present, and future of capitalist development together. That it is not the dissolution of a conjuncture is what leads Aglietta to argue:

[D]evalorization no longer expresses itself chiefly as a brutal interruption of the course of fixed capital depreciation. It forms part of the metamorphoses of value, and is integrated into the financial provisions for replacing fixed capital...This fund is lumped together with the amortization fund, from which it cannot really be distinguished. (Ibid., 108)

In my final section, I use “disaccumulation” to formalize the temporal logic through which the failure to reproduce already-created value virtualized by the technologies of the production process (devalorization) becomes analytically indistinguishable from the incremental reproduction of already-created value through the technologies of the production process (amortization). This indistinction likewise indicates that disaccumulation is *not* the untethering of the production process from the reproduction process. What changes is the fact that disaccumulation now holds the moments of production and reproduction together. This is what it means to say, now quite literally, that a process of descendancy (rather than ascendancy) is what ensures that contemporary capitalism remains capitalism. Devalorization, if it is actually indistinguishable from amortization, must take place in the same productive-reproductive process. Disaccumulation therefore describes the way in which devalorization is produced in the production process and reproduced by the reproduction process. *Consequently, there must be a real sense in which disaccumulation can be said to accumulate.*

6. Automation All the Time

Across “2. Crisis and Chronology” and “3. The Realer Subsumption,” I argued that, when Marx sublimated the prospective crisis of the accumulation of fixed capital in *Grundrisse*, he also rendered the problem of the replacement of labour by technology intrinsic but secondary to the replacement of technology by technology. The consequences of this transformation meant that technological development became the accumulative mechanism behind capitalist development—its mode of existence in tending towards real subsumption. In studying how this legacy

was borne by Cyclicists writing after Marx, I demonstrated that technological development was therefore simultaneously conceived as progressive and anachronistic—an iterative process through which labour was constantly staged in its disappearance as the obverse of the way in which capitalism realized itself in an iterative epoch of real subsumption, again and for the first time. In “4. The Epoch After,” I demonstrated how the Secularists took aim at real subsumption in order to take aim at its iterativity. Arguing that real subsumption is behind us entailed that the Secularists commit to a symmetrical proposition through which the mechanism of capitalist accumulation that did, eventually, accomplish real subsumption is also the mechanism behind disaccumulation in the time after real subsumption. In “5. Angels of Devalorization,” I then showed how disaccumulation could only be conceived as a symmetrical mechanism to the extent that it could be thought according to the same temporal loci through which the technologies of the production process link production and reproduction.

In my conclusion, I propose that the Secularists remain within the legacy of Marx’s sublimation of the crisis of fixed capital accumulation between *Grundrisse* and *Capital* and I outline the consequences of that legacy today. I will first show that, if disaccumulation now describes how automative technologies link the production process to the reproduction process, then disaccumulation must itself be said to compound. In other words, if devalorization is a real contradiction, it is because it conceptualizes something other than the simple dissolution of the mechanism that held together production and reproduction in the phase of capitalism’s ascendancy. I will then argue that, if disaccumulation does not decentralize the importance of automative technologies as temporal loci connecting the reproduction of already-created value to the production of new value, it is because it instead remaps their temporal logic. Externally, disaccumulation might be viewed as an algorithm which charts out capitalism’s eventual end. However, this will give us an inverted and incorrect view of its internal logic. Internally, disaccumulation must rather be understood as process that makes an indefinite claim on the future as the future of capitalism. I conclude by reformulating an argument “3. The Realer Subsumption” made in terms of capitalist ascendancy: today, what automative technologies are actually said to *do* is likewise derived from the anachronistic temporality of capitalist development that the replacement of technology by technology first enables. Automative technologies become functional equivalents of

human labour as an outcome of the process through which the replacement of technology by technology becomes a dynamic of disaccumulation. In restaging labour's repeated subsumption and disappearance today, full automation is the modality through which capitalism iteratively articulates its own indefinite dynamics of disaccumulation.

We saw that the Secularists seem to revive a central concern of classical economics—the declining rate of profit—but reinterpret it as an internal product of the dynamic of accumulation, which therefore becomes a dynamic of disaccumulation. Unlike its classical sense, here the declining rate of profit is due to a real contradiction in which the failure of the replacement of technology by technology to reproduce already-created value is redoubled as downward pressure on the virtual scope of future value. However, “failure” is an unsatisfactory term here, as is “devalorization,” if it is taken to mean only that a quantity of value initially created is now lost. It is one thing to note that capitalism is based on an ultimately unsustainable contradiction: a system of equivalence and a principle of conservation coupled with a mechanism which violates equivalence by creating unprecedented value and a principle that commensurates this value in the future. Inasmuch as disaccumulation is now the foundation of an historiographical argument, its own implied terminus seems to radically limit it as a lasting metric for the future history of capitalism: capital cannot, by definition, disaccumulate infinitely even though capital can, by definition, accumulate infinitely. This fact is doubtless the hope of many of the Secularists who periodize the time after real subsumption—that here, on the threshold of capitalism's declension, might be a glimpse of what lays beyond it. Thus Brown terminates on “The Stationary State” (2050) as a period ostensibly outside the bounds of capitalism. Does this render the dynamic of disaccumulation as a prophetic algorithm through which capitalism will eventually price itself out?

We should see, already, that if the present epoch of capitalism seems to double as a proposition about the prospective end of capitalism, then from a temporal perspective it has little in common with the sense in which we have used “epoch” in the phase of capitalist accumulation. Quite the opposite, the accumulative epochs that the current moment succeeds define themselves in terms of the limits they displace rather than engender. The real contradiction animating capitalism is not only that two contradictory logics exist in the same place, at the same time, but that they do so for the same reason. In accumulation, this real con-

tradiction describes precisely why capitalism works—there is no preservation of equilibrium except through its violation; there is no conservation except through addition. The energy of the contradiction itself is what magnetizes and associates its contradictory elements. If the declining rate of profit indicates how disaccumulation disassociates these two contradictory logics, then disaccumulation does not describe a real contradiction. Rather, it describes a contradiction that has *already been resolved* virtually. Thus conceived, this trajectory would follow the gradual uncoupling of reproduction and production precisely because they had already lost their associating principle. The fact that we tend to imagine the “Declining Rate of Profit” as an exceptional epoch that engenders its own anterior limit—a virtual trajectory that only needs to be followed to be actualized—is a sign that we are prioritizing the declining rate of profit as the causal mechanism behind disaccumulation, rather than understanding disaccumulation as the causal mechanism behind the declining rate of profit.

While it may initially sound like a semantic distinction, I propose that the declining rate of profit should be considered as the outcome of a reorganization of the temporal relationship between production and reproduction, not as the causal mechanism behind disaccumulation. This shift would highlight how the real contradiction behind devalorization is not virtually resolved but rather actually *endures* as a contradiction once devalorization is generalized in disaccumulation. As I noted in “4. The Epoch After,” the real contradiction associating exchange with production became a modality of accumulation because its temporal logic coupled the actualization of a virtual, unprecedented magnitude of newly-created value with the virtualization of an actual magnitude (the preservation of already-created value through its consumption and reproduction in a *later* production process). Inasmuch as devalorization is another valence of the production process (the other being valorization), what is produced is an unprecedented magnitude that also violates the principle of equivalency in exchange. This is why Aglietta still articulates the real contradiction of devalorization as a violation of the principle of equivalency: *both* the production of profit in an accumulative system (valorization) and the production of loss in a disaccumulative system (devalorization) violate this principle. We are therefore speaking of a form of *negative surplus*—a magnitude that also appears as supernumerary, unprecedented value that will need to be commensurated to be actualized in a future process of exchange.

As we have seen, surplus violates the principle of equivalence by producing more than what was exchanged. Within the dynamic of accumulation, that surplus must then be given an equivalent in a later production process in order to be actualized. Negative surplus violates the principle of equivalence by producing less than what was exchanged. Within the dynamic of disaccumulation, that negative surplus must be given an equivalent in a later production process in order to be actualized. If negative surplus value appears as a declining rate of profit, it is because this magnitude understands its *future equivalent* as *future reparations*—as a reparative magnitude for the already-created value that should have been conserved by right but was lost instead. In “4. The Epoch After,” surplus described what the future owed us. Negative surplus describes what we owe the future. This is indeed the colloquial sense in which we are said to realize a loss.

If devalorization *compounds*, thus becoming disaccumulative, it is because what it simultaneously reproduces is the loss of that already-created value which should have been conserved. The dynamics of disaccumulation describe an abyssal modality of time in which the past (reproduction) and the future (production) are drawn together. As the actualization of a virtual loss, negative surplus value *must* be settled by a future equivalent but definitionally *cannot be* without that settlement repeating and compounding the loss. It follows that, when Aglietta says that amortization (the incremental reproduction of already-created value through the technologies of the production process) and devalorization become genuinely indistinguishable, he is also describing the temporal reconfiguration of the relationship between reproduction and production. If, as he notes, the devalorization process allocates a magnitude of surplus for the reparation of past value not reproduced by that same process, then he describes the way in which (1) virtual surplus cannot be fully realized because it is *already* the debt of the past and, consequently, (2) how this magnitude of unrealized surplus used to settle past debt will, at that same moment, be recapitulated as past debt that needs to be settled by another de/valorization process.⁴⁴ We posit an increasing magnitude of future surplus value as a virtual equivalent for the debt of the past, but we also posit that the future is the futurity of past debt (the fact that it will remain unpayable). Understanding the declining rate of profit as a symptom of the rearrangement of the tem-

44. See Aglietta (2015, 108, 313).

poral dynamic proper to accumulation shows us why we should not imagine the declining rate of profit to represent a fixed limit and thus concrete endpoint to capitalist development. The declining rate of profit appears, externally, as a subtractive tendency towards an integral limit—the number 0—that likewise puts a number on capitalism’s future lifespan. Disaccumulation is, internally, a future-oriented process through which capitalism indefinitely displaces this same limit. Both profit (surplus) and debt (negative surplus) are claims on the future which claim the continued futurity of capitalism.

The indistinguishability of amortization and devalorization is thus the indistinguishability of a profit mechanism and a debt mechanism within the dynamics of disaccumulation. Disaccumulation describes the replacement of technology by technology within a temporal logic in which the past is already a canceled future; the future is an unredeemable past. As temporal terminals, the past and the future threaten to become reversible through a process whose causes are effects and whose effects are causes. Is this the kind of capitalist real time that theorists of automation such as May imagined when he noted that we are on the dis/accumulative precipice of automating “the mental processes that can be made to control automated manual processes”? Capitalism thus appears as a species of automation today not because it is self-propelling but because disaccumulation is *self-causing*. If real time describes the modality of capitalism today, it is because the epoch after real subsumption is not only a different *kind* of epoch from primitive accumulation, formal subsumption, and real subsumption. The time after real subsumption is not, after all, epochal; it is abyssal.

The Cyclicist archive shows us how the replacement of technology by technology in a period of accumulation stages the repeated subsumption of labour and thus constantly asks the question of its full automation. The Secularist archive critiques the iterativity of this question by critiquing the iterativity of real subsumption. Analyzing the role of the replacement of technology by technology in a dynamic of disaccumulation demonstrates that the Secularists do not overcome this temporal problem in overcoming real subsumption. For his part, Benanav attempts to treat full automation today by distinguishing between technological properties that are labour-saving (non-automotive) and labour-replacing (automotive technologies).⁴⁵ If Benanav’s goal is to understand how automation operates in a capitalist present defined by stagnation, he

45. See Benanav (2020, 5).

should not be able to maintain both of the following points: (1) any increase in the productivity of the production process that is not accompanied with an equivalent increase in output will reduce the number of workers employed in the production process and (2) we can meaningfully distinguish labour-augmenting and labour-replacing technologies through an analyses of their technological properties.⁴⁶ If we could begin from the optic of technological properties and distinguish between labour-saving and labour-replacing technologies using such properties, then Benanav's economic argument would be moot. If Benanav's economic argument is not moot, it is because any technology that increases productivity without increasing output will become labour-replacing.

Accordingly, Benanav's account indexes an undecidable choice between a political-economic theory of stagnation and a media philosophy of labour. If, in his political-economic theory of stagnation, technology is an economic modifier in which all increases in productivity translate more and more into job loss, in his media theory of labour, all technological development is consequently automative development and all technological operations are automative operations. If Benanav attempts to displace and peripheralize automation discourse as an epochal determinant through a political-economic theory of disaccumulation, disaccumulation overcomes automation discourse only to rediscover automation everywhere. Whether a more effective hammer or a fully-autonomous robot, all technology tends to be automative technology under a dynamic of disaccumulation. It is, ironically, the time after real subsumption which fully synthesizes a media theory of automation and a political-economic periodization of capitalism.

The constant restaging of the question of full automation today—a problem of the replacement of labour by technology—is thus the restaging of capitalism's own disaccumulative dynamics—the replacement of technology by technology. This is why I have maintained, throughout this article, the initially counterintuitive proposition that automative technologies are *temporal* registers on capitalist development. Reading across the Cyclicists and Secularists thus demonstrates how automation becomes a technological property in this first sense—a functional equivalent of human labour—because it is derived from a temporal dynamic structuring capitalism's mode of dis/accumulation. Automative technologies work *now*, as automative, because they double as an exhausted call for a reparative magnitude of value, *later*. An economic paradigm in

46. See Benanav (Ibid.).

which any technology is an automative technology is thus only the obverse of an automative mode of disaccumulation in which capitalism ‘moves by itself’—which is to say that it operates in and as the absence of its own material supports. Echoing Marx, Benanav is therefore correct that striking workers misidentify automative technologies as the primary threats to their livelihoods. Automative technologies are forebearers of a self-striking out, a capital strike that has already happened.

References

- Aglietta, Michel. 2015. *A Theory of Capitalist Regulation: The US Experience*. London: Verso Books.
- Arthur, Christopher J. 2008. “USA, Britain, Australia and Canada.” In *Karl Marx’s Grundrisse: Foundations of the Critique of Political Economy 150 Years Later*, edited by Marcello Musto. New York: Routledge.
- Balakrishnan, Gopal. 2009. “Speculations on the Stationary State.” *New Left Review* 59: 5–26.
- Beller, Jonathan. 2006. *The Cinematic Mode of Production: Attention Economy and the Society of the Spectacle*. London: Dartmouth College Press.
- Benanav, Aaron. 2019a. “Automation and the Future of Work—1.” *New Left Review* 119: 5–38.
- . 2019b. “Automation and the Future of Work—2.” *New Left Review* 120: 117–46.
- . 2020. *Automation and the Future of Work*. London: Verso Books.
- Brenner, Robert. 2006. *The Economics of Global Turbulence*. London: Verso Books.
- Brown, Nathan. 2018. “Postmodernity, Not Yet: Toward a New Periodisation.” *Radical Philosophy* 2.01: 1–27.
- Deleuze, Gilles, and Félix Guattari. 1987. *A Thousand Plateaus: Capitalism and Schizophrenia*. Minneapolis: University of Minnesota Press.
- Foley, Duncan. 1986. *Understanding Capital: Marx’s Economic Theory*. Cambridge, MA: Harvard University Press.
- Fumagalli, Andrea. 2015. “The Concept of Subsumption of Labour to Capital: Towards Life Subsumption in Bio-Cognitive Capitalism.” In *Reconsidering Value and Labour in the Digital Age*, edited by Eran Fisher and Christian Fuchs. New York: Palgrave Macmillan.
- Heinrich, Michael. 2013. “The Fragment on Machines: A Marxian Misconception in the Grundrisse and Its Overcoming in Capital.” In *In Marx’s Laboratory: Critical Interpretations of the Grundrisse*, edited by Riccardo Bellofiore, Guido Starosta, and Peter D. Thomas. Leiden: Koninklijke Brill NV.
- Hui, Yuk. 2018. “On Automation and Free Time.” *e-flux Architecture*. <https://www.e-flux.com/architecture/superhumanity/179224/on-automation-and-free-time/>.
- Marx, Karl. 1990. *Capital: A Critique of Political Economy, Volume 1*. New York: Penguin Books.
- . 1993. *Grundrisse: Foundations of the Critique of Political Economy*. New York: Penguin Books.
- May, John. 2017. “Everything Is Already an Image.” *Log* 40: 9–26.
- Meister, Robert. 1990. *Political Identity: Thinking Through Marx*. Cambridge: Basil Blackwell Inc.

- . 2021. *Justice Is an Option: A Democratic Theory of Finance for the Twenty-First Century*. London: The University of Chicago Press.
- Musto, Marcello. 2008. “Dissemination and Reception of the Grundrisse in the World: Introduction.” In *Karl Marx’s Grundrisse: Foundations of the Critique of Political Economy 150 Years Later*, edited by Marcello Musto. New York: Routledge.
- Negri, Antonio. 1991. *Marx Beyond Marx: Lessons on the Grundrisse*. Brooklyn: Autonomedia.
- Panzieri, Raniero. 1980. “The Capitalist Use of Machinery: Marx Versus the ‘Objectivists.’” In *Outlines of a Critique of Technology*, edited by Phil Slater. London: Ink Links Ltd.
- Pasquinelli, Matteo. 2019. “On the Origins of Marx’s General Intellect.” *Radical Philosophy* 2.06: 43–56.
- . 2023. *The Eye of the Master: A Social History of Artificial Intelligence*. London: Verso.
- Spence, Martin. 2019. “Marx Against Marx: A Critical Reading of the ‘Fragment on Machines.’” *tripleC: Communication, Capitalism & Critique* 17 (2): 327–39.
- Terranova, Tiziana. 2014. “Red Stack Attack! Algorithms, Capital and the Automation of the Common.” In *#Accelerate: The Accelerationist Reader*, edited by Robin MacKay and Armen Avanesian, 379–99. Falmouth: Urbanomic Media LTD.
- Tronti, Mario. 2008. “Dissemination and Reception of the Grundrisse in the World: Introduction.” In *Karl Marx’s Grundrisse: Foundations of the Critique of Political Economy 150 Years Later*, edited by Marcello Musto. New York: Routledge.
- Willig, Robert D., and Elizabeth E. Bailey. 1979. “The Economic Gradient Method.” *The American Economic Review* 69 (2): 96–101.

Biography

Devin Wangert is an assistant professor of media studies at the School of Advanced Studies, University of Tyumen. He is currently working on his second book, titled *Media Theories of Labour: Automation and the Economics of Exhaustion*.