Voice Assistants, Capitalism, and the Surveillance of Social Reproduction

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Abstract *Drawing on the Marxian critique of political economy and feminist social reproduction theory, this contribution examines the role of voice assistants (VAs) or intelligent personal assistants (IPAs) in the reproduction of labor and capital. I argue that the appropriation of user-generated voice data serves the purpose of streamlining and accelerating the circulation and consumption of commodities, and, thus, ought to be understood as a continuation, or even radicalization, of classical capitalist accumulation. I reach this conclusion in two steps. Firstly, I locate the appropriation of user-generated voice data captured by smart speakers within a more general history of the role of surveillance in (re)producing capitalist social relations. Indeed, surveillance has been, and continues to be, central to (a) the appropriation of surplus value in the sphere of production; (b) the social reproduction of labor power; and (c) the management of circulation and consumption. In short, surveillance has been key in trying to fix some of capitalism's most important contradictions. Secondly, I analyze the business models of the corporations behind the three most prominent brands of smart speakers – Apple, Amazon, and Google – to show how the appropriation of user-generated data via smart speakers marks an extension of capitalist surveillance into the sphere of social reproduction.*

1. Introduction

In recent decades, social theory has seen a proliferation of diagnoses of novel forms of capitalism or even proclamations that we have reached the end of capitalism (as we know it). Labels such as cognitive capitalism (Couldry and Mejias 2019; Fumagalli 2010; Vercellone 2010), data capitalism (Sadowski 2019), digital capitalism (Fuchs 2018; Fuchs and Mosco 2017; Sadowski 2020; Schiller 1999), platform capitalism (Langley and Leyshon 2017; Srnicek 2017)

and surveillance capitalism (Foster and McChesney 2014; Zuboff 2019) imply that networked digital technologies have facilitated the emergence of new forms of capitalism or have even led to a fundamental break with the logic of capitalist accumulation (most recently, Varoufakis 2023).

According to Shoshana Zuboff (2019), the appropriation of user-generated voice data by means of smart speakers exemplifies the logic of 'surveillance capitalism', which, for her, marks a clear break with classical capitalist accumulation. Focusing on the case of voice assistants (VAs) or intelligent personal assistants (IPAs), which have entered many private households in the form of so-called smart speakers, I propose that we ought rather to understand the socio-economic role of networked digital technologies as well as their surveillance function in more traditional Marxian terms. I will show that the appropriation of user-generated voice data serves the purpose of streamlining and accelerating the circulation and consumption of commodities, and must therefore be understood as a continuation, or even radicalization, of classical capitalist accumulation. Firstly, surveillance capitalism in general, and the appropriation of user-generated voice data captured by smart speakers in particular, ought to be located within a more general history of the role of surveillance in (re)producing capitalist social relations. Building on the work of Andrejevic (2007), Fuchs (2013), Ferguson (2020), and Fortunati (1995), I will show in the following that surveillance has been, and continues to be, central to (a) the appropriation of surplus value in the sphere of production; (b) the social reproduction of labor power; and (c) the management of circulation and consumption. In short, surveillance has been key in *trying* to fix some of the central contradictions of capitalism. Secondly, I will analyze the business models of the three most well-known providers of digital voice assistants – Apple, Amazon, and Google – to demonstrate that the appropriation of user-generated data attained by smart speakers is part of a wider extension of capitalist surveillance into the sphere of social reproduction in order to sell more commodities more quickly.

2. Capitalist Accumulation and Social Reproduction

To map out the role of surveillance in and for both capitalist accumulation and social reproduction, I will take a brief detour through the Marxian critique of political economy. In the first volume of *Capital*, Marx (Marx 1976) argues that commodities with different qualitative use values can only enter purely quan-

titative exchange relations because they are all products of human labor. "Socially necessary labor time" (129) determines a commodity's value, which is, in turn, represented by its exchange value in relation to other commodities, and ultimately expressed in terms of a price. The peculiarity of the commodity of labor power is that it is the only commodity that can produce more value than it itself has. Labor power also has a value, namely the socially necessary labor time for producing the commodities needed to sustain a laborer at a historically and geographically specific standard of living (275). The value of labor power is reproduced after a certain time (necessary labor time), but if laborers are made to work longer and/or more productively (surplus labor time) than required to reproduce the value of their labor power, capital has obtained surplus value (325). For Marx, exploitation is expressed in the contractual obligation of laborers to work longer (absolute surplus value) and/or more productively (relative surplus value) than necessary to produce the value of the commodities they need to sustain themselves at a historically and geographically specific standard of living (643–654). In this sense, exploitation is the sole source of surplus value, and the continuous productive reinvestment of at least some portion of surplus value – what Marx calls capital accumulation or valorization – is what ultimately defines the capitalist mode of production (725–734).

This is a powerful critique of capitalism, but, as many feminist theorists and activists have argued, it falls somewhat short, because it fails to address the additional work necessary for reproducing both individual workers and the working class (Bhattacharya 2017; Bakker 2007; Dalla Costa and James 1972; Ferguson 2020; Fortunati 1995; Fraser 2014; Glenn 1992; Katz 2001; Kienscherf and Thumm 2024; Mezzadri 2021; Naidu 2022; Mies 2014; Picchio 1992; Vogel 2013). Workers receive a money wage that is supposed to cover all the expenses required to sustain a specific standard of living. But this money wage needs to be converted into readily consumable use values. The adage that you cannot eat money holds particularly true here. For example, buying groceries and preparing a meal after a day of work requires additional labor. Hence, all sorts of additional labor processes and labor times are necessary for (re)producing both workers and the working class, on top of the labor time spent earning the wage:

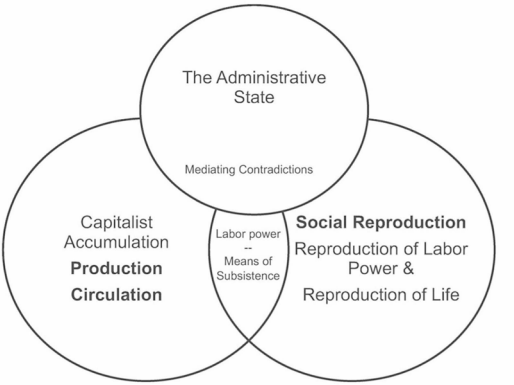
> [Marx] does not realize that the individual male worker's consumption is not a direct consumption of the wage, that the wage does not have an immediate use-value for the male worker and that the consumption of the

> wage's use-value presupposes that some other work has taken place […] (Fortunati 1995, 49).

The work that goes into producing and reproducing both workers and labor power is termed social reproductive work, while the overall process is called social reproduction. While much social reproductive work is performed within the household, a large amount is also performed by public and private sector organizations. Social reproductive work, moreover, may be commodified to a greater or lesser extent and may be waged or unwaged. Moreover, most social reproductive work has been and continues to be disproportionately performed by women. And this holds particularly true for household-based unwaged social reproductive work (see also Kienscherf and Thumm, 2024).

Under capitalism, employers do not simply want as much of their employees' labor time as possible but also labor of a particular quality, intensity, and productivity. Employers pursue absolute surplus value by having their workers work longer than needed to reproduce the value of their labor power, and relative surplus value by having them work as intensively and/or productively as possible. Capitalist accumulation, therefore, pivots on controlling labor in terms of both duration and intensity. This has serious repercussions for social reproduction. The more time workers spend performing waged labor to generate capital, the less time they have for engaging in reproductive work, either for themselves or for their families and communities. The more intensive their work hours, the less energy they have for performing reproductive work. When subject to the capitalist logic of value, then, increasing the duration and intensity of labor time severely undermines workers' capacity for social reproduction. On the other hand, having too little or no access to waged labor may also undermine workers' capacities for social reproduction, because under capitalism they must buy their means of subsistence with the money wage they receive in exchange for their labor power. Hence, there is not only a contradiction *between* capitalist accumulation and social reproduction but also a contradiction *within* social reproduction between the (re)production of human life and the (re)production of labor power. Capitalist accumulation depends on the availability of labor power, but its exploitation of labor undermines the conditions not only for the reproduction of labor power but also for the reproduction of life itself, so that the state has to step in to secure the condition of capitalist accumulation. This simple Venn diagram (Figure 1) serves to illustrate the contradictory relations between capitalist accumulation and social reproduction:

Figure 1: The relations between capitalist accumulation, social reproduction, and the state.



Some feminist theorists tend to reduce social reproduction to the production of labor-power-as-commodity (e.g., Dalla Costa and James 1972; Fortunati 1995). Yet, social reproduction also produces human life itself – in biological, social, and cultural terms. It is only under capitalism that human beings become the bearers of the commodity of labor power. In fact, there are many aspects of social reproductive work that point beyond the capitalist imperative of value (see Ferguson 2020). For one, even in its waged forms, social reproductive work is not nearly as susceptible to the treadmill effect as commodity-producing types of labor are – although that is not for lack for trying. Indeed, productivity metrics often fall short when applied to labor processes that deal with human beings. It is precisely because it does not directly produce value for capital that so much social reproductive labor is either relatively badly paid or completely unwaged

3. Surveillance of Production, Circulation, and Social Reproduction

Every mode of production that seeks to extract surplus from producers requires some form of surveillance – at least in the sense of basic supervision – to ensure that workers perform the required work. This held just as true for slave production in ancient Greece and feudalism in the medieval period as it does for capitalism. What distinguishes the capitalist mode from other modes

of production is that under capitalism surplus production is no longer a means to an end but becomes an end in itself. As Ellen Meiksins Wood puts it, "the production of goods and services is subordinate to the production of capital and capitalist profit. The basic objective of the capitalist system, in other words, is the production and self-expansion of capital" (2002, 9). This is why capitalism aims to constantly increase labor productivity and thereby extract more relative surplus value. This leads to a particular type of labor extraction problem, as the extraction of relative surplus value requires the extraction from workers of not just a particular kind of labor for a specific amount of time, but of labor of a particular intensity and productivity. Increasing the extraction of relative surplus value thus requires not only the supervision of workers to ensure they work, but also the collection and analysis of data about the production process in order to evaluate it and, based upon the assessment, take measures to boost productivity. This evaluation process is what ultimately gives rise to the infamous treadmill effect whereby each productivity gain becomes the new baseline against which productivity is subsequently measured. Increases in productivity raise "the amount of value produced per unit of time – until this productivity becomes generalized; at that point the magnitude of value yielded in that time period, because of its abstract and general temporal determination, falls back to its previous level" (Postone 1993, 289). Taylor's *Principles of Scientific Management* provide perhaps the best-known analysis of the use of surveillance for the purpose of extracting relative surplus value from labor (Taylor 1911; see also Braverman 1974). Over time, surveillance of and control over workers has been progressively inscribed into the very technological design of the labor process (Braverman 1974). In the early days of capitalism, capitalists took control of traditional labor processes and appropriated them for the purpose of accumulation. This is what Marx (1976, 645) calls the *formal subsumption* of labor by capital. But, as the capitalist mode of production expanded, capitalists began to (re)design labor processes in order to meet their objectives to extract ever more relative surplus value. This is what Marx (1976, 645) calls the *real subsumption* of labor by capital. Surveillance, initially in the form of close direct supervision and later in the sense of data collection and analysis, has played and continues to play a central part in facilitating capital's *real* subsumption of labor. Capitalist surveillance in the sphere of production thus helped consolidate the capitalist mode of production. We could call the period of the consolidation of capitalism in the late 19th/early 20th century Taylorism – characterized by intensive accumulation without mass consumption (see Jessop and Sum 2006).

Once capital had established tight control over the production process, some capitalists also tried to extend factory-floor-like surveillance to their workers' reproductive sphere, i.e., to their private households. Henry Ford's (in)famous sociology department is a case in point. Capitalists' surveillance of their workers' social reproduction served the general purpose of ensuring that workers' lifestyles would not interfere with the imperative of producing surplus value. Employers, therefore, surveilled working-class consumption habits in order to promote conventions around sobriety, cleanliness, good housekeeping, and the like (Meyer III 1981; quoted in Roediger and Esch 2012). Early capitalist surveillance of working-class households was also driven by the distinct paternalism of particular capitalists who sought to shape their workers' behaviors according to their own religious and political beliefs. Capitalist surveillance of workers' social reproduction persists, for example in dormitory production systems (Schling 2017). Yet, in the Global North, capitalist surveillance of working-class social reproduction has for the most part been replaced by state surveillance, which emerged in response to the dislocations brought about by unfettered capitalist accumulation. In fact, unfettered capitalist accumulation ends up undermining the very conditions for accumulation. As Marx (1976, 375–6) writes in *Capital, Vol. I*:

> But in its blind and measureless drive, its insatiable appetite for surplus labour, capital oversteps not only the moral but even the physical limits of the working day. […] By extending the working day, therefore, capitalist production, which is essentially the production of surplus value, the absorption of surplus labour, not only produces a deterioration of human labour-power by robbing it of its normal moral and physical conditions of development and activity but also produces the premature exhaustion and death of this labour-power itself.

The various social dislocations caused by capitalist accumulation – in terms of not only working-class health and well-being but also of overall societal health and well-being – gave rise to what Karl Polanyi (1957, 151–157) famously called the double movement: the enactment of protective legislation to secure not just the reproduction of labor power but also the reproduction of life itself. This occurred partly in response to the class-based demands for shorter working days, occupational health and safety measures, and various forms of welfare (see Mohandesi and Teitelman 2017; Piven Fox and Cloward 1993). Yet, many social protective measures and regulations also arose out of concerns that were

not class-specific. The bourgeoisie was also concerned about pollution and the quality of industrially-produced foodstuffs. Just consider the reception of Upton Sinclair's *The Jungle* (1973 [1905]), a muckraking novel about labor conditions and capitalist exploitation in the Chicago meatpacking industry at the beginning of the 20th century. Most bourgeois readers, including President Theodore Roosevelt, were far more disturbed by the stomach-turning description of industrial food production than by that of the labor conditions (see, for example, Pickavance 2010). They were, after all, much more likely to eat industrially-produced meat products than to work in a meatpacking plant. *The Jungle* thus played a key role in raising concerns that led to the passing of the Pure Food and Drug Act in 1906. Faced with the central contradiction between capitalist accumulation and social reproduction, the modern administrative state arose as the *formally* neutral protector of the conditions for capitalist accumulation. The administrative state thus came to mediate between the imperative of accumulation and the need for stable social reproduction. This historical process unfolded with considerable local variation across the Global North between the second half of the 19th century and the end of World War II. In the case of the US, the development began with the rise of the progressive movement at the end of the 19th century and culminated with the New Deal in the early 1930s. The following – far from complete – list shows that the modern administrative state has developed enormous domestic surveillance capabilities: the administrative state surveils the sphere of *production* to enforce environmental standards, health and safety standards, food and drug purity standards, labor practices, etc.; the sphere of *circulation* to make and enforce market rules, to guarantee consumer safety, etc.; and the sphere of *social reproduction* to assess citizens' eligibility for welfare programs, to guarantee the safety and well-being of children, to police working-class lifestyles, etc. (see Kienscherf 2019, 2021). In brief, by way of surveillance, the modern administrative state seeks to mediate the contradiction between capitalist accumulation and social production, as well as the contradiction between the reproduction of life itself and the reproduction of labor power within social reproduction (see Figure 1).

Over the course of the 19th century, capital came to deploy increasingly sophisticated forms of surveillance to gain almost full control over labor in the process of production. But for capital to accumulate, it must also successfully pass through the sphere of circulation. Rising productive throughputs thus prompted the need to exert more control over the sphere of circulation (see Beniger 1986). This brings us to the period of Fordism, which was characterized by intensive accumulation with mass consumption. While under Taylorism tech-

niques of surveillance had been developed and deployed to manage the production process, Fordism saw these techniques of surveillance extended into the sphere of circulation, as well as the development of new ones, as can be seen in the rise of the mass communication, market research, and advertising industries (see Andrejevic 2007).

The political, economic, and social crisis of the 1970s, however, precipitated the contemporary Post-Fordist capitalist period (see Jessop 2002), which is characterized by flexible accumulation alongside customized production and consumption. This includes the extension of precarious employment situations to hitherto relatively privileged populations, alongside changes in production, which have been both facilitated by and have given rise to new transportation, information, communication, and surveillance technologies. The shift from just-in-case to just-in-time production and the advance of mass customization – "high volume and high mix" production (Eastwood 1996) – hinges on the collection, sharing, and analysis of data within and across corporations in order to manage increasingly complex production processes and supply chains. On the one hand, real-time surveillance of intricate supply chains has become essential to manage the geographically dispersed production and circulation processes that characterize Post-Fordism. On the other, the production of ever more customizable commodities at ever higher volumes also required managing consumer demand by deploying increasingly precision-targeted techniques of marketing and advertising. Sabine Pfeiffer (2022) calls this the development of the *distributive* forces of capitalism that, unlike productive forces, are not geared towards *producing* value but towards *realizing* value as efficiently as possible.

This is the context in which capitalist surveillance in the sphere of circulation has been extended into the sphere of social reproduction. The algorithmic selection, combination, and analysis of data produced by people's interactions on and with digital platforms has facilitated the analysis of who is exposed to which advertisements and how that exposure affects their consumptive behavior (Andrejevic 2007; Dyer-Witheford 2015; Srnicek 2017). Micro-targeted advertising, if it is to be based on reliable information about the preferences, wishes, and desires of ever more finely-grained consumer demographics, requires access to data not only about people's patterns of consumption but also about their more general patterns of social reproduction. This is how the digital platform-based surveillance of consumers differs from the 'mere' surveillance of consumption at sites of consumption, such as supermarkets. Supermarket loyalty cards, for instance, monitor only one particular aspect of people's social

reproduction: their interaction with capitalist markets (Trurow 2017). Digital platforms like Google and Facebook, by contrast, collect data about all the interactions that the platforms facilitate. While capitalist surveillance of circulation under Fordism may indeed be construed as an early foray into the monitoring of social reproduction in order to accelerate the circulation of commodities, in its early days, Fordist marketing and advertising surveillance was focused more on markets than on market actors, more on consumption than on consumers. Significantly, the shift from tracking consumption to monitoring consumers marks the extension of capitalist surveillance of circulation into the sphere of social reproduction.

Many social reproductive activities now take place online, and digital advertising platforms, like Google and Facebook, facilitate the extraction of data that users generate while interacting with one another via these platforms and/or with the platforms themselves:

> Platforms allow surveillance capital to channel activities that happen outside the logic of capitalist accumulation (but are still a condition for its reproduction) into processes of valorization. By engaging in these activities on platforms, users produce data that surveillance capital then expropriates through almost ubiquitous surveillance. (Kienscherf 2022, 23)

This is what Shoshana Zuboff (2019) calls "surveillance capitalism": which is not, I argue, a new form of capitalism, but rather the extension of capitalist surveillance into the sphere of social reproduction with the aim of shaping and controlling consumer demand (see Kienscherf 2022).

4. Personal Digital Assistants in Capitalist Accumulation and Social Reproduction

Despite attempts to channel ever more human behavior through digital platforms, many processes of social reproduction still take place offline and, thus, have eluded the reach of platform surveillance – until recently. Now platforms have acquired 'eyes and ears' that extend into offline spaces. This is where the internet-of-things and 'smart' everyday objects, such as smartphones, smart watches, smart fridges, smart thermostats, and smart speakers, enter the equation. What all these 'smart' everyday objects have in common is that they are connected to online platforms and they are equipped with sensors

that allow for the appropriation of offline data (Sadowski 2020; Turow 2021). Indeed, "the 'personal digital assistant' is revealed as a market avatar, another Trojan horse in which the determination to render and monetize your life is secreted under the veil of 'assistance' and embellished with the poetry of 'personalization'" (Zuboff 2019, 260). Voice assistants thus play a key role in endeavors to subject offline social reproduction to capitalist surveillance. Waldecker and Volmer (2022) point out that voice data, due to its embodied quality, may contain information on age, gender, mood, health, or personality. This is why the prospect of appropriating vast amounts of voice data is so appealing to the advertising industry.

At the same time, as Waldecker and Volmer (2022) show, in practice, voice assistants are often perceived as somewhat obtuse maids. Indeed, it is no coincidence that voice assistants tend to have female names (Alexa and Siri) and feminine voices: this situates them squarely in the feminized domestic sphere within a gendered division of labor (see Strengers & Kennedy 2020). Moreover, in everyday interaction voice assistants may seem somewhat obtuse, because voice recognition software does not always work as advertised and users often need to repeat their commands several times in order to get the required response. Yet, voice assistants ultimately elude the control of their users not because of their 'obtuseness' but because of their 'smartness': voice assistants are embedded in distributed digital platforms and, as such, serve the extraction, analysis, and ultimately the monetization of everyday household communication. On the one hand, the voice data generated by the interactions between users and voice assistants provide training data used to help optimize a given system's acoustic intelligence (rendering them less obtuse). On the other hand, the same data can also be used for producing fine-grained consumer profiles that are a prerequisite for targeted advertising.

The situation is further complicated by important differences between the business models of the providers of voice assistants. Apple's voice assistant, Siri, is part of its range of upscale and high-margin gadgets. Apple claims to only use user-generated data as training data to improve its own systems. In its legal guidelines, Apple explicitly states that "Siri data is not used to build a marketing profile, and is never sold to anyone" (Apple 2023). However, Apple does not specify what happens to data shared through third-party integration with Siri, because "When Siri interacts with a third-party app on your behalf, you are subject to that app's terms and conditions and privacy policy" (Apple 2023). In Marxian parlance, it seems as if Apple operates as *industrial capital* that includes voice assistants within its range of strongly branded, high-margin commodi-

ties proclaiming high standards of data security, while third parties that gain access to voice data by integrating their apps with Siri may still use that voice data for the purpose of targeted advertising. External app providers are able to receive, store, and exploit relevant voice data if their app is integrated with Siri and if the user grants the app the necessary access permissions – which is obligatory in order to use the Siri feature with the app (Apple 2021).

Amazon's voice assistant, Alexa, serves first and foremost as a direct interface to its online retail platform. This is why the "Alexa Terms of Use" go to great lengths to legally specify the practices of "voice purchasing" that it facilitates (Amazon 2023a). However, Amazon's general Privacy Notice, to which its Alexa products are also subject, clearly states:

> We provide ad companies with information that allows them to serve you with more useful and relevant Amazon ads and to measure their effectiveness. We never share your name or other information that directly identifies you when we do this. Instead, we use an advertising identifier like a cookie, a device identifier, or a code derived from applying irreversible cryptography to other information like an email address. … While we do not share your specific shopping actions like purchases, product views, or searches with ad companies, we may share an advertising identifier and an estimate of the value of the ads they show you on our behalf so they can serve you with more effective Amazon ads. Some ad companies also use this information to serve you relevant ads from other advertisers. (Amazon 2023b)

No information is offered indicating to what extent parameters associated with voice data in particular feed into the construction of "an advertising identifier and estimate of the value of the ads" that are shown to users, but it can be assumed that they do. For the most part, then, Amazon operates as *commercial capital* (Marx 1981, 379–393) that sells its voice assistant systems at cost in the hope that Alexa may ultimately help increase and accelerate the turnover of commodities. Thus far, however, Amazon has been losing money on its Alexa venture, with users showing reluctance to make voice purchases (Olson 2022; Kim 2022).

Google's voice assistant is an integral part of its overall digital architecture for the extraction of user data. In its privacy policy, Google stresses that it collects data – including "voice and audio data" – primarily for the purpose of "building better service" which, notably, also includes personalized ads (Google 2023). The "Google Privacy Policy" mentions personalized ads as something of

an afterthought to its mission to constantly improve people's digital lives, while failing to mention that advertising revenue makes up more than 80 percent of Google's total revenue (Statista 2023). Google's voice assistant, then, is best viewed against the backdrop of Google's operation as *surveillance capital* – a subset of commercial capital that produces commodities of a very specific kind: finely-grained consumer profiles based on data extracted from people's everyday lives (see Kienscherf 2022).

The characterization of Apple as industrial capital, Amazon as commercial capital and Google as surveillance capital is a distinction of ideal types. Nonetheless, it highlights important differences in how voice assistants figure within these corporations' specific business models. Yet this differentiation ought not be read as a moral judgment in the vein of Zuboff's (2019, 28–31) distinction between Apple's benign form of capitalist disruption and Google's 'bad' surveillance capitalism. Indeed, these different business models are not indicative of different types of capitalism but of different – albeit closely entangled – processes *within* capitalist accumulation. In short, all three major providers of voice assistants harness voice data to optimize their own systems and they all – albeit with some variations –allow for the sharing of voice data with third parties, but they appear to differ in how voice data figure within their respective business models. Ultimately, the use to which these corporations put user-generated data in general and voice data in particular depends on how they position themselves within the overall circuit of capitalist accumulation.

5. Conclusion

Surveillance has long played and continues to play a key role in smoothing out the overall cycle of capitalist accumulation. In the sphere of production, surveillance facilitates capital's extraction of relative surplus value from labor, while in the sphere of circulation, it speeds up the exchange of commodities. In raising labor productivity and in cutting both production and circulation time, surveillance thus accelerates the overall turnover of capital and hence helps boost capitalist accumulation (see Marx 1978, 316–33). State surveillance of production, circulation, and social reproduction, on the other hand, aims to mediate the more general contradiction between capitalist accumulation and social production, as well as the contradiction between the reproduction of life itself and reproduction of labor power within social reproduction.

In the contemporary Post-Fordist era, the production of ever more customizable commodities at ever higher volumes makes it necessary to manage consumer demand by means of increasingly precision-targeted techniques of marketing and advertising. To this end, corporations have sought to extend commercial surveillance into the sphere of social reproduction, enabling them to tap their users' data for the purpose of micro-targeted advertising. The first step in this process was to channel increasing numbers of social reproductive activities to flow via digital platforms so that the data produced could be easily appropriated. The second step was to roll out smart technologies with platform-linked sensors that allow them to capture data generated in hitherto offline spaces of social reproduction such as private homes (Sadowski 2020; Turow 2021; Zuboff 2019). Digital voice assistants have thus become a tool to capture voice data from within private households.

The three major providers of digital voice assistants, Apple, Amazon, and Google, ultimately harness their users' voice data as part of a more general effort to accelerate the turnover of their specific commodities: high-margin electronic gadgets in the case of Apple, all sorts of different commodities in the case of Amazon, and fine-grained behavioral profiles alongside digital advertising space in the case of Google. The respective business models of Apple, Amazon, and Google thus operate within the overall imperative of capitalist accumulation and by no means herald a radically new form of capitalism. In fact, the appropriation of voice data 'merely' marks a further extension of capitalist surveillance, which was previously limited to market-based social reproduction (buying commodities) and is now deeply embedded within the sphere of reproduction, an ideal vantage point from which to surveille as many aspects of social reproduction as possible.

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