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Article

The Implications of Digital Employee Monitoring and People Analytics for Power Relations in the Workplace

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Abstract

Jeremy Bentham's panopticon prison project was based on three central assumptions: the omnipresence of the "watcher"; the universal visibility of objects of surveillance; and the assumption, by the "watched," that they are under constant observation. While the metaphor of the panopticon, following Michel Foucault's work, was often applied to workplace and workplace surveillance to highlight the "disciplining" power of the supervisor's "gaze," this paper argues that it is only with the recent advent of digital employee monitoring technology that the workplace is becoming truly "panoptic." With modern electronic means of surveillance, the supervisor is always "looking"—even when not physically present or not actually watching employees—as all worker actions and movements may now be recorded and analyzed (in real time or at any time in the future). This paper argues that the modern workplace approximates Bentham's panoptic prison much more than the "traditional" workplace ever did and examines the implications of this fundamental historical change in the paradigm of employee monitoring for power relations in the modern workplace.

Introduction

This paper seeks to contribute to the growing body of literature on the increasing use of new digital surveillance and analytics technology by employers to monitor employees. This issue has already been addressed in a significant number of studies. A large proportion of existing analyses has focused on the implications of new workplace surveillance technology for employee privacy. Thus, Ajunwa, Crawford, and Schultz (2017: 772), for example, argue that modern "limitless" employee monitoring has rendered worker privacy "illusory." Bodie et al. (2016) observe that the data gathered by employers on workers often include information on employee aptitudes and skills, health and fitness, psychological disposition, etc., which constitutes a significant invasion of privacy. The implications of new employee monitoring for the right to privacy are also discussed by a wide range of other academics (e.g., Ball 2010; Lane 2003; Nolan 2003; Schumacher 2011; Zureik 2003; Rothstein 2000), and these implications are one of the central themes in the debate on modern workplace surveillance in non-academic media outlets, such as *The Financial Times* (O'Connor 2016a, 2016b; Kuchler 2014), *The New York Times* (Dougherty and Hardy 2015; Lohr 2014; Walker 2017), BBC (e.g., Derousseau 2017; Peñarredonda 2018), CBS (e.g., Kashdan 2015; Delgado 2018), *The Week* (2015), and many others.

An issue that overlaps with privacy concerns, and that is also widely addressed in existing literature, is the potential of new means of workplace surveillance to lead to discrimination. For example, Rosenblat, Kneese, and boyd (2014a: 6) observe that employers' access to sensitive information about employees may be used "in ways that can mask discrimination." Bodie et al. (2016: 46) observe that the quality of the data about

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workers and the way they are analyzed by employers may be flawed and pose "special problems for discrimination." Ajunwa, Crawford, and Schultz (2017) argue that the practice of collecting data on worker health may result in discrimination with respect to promotion, pay increases, bonuses, etc. Similar concerns are raised with respect to "corporate wellness programs" (discussed in detail below) by Hendrix and Buck (2009), who identify a whole range of ways in which the data on workers' physical conditions gathered as part of these programs might lead to different forms of discrimination (see also Hinton 2006). It may be noted that the potential of different forms of new surveillance technologies to result in biases and discrimination has also become quite widespread in non-academic literature (e.g., Hamblen 2015; Sheppard and Richter & Hampton 2019; Silverman 2016; Moran 2017; Rose 2008).

Another issue that has received significant attention is the relationship between the digital monitoring of employees and increases in work intensity, often going hand in hand with worker burnout, stress, and other related health problems. Thus, Mulholland and Stewart (2013: 548, 550, 552) observe that the ability of management "to directly monitor and control worker performance and productivity" leads to a dramatic increase in the intensity of work, which is accompanied by permanent worker stress and frequent burnouts. Moore, Akhtar, and Upchurch. (2018: 17) also demonstrate that new monitoring technologies result in "intensified control mechanisms over workers," which often result in overwork and stress. Jeske and Santuzzi (2015: 64) similarly show that new employee surveillance technologies "intensify stress, adversely affecting job satisfaction" (see also Mulki et al. 2008; Stanton and Julian 2002; Hodson et al. 2014). In more recent years, similar conclusions have been drawn with respect to "on-demand" or "gig" workers that find jobs via specialized digital platforms. Thus, as Rosenblat (2018: 139) has demonstrated with respect to Uber's drivers, surveillance of these workers is highly detailed "from the shakiness of their phones to their passenger sourced ratings." One of the issues here is that the surveillance and evaluation algorithms that Uber and other platforms use are highly opaque—they may be described as "black box" algorithms (Pasquale 2015)—and workers do not have any information on how they operate. In this setting, they are forced to do their best to get good feedback from customers or risk having their profiles deactivated. This often involves engaging in additional—often unseen and unpaid—labor (Moore, Akhtar, and Upchurch 2018), such as adopting a more communicative and emotional attitude (see Hoschild 1983) in order to please the customer, which in turn creates additional stress (Rosenblat 2018; Raval and Dourish 2016; Gandini 2016).

The contribution of this paper to the existing body of literature lies in examining in more detail the implications of the new paradigm of workplace surveillance for power relations in the workplace. If workplace surveillance was previously focused on employee performance and was limited to supervisors' eyes, it is now continuous and increasingly extends to the health and fitness of employees (monitored and analyzed using new technologies). With modern means of surveillance, the supervisor is always "looking," even when not physically present, because all worker operations and movements may be recorded and analyzed. As a result, the modern workplace is becoming truly panoptic, which has very important implications for what Foucault referred to as "disciplinary" power (1979) and "bio-power" (2009) in the context of the workplace. In his early works, Foucault (1976, 2006) examined how the architectural design of institutions such as asylums, clinics, and hospitals enabled the spatial distribution of individual bodies and the organization of a field of visibility, which gave the "watchers" the power to observe, scrutinize, and control the behavior of each patient. In *Discipline and Punish* (Foucault 1979) and in some of his later writings and lectures (e.g., Foucault 1980, 1985, 2010), Foucault, borrowing Bentham's term "panopticon," shows that the nature of power present in such institutions is not reducible to power as repression or "power over"; it also involves the "technologies of the self," or the exercise of power over oneself, as the "watched," aware of being under constant observation, end up internalizing the existing rules and norms, and start behaving in the required manner *without coercion*. In his later works, Foucault (2003, 2009) focuses on a different technology of power—biopower—which emerged in the second half of the eighteenth century and later developed in a symbiotic relationship with disciplinary techniques. Its subject was the state and its object was the population, increasingly seen as having aggregate characteristics—birth rate, mortality rate, recurrence of epidemics, etc.—and governments started to focus on the welfare of the population, and particularly on health issues, beginning to medicalize the population through various campaigns and

policies. As Foucault (2003: 243) put it, after "a first seizure of power over body in an individualizing mode, we have a second seizure of power that is not individualizing but… massifying, that is directed not at man-as-body but at man-as-species [that]… I would call a 'biopolitics' of the human race." I will use Foucault's insights to help grasp the changes that are taking place in the workplace surveillance paradigm with the rise of digital employee monitoring technologies.

This paper is structured as follows: In Section 1, I argue that workplace surveillance historically focused on employee performance and was based on visual observation and "subjective" (i.e., not based on automated analytics) evaluation by supervisors and managers. In Section 2, I examine examples of new workplace surveillance technologies. This prepares the ground for Section 3, where I discuss the qualitative changes that these technologies bring to employee monitoring and their implications for power relations in the workplace.

Section 1: "Traditional" Workplace Surveillance: An Imperfect Panopticon

Let us start by observing that worker surveillance is a structural necessity in capitalism. Indeed, one of the central features of this mode of production is the separation of direct producers from the means of production and the consequent transformation of human labor into a saleable commodity, used for the extraction of surplus. As Marx (1976: 274) observed, capital only comes to life when it meets in the marketplace "a special commodity"—labor-power—and "arises only when the owner of the means of production… finds the free worker available, on the market, as the seller of his own labour-power." What is characteristic of the wage-labor relation (as has also been noted by classical political economists such as Smith and Ricardo; see Manokha 2015) is a structural divergence of interest between two parties: employers, who generally seek to obtain as much as possible from employees and to pay as little as possible, and employees, who have the opposite interest—to work less and get as high of pay as possible. What this implies is that, from the point of view of employers, surveillance of employees becomes a necessity in order to ensure that the commodity they purchase—human labor-power—is used as productively as possible: "the worker works under the control of the capitalist… [who] takes good care that the work is done in a proper manner," which, in turn, involves the development of "*a barrack-like discipline*… in the factory… dividing the workers into *manual labourers and overseers*" (Marx 1976: 549; emphasis added).[1]

Thus, it is hardly surprising that Foucault, following Bentham, referred to the capitalist factories as one of the panoptic settings (alongside asylums, clinics, and hospitals), observing that prisons resemble factories, which in turn resemble prisons (Foucault 1979: 198). As a matter of fact, the very origin of the idea of the panopticon is related to the organization of factory labor: it was developed by Bentham's younger brother Samuel to oversee a force of inexperienced Russian serfs at the workshops of Prince Potemkin. Jeremy Bentham acknowledged this and later observed that his panoptic prison project could be applied wherever the "watched" are required to internalize the necessary rules and to exercise self-discipline, including "to the business of... manufactories" (Bentham 1971: 501–503).

Now, following Foucault and several other authors, the history of "traditional" workplace surveillance in capitalism—based on visual "gaze" and abstract time—could indeed be viewed as a series of attempts and innovations on the part of employers to render the workplace as panoptic as possible. However, as we will

[1] In recent years, the term "surveillance capitalism," first employed by Foster and McChesney (2014) and later developed by Zuboff (2015, 2016, 2018), is increasingly employed to refer to the collection and monetization of user data by various platforms, as well as to the practices of worker surveillance using digital technology. This term, however, is unfortunate because it sees surveillance in capitalism as a new feature specific to our historical period. Surveillance of workers has always been present in capitalism for the reasons just discussed; in addition, since the early days of capitalism, capitalist firms have also engaged in the analysis of their markets, the activities of competitors, and consumer tastes and preferences. In this view, the term "surveillance capitalism" is a form of tautology (see Manokha 2018).

see below, it is only with the rise of digital means of employee surveillance that this goal is finally being achieved. But let us first look at the "traditional" paradigm of workplace surveillance and its main characteristics.

One of the first elements introduced by employers in the context of the "traditional" workplace surveillance paradigm was abstract time. The use of time to control the labor process actually predated capitalism and had already been used to mark, for example, the workday of guild laborers in medieval Europe (Dohrn-van Rossum 1996). However, in this context, time had not yet been privatized—it had not yet entered each workplace to measure in a specific manner the effort of *each worker*—and guild laborers could set their own pace of work as they saw fit. The privatization of time occurred only with the rise of capitalism and with its commodification of human labor and the entry of the clock into each workplace beginning in the eighteenth century. With the introduction of clocks, "the full abstraction of work time into commodified hours would occur" and they significantly increased employers' "disciplining capacity" (Snyder 2016: 34, 38). This allowed factory owners to shift to a pay-by-the hour system and to fix the number of hours that workers had to work per day, as well as to begin to create different surveillance mechanisms to ensure compliance (Huggett 1973; Smith 1980). By the end of the eighteenth century, "the marriage between work, the hour, and pay became standard within the factory" (Snyder 2016: 36).

Here it is useful to recall Marx's (1976) distinction between *extensive* and *intensive* exploitation as a means to increase surplus-value. The former involves methods that augment the amount of time dedicated to work (e.g., elongating the time spent working); the latter refers to techniques seeking to increase worker productivity (e.g., accelerating the rhythm of work or making the laboring process more efficient). Extensive exploitation characterized factory labor processes in the nineteenth century before it met with more and more worker resistance and gave rise to reform movements in the latter half of the century. This compelled factory owners to focus instead on productivity improvement, which, at the time of Marx's writing, mostly involved "further improvement of machinery" (Marx 1976: 533–524). It is the attempts to increase intensive exploitation that later led employers to the search for better means of employee surveillance and to the adoption of new measures that may be seen as efforts to perfect the panoptic *dispositif* of the workplace. An important landmark in this respect was the birth of "scientific management," which Frederick Taylor (1919), an engineer and efficiency consultant, systematized and popularized. Taylor (1919: 13–14) analyzed the labor process in order to maximize worker productivity and argued that this could be achieved in two ways: first, by limiting the time wasted during the production process (especially by combatting "worker soldiering," by which he meant "deliberately working slowly"; second, by the slicing of the labor process into a set of basic operations. Taylor (1919: 27) believed that it was "only through the adoption of modern scientific management" that employers will succeed in "obtaining the maximum output of each man and each machine." Taylor's "scientific management" effectively involved the development of more and more sophisticated techniques of worker surveillance and monitoring (Crowley et al. 2010). "The rule of the Taylorist system is that the unobserved worker is an inefficient one" (Rosenblat, Kneese, and boyd 2014: 2). Or, as Snyder (2016: 31) put it, "from this point of view, Chronos is a taskmaster, vigilantly surveilling the movements of his subjects, stopwatch in hand." In this respect, Taylor's innovations contributed to the further development of disciplinary power within the workplace establishing, to use Foucault's (1995: 152) terms, "a kind of anatomo-chronological schema of behaviour" under the gaze of the supervisor. We may also mention the micromotion studies of Frank and Lillian Gilbreth, who sought to extend Taylor's work by developing more rigorous techniques of worker observation—the filming and timing of a worker's operations in order to compare the times of each of the worker's motions and to synthesize the best elements into a method that would become standard for the job in question (Price 1992: 60). The work of the Gilbreths also involved an additional dimension of worker surveillance, which consisted of providing employers with guidelines concerning what they should pay particular attention to in worker supervision (e.g., worker postures, their "therbligs"—fragments of hand movements—techniques used) (Price 1989).

In addition to these developments in the paradigm of workplace surveillance based on visual observation and abstract time (which remain largely unchanged, despite some additional innovations), we need to mention one important historical exception to such techniques—Henry Ford's experiment with monitoring

worker hygiene and health. When Ford introduced a moving assembly line in 1913, the increase in productivity was immediately dramatic, but so was the rise in worker turnover: in 1913, every time the company wanted to add one hundred men to its personnel it had to hire 963 men, as workers found the work too exhaustive and left shortly after being recruited (Sward 1948: 48–49). Ford's solution to this problem was to double wages in 1914, which immediately led to a decline in worker turnover. But higher wages came with a condition: the adoption of healthy and "moral" lifestyles by employees, who were expected to lead "a clean, sober and industrious life" (Ford Motor Company 1915: 8). This involved "personal hygiene, cleanliness of homes, and… bathing frequently" (Ford Motor Company 1915: 13). To monitor workers' compliance with these standards, Ford set up a "Sociology Department" staffed with about thirty "inspectors" who would make surprise visits to workers to "collect information on every one of the employees" on living conditions and lifestyles (Ford Motor Company 1915: 9).

Now, Ford's concern with the health and "morals" of employees, as Gramsci (1971) pointed out, had to do with the changes in the "objective conditions"—the rise of mass production and an increased intensification of labor, which required physically fit laborers capable of enduring the rhythm of the assembly line. Gramsci (1971: 303) argued that Ford's assembly line was a "more wearying and exhausting" form of the "consumption of labour power," and Ford's attempt to control the workers' health and morality were the means to preserve "a certain psycho-physical equilibrium which prevents the physiological collapse of the worker, exhausted by the new method of production." Ford's "Sociology Department" was eventually closed in the early 1920s for reasons that will be discussed below when we compare this experiment with modern techniques of health and fitness monitoring adopted by corporations. Let us first examine the latest innovations in monitoring worker productivity as well as the growth of the so-called "corporate wellness programs" that focus on employee health and fitness.

Section 2: From Visual "Gaze" to Digital Monitoring and Analytics

Moore, Upchurch, and Whittaker (2018: 2) observe that with the emergence of "technologies that can be used to measure, track, analyse and perform work," management can now "control work at ever-more intensified levels." In what follows, I will mostly focus on surveillance exercised over employees that are hired in a "traditional" way—that is, as members of staff present on employers' premises and/or using employers' equipment (e.g., trucks, computers); however, I will also mention briefly some of the key developments in the surveillance of "gig" or platform laborers.

Let us begin with the rise of Industrial Internet of Things (IIoT), a system of networked smart objects and workers that enables "real-time access, collection, analysis, communications, and exchange of process, product and/or service information, within the industrial environment" (Boyes et al. 2018: 3–4). The development IIoT was "partly inspired by the success of RFID technology… used for tracking objects, people, and animals" (Kortuem et al. 2010: 30). The factory of the future is now expected to be a place where objects "sense, log, and interpret what's occurring within themselves and the world, act on their own, intercommunicate with each other, and exchange information with *people*" (Kortuem et al. 2010: 30; emphasis added). In other words, IIoT involves the development of digital equipment installed not only on "things" (inputs, conveyor belts, etc.) but also on workers. On one hand, this further illustrates the fact that, under capitalism, human labor is treated as a thing—as a production input like any other; on the other hand, this further demonstrates the enhancement of the surveillance capacities of employers over workers. While this process is still in its initial stage of development, there already exist some indications about the nature of the digital surveillance that is being deployed and, ironically, one of the key innovators here is again the Ford company. Thus, Ford is now experimenting with skintight bodysuits equipped with sensors that workers wear in order "to help improve their postures and enhance productivity" (Millman 2018). This body-tracking technology, which traces everything that the workers (referred to as "industrial athletes") do using fifteen sensors connected to a wireless detection unit, was launched at Ford's Valencia Engine Assembly Plant in Spain (Millman 2018). But it is not just big factories that introduce such technologies. For example, a small US producer of products used in the oil field industry, Afton Manufacturing, recently employed a comparable technology (known as WaspTime RFID technology) and, in two years, claims to

have obtained significant gains in productivity (7,280 hours and $6,000 in time and productivity saved each year) (Waspbarcode n.d.). While it is common to present the use of sensors on workers in the context of IIoT as primarily contributing to their safety, it is obvious that, in reality, it is all about increasing worker productivity, which arises (at least in part) from the increased surveillance of employees that these technologies permit (e.g., Key Management Group 2016; Schmid 2018).

Another major area in which such technologies are widely used is warehouse work. Thus, Amazon warehouse loaders carry devices that indicate to them the shortest way to the shelves, give them a real-time indication if they are running behind on their targets, and allow managers to send messages to these devices to tell workers to speed up, to stop talking, etc. The British grocery chain Tesco outfitted its employees with armbands that track assignment completion time, order fulfilment, and other information to track workers transporting goods to about ninety aisles of shelves (Boitnott 2015). This system of tracking is also widely used by firms specializing in delivery. Thus, in 2009, UPS had already started using technologies that transmit data from remote sensors and GPS devices to computers for analysis (Kaplan 2015: 32). The monitoring system that now governs the working life of a driver for UPS includes handheld delivery-information acquisition devices as well as more than two hundred sensors on each delivery truck that track everything from backup speeds to stop times to seat belt use (Kaplan 2015). In addition, employers are increasingly able to track employee movement not only inside but also outside the workplace (Ajunwa, Crawford, and Schultz 2017: 769), and this practice is likely to grow much further (Kaplan 2015: 32).

Some firms develop tracking devices that also allow the analysis of "social dynamics at work"—how employees talk to one another, in what tone of voice, how they sit at lunch tables, etc. Thus, in 2015, the Boston-based analytics firm Sociometric Solutions supplied some twenty companies with employee ID badges fitted with microphones, location sensors, and accelerometers in order to examine how employee interactions affect performance (*The Week* 2015). One of its clients, Bank of America, thus discovered that, in the cafeteria, certain people only sat with three other people (at four-seat tables) while others sat with eleven other people (at twelve-seat tables). Those who sat at larger tables were 36% more productive and had 30% lower stress levels when the company started layoffs (*The Week* 2015). More recently, Walmart patented a similar system called "Listening to the Frontend," which will record the conversations of cashiers and shoppers and monitor specific noises, like the beeps of item scanners and rustling of bags (Delgado 2018). A whole sector of the "quantified workplace" has emerged in the US in which firms, such as Evolv, specialize in studying in real time how millions of employees behave each day using the data obtained from such tracking devices.

Important developments have also taken place in the supervision of workers using computers. A new industry of "user activity monitoring" (UAM) technology has developed whose current market is estimated at $1.1 billion and is expected to grow to $3.3 billion by 2023 (PR Newswire 2018). The products (e.g., ActivTrak, InterGuard, Activity Monitor) enable employers to record and analyze employee activity with respect to email, social media, keystrokes, printing, etc. As a rule, employers are provided with a possibility to compare employee performance, to run reports on selected users over any time period, and to identify unusual behavior patterns. The adoption of UAM technologies is now highly widespread, particularly in the United States (*The Week* 2015).

In addition, there are two other technological developments that deserve a special mention, as they demonstrate the extent to which new technologies may further commodify human labor in ways that might have appeared unimaginable only a few years ago. The first of these involves the "microchipping" of employees—placing RFID implants under the skin—a process developed by the Swedish enterprise Epicenter, most of whose employees now have these microchips implanted. Another company based in the US, Three Square Market, also recently microchipped half of its employees at a "chip party" organized for the event (BBC 2017). The key advantage of the implant, according to the chief executive of Epicenter, is that it "replaces a lot of devices" (*Telegraph* 2017) and allows individuals to operate printers, open electronic locks, or purchase snacks from vending machines with a wave of the hand. Because of the device's convenience, Three Square Market representatives believe that "everyone will soon be doing it" (BBC

2017). At the same time, it is acknowledged that these chips would enable management to track every single movement of employees, including the duration of toilet breaks, as well to get insights into their food consumption through the monitoring of their purchases from the company's vending machines.

The second important development is a recent product designed to allow employers to track employee brain activity at work. Launched by SAP, a software firm, and Emotiv, a leader in mobile "neuroinformatics" solutions, the product labelled Focus UX is capable of detecting employees' "cognitive state and then adapt[ing] the user experience (UX)" to best fit what they are able to handle at that moment (Cabahug 2018). This, it is claimed, will improve "well-being and productivity in the workplace" (Cabahug 2018). Although marketed as a means for employees to avoid "cognitive overload," it is obvious that gathering the information concerning employee brain activity and attention levels has the potential to become one of the most extreme forms of employee surveillance that has ever existed (see Reuters 2019). It should be noted that similar technologies are already being adopted in China (Parsons 2018).

The second category of surveillance to which employees are increasingly subjected is the monitoring of their health and fitness, particularly in the Anglo-Saxon world where there has been a proliferation of "corporate wellness programs"—"employer-sponsored programmes designed to support employees as they adopt behaviours that reduce health risks, and… enhance personal effectiveness" (Berry, Mirabito, and Baun 2010). Two-thirds of US employers now offer some kind of wellness program (Kaiser Family Foundation 2014), which usually involve weight-loss initiatives, gym membership discounts, smoking cessation programs, personal health coaching, or classes in nutrition or healthy living. Most firms use financial incentives to encourage employee participation in these programs (Cawley 2014: 811). According to a survey of representative US employers, such financial incentives increased to a record $693 per employee in 2015 from $594 in 2014 and $430 five years earlier (Begley 2015). The market size for wellness programs in the US is estimated at $6 billion and is expected to cross $13 billion by 2023, growing at 8% per year (Arizton 2018). Globally, the market size in 2014 equaled $40.7 billion and was expected to "gain momentum across the world in the coming 5-10 years" (Global Wellness Institute 2016: 11).

What is important is that an increasing number of wellness programs involve the collection and analysis of personal data concerning employee fitness and health. As Ajunwa, Crawford, and Schultz (2017: 763) observe, employers "mine employee data—which prescription drugs they use,… when they stop filing their birth control prescriptions. *Walmart*, for example, assesses employee data to nudge employees toward weight loss programs or to suggest physical therapy instead of expensive operations." Swedish Scania requires employees to "to come to work in a condition that makes them ready and able to work" in accordance with the company's routines and performance standards" (Holmqvist and Maravelias 2011: 79). Although it is acknowledged that "Scania cannot command their employees to eat properly, to exercise, and to educate themselves," it is assumed that employees should take care "of health-related things such as physical fitness and personally traits," for Scania expects from its employees that "they remain 'attractive' and 'capable'" (Holmqvist and Maravelias 2011: 80).

Many wellness programs resort to biometrical screening and, increasingly, to the use of wearable technology to digitally monitor employees. Thus, devices such as Fitbit, which can record information related to health, fitness, sleep quality, fatigue levels, and location, are now being used by employers as part of their wellness programs (Manokha 2017). One of the first was BP America, which introduced Fitbit bracelets in 2013. In 2015, at least 24,500 of BP's employees were using them, and more and more US employers have followed suit. Many other US companies have since used such technology. For example, Profusion used Fitbits and other apps to track 171 personal metrics—including sleep quality, heart rate, and location—twenty-four hours a day for thirty-one staff members and then, based on the results obtained, divided its personnel into "Busy and coping" and "Irritated and unsettled" (O'Connor 2015); Appirio gave Fitbits to around four hundred employees in 2014; in the same year, Vista Staffing Solutions, a healthcare recruitment agency, started a weight-loss program using Fitbits and Wi-Fi-enabled bathroom scales (O'Connor 2015. A number of analysts predict that, in several years, data-driven incentives concerning employee health and fitness will become the norm (Moran 2017; see also Cabahug 2018).

Having looked at these examples, let us now examine the changes that they bring to workplace surveillance and their implications for power relations among employers and employees.

Section 3: Towards Absolute Panopticism

As mentioned above, the metaphor of the panopticon had been applied to workplace and workplace surveillance before the advent of digital employee monitoring technology. While this was certainly a valid metaphor that helped, in particular, to highlight the disciplining "power" of the supervisor's "gaze," the traditional workplace did not really operate as a panoptic setting as originally intended by Bentham. Indeed, from Bentham's project, we may infer the following three key features of the panoptic prison: (1) the omnipresence of the inspector, ensured by his total invisibility; (2) the universal visibility of objects of surveillance; and (3) the assumption of constant observation by the watched. The traditional workplace surveillance paradigm never fulfilled these conditions: the "inspector" (the supervisor, the manager) could never be assumed to be omnipresent by workers, as he was always visible; the employees knew that they were being watched only when the "watcher" was present, and there was no universal visibility of employees; and, as a result, there could be no assumption of constant surveillance on the part of workers. In addition, even when the supervisor was actually looking, there was a possibility for workers to avoid laboring at full capacity.

The rise of electronic means of surveillance has fundamentally changed the workplace, and it may be argued that, for workers placed under digital surveillance, the three main assumptions behind the panopticon are now increasingly fulfilled: the omnipresence of the employer is ensured by the digital gathering and storage of all information concerning productivity; their universal visibility is guaranteed by the fact that everything that they do, including the organization of their lunch or toilet breaks, may be monitored; and, as a result, workers must assume that they are constantly observed. However, the transformations brought about by new technologies do not stop there. As we saw earlier, it is increasingly not just worker productivity that is monitored by employers, but also their fitness and health. It may thus be further suggested that, in the workplace, what Foucault (2003; 2009) referred to as "biopower"—which he saw as totalizing (directed at aggregates such as populations)—is becoming individualizing and, therefore, also disciplinary. One of Bentham's predictions was that, in a panoptic setting, we would observe not only the presence of "disciplinary" power, to use Foucault's (1979) term, but also the development of self-discipline or the "technologies of the self," to borrow another of Foucault's (2010) terms. When we examine modern workplace surveillance, there are indeed indications that both of these dimensions of power are greatly enhanced.

As regards the dimension of "disciplinary" power as "power over" (as some of the authors mentioned earlier have observed), employers are now better equipped to detect any non-productive activity or insufficient effort and to discipline the employees in question. For example, in a recent undercover investigation of working conditions at an Amazon warehouse near Glasgow by *The Daily Mail* (Kelly 2016), it was discovered that the use of new surveillance technology enabled managers to undertake an immediate disciplinary action against those pickers who ran behind the assigned schedule or those who were deemed to have taken too long during bathroom breaks. The study of warehouse operators by Moore, Upchurch, and Whittaker (2018: 23–24) demonstrates that digital tracking is used to monitor individual productivity and time spent on breaks, which has resulted in the dismissals of some operatives within weeks of the start of the deployment of this technology. Another example is Afton Manufacturing, mentioned in the previous section, whose manager states that, before adopting the employee tracking technology, "employees had a tendency to stretch out breaks sometimes up to 25 or 30 minutes a day, instead of the 20 minutes allocated" (Waspbarcode, n.d.), but, with the new technology, anyone taking breaks that are five minutes longer than permitted may be singled out and disciplined if needed. It may be added here that such technologies allow for a much more individualized surveillance than before (Ball 2010: 89) and the number of employees that may be monitored in such individualized and detailed manner is now potentially unlimited (Lohr 2013).

Alternatively, as regards Foucault's (2010) "technologies of the self," the individualized focus of new technologies also increases the pressure put on each worker to perform better, to beat the targets, to outperform team members. Thus, with respect to UPS's monitoring system discussed above, it has been found that some workers now attempt to outperform and beat the targets. For example, "one new hire was beating his quota by an hour and a half to two hours every day" (Kaplan 2015: 31). Others confess that being under such close surveillance is like being beaten by "a mental whip... people get intimidated and they work faster" (Kaplan 2015: 31). Moore, Upchurch, and Whittaker (2018: 24) report that warehouse workers placed under digital monitoring felt the need to work faster and "everybody speeded up." Analogous insights may be drawn from Snyder's (2016) and Levy's (2015) studies of long-distance truck drivers, which also reveal that drivers under constant electronic monitoring feel the pressure to work more. For example, they feel the pressure not to take mandated breaks and to continue working even when sleep is necessary. As a result, returning to Marx's (1976) distinction between extensive and intensive exploitation, it may be observed that the increase in the disciplinary power in the modern workplace contributes to the growth of both forms of exploitation—employees tend to work longer and more intensely. To refer to the case of UPS once more, its surveillance system allowed the firm to find out which drivers were underperforming and then take measures to increase the number of deliveries per day so that, within four years, the company was delivering 1.4 million additional packages per day with one thousand fewer drivers (Kaplan 2015: 32).

The monitoring, evaluation, and analysis of employee productivity is now increasingly complemented, as we saw in the previous section, by the focus on employee health and fitness. What we are dealing with here may be described as a form of privatization and exercise of biopower in the workplace whose extent and reach, thanks to new technologies, is incomparably greater than what Ford's "Sociology Department" ever hoped to achieve (Ajunwa, Crawford, and Schultz 2017: 742). In addition, Ford had to put an end to the monitoring of workers lifestyles because it was both costly and was increasingly seen by workers as intrusive and paternalistic (Ford [1902] 2002: 54). Modern techniques of obtaining information on employee health and fitness, by contrast, do not seem to face such constraints. The gathering of data using biometric screening or wearable devices is less intrusive than home visits, and it is also much cheaper to analyze and process. Now, what is crucial here is that the individualization and growth of biopower seems to further reinforce the panoptic dimension of the workplace and, particularly, the imperative for self-discipline on the part of employees. The incentive to pursue healthy and "moral" lifestyles for Ford's employees was not to lose eligibility for a doubled wage; for modern employees, what is at stake is their very employability—their attractiveness as employees expressed in their overall ratings or scores. This puts extra pressure on workers to not only be productive but also physically fit and requires more self-discipline (e.g., to adopt dietary restrictions, to exercise more regularly, to quit smoking). As a result, as has been confirmed by the research conducted by André Spicer, corporate wellness programs "are creating guilt and anxiety in employees" (qtd. in Berinato 2015). As reported by Spicer, "one big wellness program…led previously happy employees…to become anxious,…to make them think they needed to be more attractive to their employer, and if they did something like smoking a cigarette, they felt it affected their employability" (quoted in Berinato 2015). We may also recall Scania's "twenty-four-hour employee" policy, which puts the pressure on employees to "remain 'attractive' and 'capable'" (Holmqvist and Maravelias 2011: 80).

Now, two observations need to be made here concerning the issues that cannot be adequately addressed within the scope of this paper. First, the developments that I have discussed primarily concern traditional forms of employment. As regards platform labor, the surveillance *dispositif* here is still in the making, but we can observe that it is significantly different—it is much less panoptic and is based on "action at a distance," to borrow Bruno Latour's (1987: 219) term. The monitoring of employees is not done within the confines of the workplace and it does not measure and analyze productivity in the same way. What plays a more important role here is the evaluations that "gig" workers receive from their clients, usually aggregated as scores. Thus, workers registered with digital platforms—for example, in housekeeping (Workday, Upwork, Elance, TaskRabbit) or urban transportation (Uber, Lyft, Zipcar)—are assigned scores based on a range of indicators (the number of tasks performed, the time spent on a given type of task, reactivity in responding to task offers, etc.). There is certainly an important aspect of disciplinary power present here—if the score of an "independent contractor" declines below a certain threshold, the platform may simply

deactivate the profile of the worker in question. Nevertheless, platform workers, as a rule, have more freedom concerning the organization of their time and work (when to make themselves available for jobs, how many jobs to accept, when to stop working, etc.) in comparison to "traditionally" employed workers. In addition, their fitness and health are not monitored. These differences perhaps explain why such workers tend to see platform labor as giving them more freedom (Gandini 2016).

Second, the rise and adoption of new workplace surveillance technologies must be placed within a wider socio-economic context. Indeed, the existence of a possibility to exercise more control over employees and to obtain their compliance with new monitoring protocols does not mean that this possibility will necessarily be realized in practice. What needs to be explained is why this is actually happening. While it is beyond the scope of this paper to address this question in detail, it may be plausible to suggest that this is a result of the rise of neoliberal policies and the development of "flexible capitalism" (Boltanski and Chiapello 2005; Cappelli 1999; Kalleberg 2011; Standing 2011). As noted by Snyder (2016: 3), the term "flexible capitalism" "captures a variety of changes to production processes, employment arrangements, management strategies, and the like that are reshaping the conditions of work." It involves significant disruptions to secure and predictable career trajectories with the growth of precarious employment, irregular scheduling, and the erosion of associated social and economic rights and benefits that characterized employment relations in advanced industrial countries before the advent of neoliberalism in the late 1970s (Kalleberg 2009, 2011; Standing 2011, 2014). At the risk of oversimplification, we may suggest that, in the current context of intense competition for and precarity of jobs, capital has acquired significant relative power over labor, and these structural conditions, at least in part, explain the lack of any significant resistance on the part of workers to the changes in workplace relations: for employees in this context, the costs of losing employment are very high. The rise of "flexible capitalism" may also account for the development of corporate wellness programs. As it was in the case of Ford's "Sociology Department," contemporary concern with employee health may be seen as the need for employers to have a workforce capable of enduring the intensity of work and the conditions of work that are marked by significant increases in work-related illnesses and injuries, employee fatigue, stress, and psychological breakdowns (Global Wellness Institute 2016:17) and the development of associated health problems or even chronic diseases such as diabetes or obesity (Berlant 2010: 26–27). These health issues are costly to enterprises in terms of health payments and the costs of employee turnover (Hassard et al. 2014). However, even if wellness programs manage to achieve certain minor positive results, such as reducing "risk factors, such as smoking" and increasing "healthy behaviours, such as exercise" (Mattke et al.,2013: 106; Global Wellness Institute 2016: 12), they do not address the increases in the precariousness, insecurity, and intensity of work that are responsible for worker stress and illnesses, and they actually add more anxiety and stress and result in an increase in the need for "technologies of the self" so that workers can stay competitive.

Conclusion

The key objective of this paper was to examine new means of workplace surveillance and to analyze their implications for power relations between employers and employees. I have shown that digital employee monitoring technology has important implications for both the disciplinary power of employers and for the "technologies of the self," that is, for power that employees exercise over themselves without coercion. I have provided examples of employers obtaining significant gains in productivity from employees as new technologies enable them to increase both intensive and extensive exploitation of workers. I have also examined some evidence indicating that, placed under digital surveillance, workers themselves seek to be more productive and to outcompete colleagues and fellow employees. In addition, I have also analyzed what I have called the increasing privatization of biopower in the workplace, that is, the growing ability of employers to monitor the individual health and fitness of their employees, which further contributes to the increase in the disciplinary power of employers and also has implications for the "technologies of the self" that workers are led to adopt. Finally, while employee monitoring technologies adopted by digital platforms to track and evaluate their "independent contractors" have largely remained outside the scope of this paper, I have outlined the implications of their adoption to be explored in more detail in future research.

Now, it is crucial to note that the panopticon is a metaphor and that the workplace is not a panoptic prison—workers are not inmates, they have rights and legal protections, and they may organize to resist or limit the use of new surveillance technologies by employers. Yet, and this is something that requires explanation, the instances of resistance have so far been very limited. As Foucault often emphasized in his discussions of disciplinary institutions, as well as in his more general analyses of the exercise of different forms of power, instances of resistance or "counter-conduct" (see, in particular, Foucault 2009) are fundamental elements of any power relation. As suggested in the last section, this lack of resistance may have to do with the changes in social and economic structures that have been established with the advent of neoliberalism in the last four decades or so. Indeed, for workers to accept the minute tracking of movements, including lunch breaks and toilet breaks, or for platform workers to accept precarious work and, in addition, to engage in affective and unseen labor to please the customer in order to obtain a good rating, alternative employment must be scarce and social protections in the case of unemployment need to be poor or non-existent. Such "voluntary servitude" (Hardt and Negri 2000) seems to be inseparable from what neo-liberal policies have produced—"free individuals," meaning free from state welfare support, free from trade union membership or assistance, and increasingly free from subjectivity and humanity. In addition, we may recall that Ford had to end the monitoring of workers' lifestyles because home visits by his inspectors were increasingly seen by workers as intrusive and generated more and more resistance. Modern technologies (perhaps with the exception of implanted microchips) may appear, from the point of view of workers, to be much less intrusive. Indeed, the process of information gathering is not directly visible by employees, and it does not involve physical contact with those gathering the data. This might be another reason for the lack of significant opposition to digital workplace monitoring. However, extensive additional research is required to test these hypotheses.

Here, it is important to acknowledge the fact that the new workplace surveillance technologies focusing on worker productivity reviewed in this article are still in their early stages of development, and that the geographical scope of their adoption is far from universal. The same applies to the means that employers use to monitor the health and fitness of employees. The further adoption of these technologies will depend on the legal frameworks and instruments that exist in each country as regards the labor market and privacy protection, on union militancy, and on many other factors. The arguments made in this paper, therefore, should not be seen as implying any determinism. Yet, the lack of any meaningful resistance on the part of employees and unions so far, as well as the speed with which new technologies emerge and constantly push further and further the "frontiers of the possible," seem to indicate that the gradual transformation of workers into increasingly docile and machine-like entities is likely to continue.

The risks of this are hard to overestimate: what we are dealing with is the process of the transformation of human workers into things with objective indicators such as productivity levels, physical shape, cognitive characteristics and various aggregates of these measures that compute a comparative worth of each employee with respect to other. We seem to be entering a historical period in which machines are more and more resembling human workers, while human employees are treated more and more like machines. The role of digital workplace surveillance technologies in the latter process, as this paper has sought to show, is central. Karl Polanyi (1944) famously observed that treating human labor power as a "fictitious commodity" would lead to the destruction of society; the question that our generation needs to raise is what will the transformation of human workers into digital sets of aggregate scores and trajectories on managers' dashboards ultimately lead to?

References

Ajunwa, Ifeoma, Kate Crawford, and Jason Schultz. 2017. Limitless Worker Surveillance. *California Law Review* 105: 735–776.

Arizton. 2018. Corporate Wellness Market in US - Industry Outlook and Forecast 2018–2023. February. https://www.arizton.com/market-reports/us-corporate-wellness-market [accessed March 4, 2020].

Ball, Kirstie. 2010. Workplace Surveillance: An Overview. *Labor History* 51 (1): 87–106.

BBC. 2017. Wisconsin Company Three Square Market to Microchip Employees. July 24. https://www.bbc.com/news/world-us-canada-40710051 [accessed March 4, 2020].

Begley, Sharon. 2015. Employer Incentives for U.S. Worker Wellness Programs Set Record. *Reuters*, March 26. https://uk.reuters.com/article/us-usa-healthcare-wellness/employer-incentives-for-u-s-worker-wellness-programs-set-record-idUKKBN0MM0BB20150326?feedType=RSS&feedName=healthNewsMolt [accessed March 4, 2020].

Bentham, Jeremy. 1971. *The Correspondence of Jeremy Bentham, Volume III*. Edited by Ian R. Christie. London: Athlone Press.

Berinato, Scott. 2015. Corporate Wellness Programs Make Us Unwell: An Interview with André Spicer. *Harvard Business Review*, May. https://hbr.org/2015/05/corporate-wellness-programs-make-us-unwell [accessed March 4, 2020].

Berlant, Lauren. 2010. Risky Bigness: On Obesity, Eating, and the Ambiguity of "Health." *Against Health: How Health Became the New Morality*, edited by Jonathan Metzl and Anna Kirkland, 26–39. New York: New York University Press.

Berry, Leonard, Ann Mirabito, and William Baun. 2010. What's the Hard Return on Employee Wellness Programs?. *Harvard Business Review* 88 (12): 104–112. https://hbr.org/2010/12/whats-the-hard-return-on-employee-wellness-programs [accessed March 4, 2020].

Bodie, Matthew, Miriam Cherry, Marcia McCormick, and Jintong Tang. 2016. The Law and Policy of People Analytics. *University of Colorado Law Review* 88 (4): 961–1042.

Boitnott, John. 2015. Wearable Tech is Improving Employee Productivity and Happiness. *Entrepreneur Europe*, April 28. https://www.entrepreneur.com/article/245458 [accessed March 4, 2020].

Boltanski, Luc, and Eve Chiapello. 2005. *The New Spirit of Capitalism*. New York: Verso.

Boyes, Hugh, Bil Hallaq, Joe Cunningham, and Tim Watson. 2018. The Industrial Internet Of Things (IIoT): An Analysis Framework. *Computers in Industry* 101: 1–12.

Cabahug, Maricel. 2018. Adaptive Assistance for Improved Well-Being and Productivity at Work. SAP News Center, October 12. https://news.sap.com/2018/10/sap-emotiv-adaptive-assistance-well-being-productivity-work/ [accessed March 4, 2020].

Cappelli, Peter. 1999. *The New Deal at Work: Managing the Market-Driven Workforce*. Cambridge, MA: Harvard Business School Press.

Cawley, John. 2014. The Affordable Care Act Permits Greater Financial Rewards for Weight Loss: A Good Idea in Principle, but Many Practical Concerns Remain. *Journal of Policy Analysis and Management* 33 (3): 810–820.

Crowley, Martha, Daniel Tope, Lindsey Chamberlain, and Randy Hodson. 2010. Neo-Taylorism at Work: Occupational Change in the Post-Fordist Era. *Social Problems* 57 (3): 421–447.

Delgado, Amy. 2018. Employee Privacy at Stake as Surveillance Technology Evolves. CBS News, August 18. https://www.cbsnews.com/news/employee-privacy-surveillance-technology-evolves/ [accessed March 4, 2020].

Derousseau, Ryan. 2017. The Tech that Tracks Your Movements at Work. BBC, June 14. http://www.bbc.com/capital/story/20170613-the-tech-that-tracks-your-movements-at-work [accessed March 4, 2020].

Dohrn-van Rossum, Gerhard. 1996. *History of the Hour: Clocks and Modern Temporal Orders*. Chicago, IL: University of Chicago Press.

Dougherty, Conor, and Quentin Hardy. 2015. Managers Turn to Computer Games, Aiming for More Efficient Employees. *New York Times*, March 15. https://www.nytimes.com/2015/03/16/technology/managers-turn-to-computer-games-aiming-for-more-efficient-employees.html [accessed March 4, 2020].

Ford, Henry. (1903) 2002. *My Life and Work*. Blackmask Online. E-Book.

Ford Motor Company. 1915. Helpful Hints and Advice to Employees: To Help Them Grasp the Opportunities Which Are Presented to Them by the Ford Profit-Sharing Plan. Detroit: Ford Motor Company.

Foster, John, and Robert McChesney. 2014. Surveillance Capitalism Monopoly-Finance Capital, the Military-Industrial Complex, and the Digital Age. *Monthly Review* 66. https://monthlyreview.org/2014/07/01/surveillance-capitalism/ [accessed March 4, 2020].

Foucault, Michel. 1976. *The Birth of the Clinic*. London: Tavistock Publications Ltd.

———. 1979. *Discipline and Punish: The Birth of the Prison*. New York: Vintage Books.

———. 1980. The Eye of Power. In *Power/Knowledge: Selected Interviews and Other Writings (1972-1977),* edited by Colin Gordon, 146–165. New York: Pantheon Books.

———. 1985. Sexuality and Solitude. In *On Signs: A Semiotics Reader,* edited by Marshall Blonsky, 365–372. Oxford, UK: Blackwell.

———. 2003. *"Society Must Be Defended": Lectures at the Collège de France (1975-76)*. New York: Picador.

———. 2006. *History of Madness*. Abingdon, UK: Routledge.

———. 2009. *Security, Territory, Population: Lectures at the Collège de France 1977–1978*. Edited by Arnold Davidson. New York: Palgrave Macmillan.

———. 2010. *The Government of Self and Others: Lectures at the Collège de France 1982-1983*. Edited by Arnold Davidson. New York: Palgrave Macmillan.

Gandini, Alessandro. 2016. *The Reputation Economy: Understanding Knowledge Work in Digital Society*. London: Palgrave Macmillan.

Gramsci, Antonio. 1971. *Selections from the Prison Notebooks*. Edited by Quintin Hoare and Geoffrey Smith. New York: International Publishers.

Global Wellness Institute. 2016. The Future of Wellness at Work. January. Miami, FL: The Global Wellness Institute.

Hamblen, Matt. 2015. Programs are Used to Weed Out Workers Who Raise Premiums, One Attorney Says. *Computer World*, June 19. http://www.computerworld.com/article/2937721/wearables/wearables-for-workplace-wellness-face-federal-scrutiny.html [accessed March 4, 2020].

Hardt, Michael, and Antonio Negri. 2000. *Empire*. Cambridge, MA: Harvard University Press.

Hassard, Juliet, Kevin Teoh, Tom Cox, Philip Dewe, Marlen Cosmar, Robert Gründler, Danny Flemming, Brigit Cosemans, and Karla Van den Broek. 2014. *Calculating the Cost of Work-Related Stress and Psychosocial Risks – A Literature Review.* Bilbao, Spain: European Agency for Safety and Health at Work.

Hendrix, Ann, and Josh Buck. 2009. Employer-Sponsored Wellness Programs: Should Your Employer Be the Boss of More Than Your Work? *Southwestern Law Review* 38 (3): 465–478.
Hinton, Kathryn. 2006. Employer by Name, Insurer by Trade: Society's Obesity Epidemic and its Effects on Employers' Health Care Costs. *Connecticut Insurance Law Journal* 12: 157–160.
Hodson, Tom, Jeff Schwartz, Ardie van Berkel, and Ian Winstrom Ottem. 2014. *Global Human Capital Trends 2014*. Birmingham, AL: Deloitte University Press.
Holmqvist, Mikael, and Christian Maravelias. 2011. *Managing Healthy Organizations: Worksite Health Promotion and the New Self-Management Paradigm*. London: Routledge.
Hoschild, Arlie Russell. 1983. *The Managed Heart: Commercialisation of Human Feeling.* Berkeley, CA: University of California Press.
Huggett, Frank. 1973. *Factory Life and Work: A Documentary Inquiry*. London: Harrap.
Jeske, Debora, and Alecia Santuzzi. 2015. Monitoring What and How: Psychological Implications of Electronic Performance Monitoring. *New Technology, Work and Employment* 30 (1): 62–78.
Kalleberg, Arne. 2009. Precarious Work, Insecure Workers: Employment Relations in Transition. *American Sociological Review* 74: 1–22.
———. 2011. *Good Jobs, Bad Jobs: The Rise of Polarized and Precarious Employment Systems in the United States, 1970s to 2000s*. New York: Russell Sage Foundation.
Kaplan, Esther. 2015. The Spy Who Fired Me: The Human Costs of Workplace Monitoring. *Harper's Magazine*, March. http://www.populardemocracy.org/sites/default/files/HarpersMagazine-2015-03-0085373.pdf [accessed March 4, 2020].
Kashdan, Jason. 2015. New Ways Your Boss Could Be Keeping Tabs on You. CBS News, August 21. https://www.cbsnews.com/news/companies-use-technology-monitor-employees-at-outside-office/ [accessed March 4, 2020].
Kelly, Lorraine. 2016. Amazombies. *Daily Mail*, December 3. http://www.dailymail.co.uk/news/article-3997864/Amazombies-Seven-seconds-item-filmed-blistering-12-hours-shifts-timed-toilet-breaks-Christmas-order-does-worker-elves.htm [accessed March 4, 2020].
Kaiser Family Foundation. 2014. 2014 Employer Health Benefits Survey. *Henry Kaiser Family Foundation*, September 10. https://www.kff.org/report-section/ehbs-2014-summary-of-findings/ [accessed March 4, 2020].
Key Management Group. 2016. Improving Workplace Safety with Wearable Tech and Automation. *Key Management Group US*, May 5. http://makri.kmgus.com:11747/wp-content/uploads/Wearables-eBook-new-2-April-2016.pdf [accessed March 4, 2020].
Kortuem Gerd, Fahim Kawsar, Daniel Fitton, and Vasughi Sundramoorthy. 2010. Smart Objects as Building Blocks for the Internet of Things. *IEEE Internet Computing* 14 (1): 30–37.
Kuchler, Hannah. 2014 Data Pioneers Watching Us Work. *The Financial Time*s, February 17. https://www.ft.com/content/d56004b0-9581-11e3-9fd6-00144feab7de [accessed March 4, 2020]
Lane, Frederick. 2003. *The Naked Employee: How Technology is Compromising Workplace Privacy*. New York: American Management Association.
Latour, Bruno. 1987. *Science in Action*: *How to Follow Scientists and Engineers through Society*. London: Open University Press.
Levy, Karen. 2015. The Contexts of Control: Information, Power, and Truck-Driving Work. *The Information Society* 31 (2): 160–174.
Lohr, Steve. 2013. Big Data, Trying to Build Better Workers. *New York Times*, April 20. http://www.nytimes.com/2013/04/21/technology/big-data-trying-to-build-better-workers.html [accessed March 4, 2020].
———. 2014. Unblinking Eyes Track Employees. *New York Times*, June 21. https://www.nytimes.com/2014/06/22/technology/workplace-surveillance-sees-good-and-bad.html [accessed March 4, 2020].
Manokha, Ivan. 2015. The Conundrum of Economics: Uncompromising Empiricism alongside Blind Faith in the "Magic" of the "Invisible Hand." *Raisons politiques* 59 (3): 121–153.
———. 2017. Why the Rise of Wearable Tech to Monitor Employees is Worrying. *The Conversation*, January 3. https://theconversation.com/why-the-rise-of-wearable-tech-to-monitor-employees-is-worrying-70719 [accessed March 4, 2020].
———. 2018. Le scandale de Cambridge Analytica contextualisé: le capital de plateforme, la surveillance et les données comme nouvelle "marchandise fictive." *Cultures & Conflits* 109: 35–59.
Marx, Karl. 1976. *Capital: Critique of Political Economy, Volume I*. London: Penguin Books.
Mattke, Soeren, Harry H. Liu, John P. Caloyeras, Christina Y. Huang, Kristin R. Van Busum, Dmitry Khodywakov, and Victoria Shier. 2013. *Workplace Wellness Programs Study*. Santa Monica, CA: The RAND Corporation.
Millman, Rene. 2018. Ford Looks to Motion Tracking Bodysuits to Aid Factory Workers. *Internet of Business*, August 7. https://internetofbusiness.com/ford-motion-tracking-bodysuits/ [accessed March 4, 2020].
Moore, Phoebe, Pav Akhtar, and Martin Upchurch. 2018. Digitalisation of Work and Resistance. In *Humans and Machines at Work: Monitoring, Surveillance and Automation in Contemporary Capitalism*, edited by Phoebe Moore, Xangthe Whittaker, and Martin Upchurch, 17–44. London: Palgrave Macmillan.
Moore, Phoebe, Martin Upchurch, and Xanthe Whittaker. 2018c. Humans and Machines at Work: Monitoring, Surveillance and Automation in Contemporary Capitalism. In *Humans and Machines at Work: Monitoring, Surveillance and Automation in Contemporary Capitalism*, edited by Phoebe Moore, Xangthe Whittaker, and Martin Upchurch, 1–16. London: Palgrave Macmillan.
Moran, Gwen. 2017. This is the Future of Corporate Wellness Programs. *FastCompany.* https://www.fastcompany.com/40418593/this-is-the-future-of-corporate-wellness-programs [accessed March 4, 2020].

Mulholland, Kate, and Paul Stewart. 2013. Workers in Food Distribution: Global Commodity Chains and Lean Logistics. *New Political Economy* 19 (4): 534–558.
Mulki, Jay, William Locander, Greg Marshall, Eric Harris, and James Hensel. 2008. Workplace Isolation, Salesperson Commitment, and Job Performance. *Journal of Personal Selling and Sales Management* 28 (1): 67–78.
Nolan, Dennis. 2003. Privacy and Profitability in the Technological Workplace. *Journal of Labor Research* 24 (2): 207–232.
O'Connor, Sarah. 2015. Wearables at Work: The New Frontier of Employee Surveillance. *Financial Times*, June 8. https://www.ft.com/content/d7eee768-0b65-11e5-994d-00144feabdc0 [accessed March 4, 2020].
———. 2016a. Bosses Reading Your Emails are Not Breaching Your Privacy. *Financial Times*, January 13. https://www.ft.com/content/bf5cc95c-ba1c-11e5-b151-8e15c9a029fb [accessed March 4, 2020].
———. 2016b. Workplace Surveillance is Sparking a Cyber Rebellion. *Financial Times*, January 19. https://www.ft.com/content/8c52aff6-bdda-11e5-9fdb-87b8d15baec2 [accessed March 4, 2020].
Parsons, Jeff. 2018. Brain-Scanning Hats Will "Make Factory Workers More Efficient and Increase Profits." *Mirror*, May 2. https://www.mirror.co.uk/tech/brain-scanning-hats-make-factory-12465396 [accessed March 4, 2020].
Pasquale, Frank. 2015. *The Black Box Society: The Secret Algorithms That Control Money and Information*. Cambrdige, MA: Harvard University Press
Peñarredonda, José Luis. 2018. How Much Should Your Boss Know About You? BBC, March 26. http://www.bbc.com/capital/story/20180323-how-much-should-your-boss-know-about-you [accessed March 4, 2020].
Polanyi, Karl. 1944. *The Great Transformation: The Political and Economic Origins of Our Time*. New York: Farrar & Rinehart.
PR Newswire. 2018. User Activity Monitoring: Worldwide Markets to 2023 - A $3.3 Billion Opportunity, Growing at a CAGR of 25.5%. June 20. https://www.prnewswire.com/news-releases/user-activity-monitoring-worldwide-markets-to-2023---a-3-3-billion-opportunity-growing-at-a-cagr-of-25-5-300684222.html [accessed October 7, 2020].
Price, Brian. 1989. Frank and Lillian Gilbreth and the Manufacture and Marketing of Motion Study, 1908–1924. *Business and Economic History* 18 (2): 88–98.
———. 1992. Frank and Lillian Gilbreth and the Motion Study Controversy, 1907—930. In *A Mental Revolution: Scientific Management since Taylor*, edited by Daniel Nelson, 58–76. Columbus, OH: Ohio State University
Raval, Noopur, and Paul Dourish. 2016. Standing Out from the Crowd: Emotional Labor, Body Labor, and Temporal Labor in Ridesharing. In *Proceedings of the 19th ACM Conference On Computer-Supported Cooperative Work And Social Computing*, San Francisco, February, CA97–107. New York: Association for Computing Machinery.
Reuters. 2019. Heady Stuff: Tracking Your Brain at Work. April 2, video. https://www.reuters.com/video/2019/04/02/heady-stuff-tracking-your-brain-at-work?videoId=533009844 [accessed March 4, 2020].
Rose, Barbara. 2008. Employers Experiment with Tough Get-Healthy Regimes. *Chicago Tribune*, February 10.
Rosenblat, Alex. 2018. *Uberland: How Algorithms are Rewriting the Rules of Work*. Oakland, CA: University of California Press.
Rosenblat, Alex, Tamara Kneese, and danah boyd. 2014. Workplace Surveillance. *Open Society Foundations' Future of Work Commissioned Research Papers*, October 8. New York: Data & Society Research Institute.
Rothstein, Lawrence. 2000. Privacy or Dignity? Electronic Monitoring in the Workplace. *New York Law School Journal of International and Comparative Law* 19: 379–412.
Schmid, Robert. 2018. Industrial IoT: How Connected Things are Changing Manufacturing. *Wired*, July, https://www.wired.com/wiredinsider/2018/07/industrial-iot-how-connected-things-are-changing-manufacturing/ [accessed March 4, 2020].
Schumacher, Susan. 2011. What Employees Should Know about Electronic Performance Monitoring. *ESSAI* 8 (38): 138–144.
Sheppard, Mullin, and Richter & Hampton LLP. 2016. Could Your Bonuses and Promotions Soon be Determined by Wearable Technology? *The National Law Review*, July 19. http://www.natlawreview.com/article/could-your-bonuses-and-promotions-soon-be-determined-wearable-technology [accessed March 4, 2020].
Silverman, Rachel. 2016. Bosses Tap Outside Firms to Predict Which Workers Might Get Sick. *Wall Street Journal*, February 17. https://www.wsj.com/articles/bosses-harness-big- data-to-predict-which-workers-might-get-sick-1455664940 accessed March 4, 2020].
Smith, Merritt Roe. 1980. *Harpers Ferry Armory and the New Technology*. Ithaca, NY: Cornell University Press.
Snyder, Benjamin. 2016. *The Disrupted Workplace: Time and the Moral Order of Flexible Capitalism*. Oxford: Oxford University Press.
Standing, Guy. 2011. *The Precariat: The New Dangerous Class*. London: Bloomsbury Academic.
———. 2014. Understanding the Precariat through Labour and Work Guy Standing. *Development and Change* 45 (5): 963–980.
Stanton, Jeffrey, and Amanda Julian. 2002. The Impact of Electronic Monitoring on Quality and Quantity of Performance. *Computers in Human Behavior* 18 (1): 85–101.
Sward, Keith. 1948. *The Legend of Henry Ford*. New York: Rinehart & Company.
Taylor, Frederick. 1919. *The Principles of Scientific Management*. New York: Harper & Brothers Publishers.
Telegraph, The. 2017. Cyborgs at Work: Swedish Employees Getting Implanted with Microchips. April 4. https://www.telegraph.co.uk/technology/2017/04/04/cyborgs-work-swedish-employees-getting-implanted-microchips/ [accessed March 4, 2020].
Week, The. 2015. The Rise of Workplace Spying. July 5. http://theweek.com/articles/564263/rise-workplace-spying [accessed March 4, 2020].
Walker, Rob. 2017. Contemplating a Trap for Prying Eyes at Work. *New York Times*, February 16. https://www.nytimes.com/2017/02/16/business/workologist-workplace-advice.html [accessed March 4, 2020].
Waspbarcode. N.d. Accurately Tracking Employee Time Drives Big Cost Savings. http://www.waspbarcode.com/~/media/pdfs/waspbarcode/case%20studies/wasptime/wasptime-afton.ashx [accessed March 4, 2020].

Zuboff, Shoshana. 2015. Big Other: Surveillance Capitalism and the Prospects of an Information Civilization. *Journal of Information Technology* 30: 75–89.

———. 2016. The Secrets of Surveillance Capitalism. *Frankfurter Allgemeine Zeitung*, March 5. http://www.faz.net/aktuell/feuilleton/debatten/the-digital-debate/shoshana-zuboff-secrets-of-surveillance-capitalism-14103616.html [accessed March 4, 2020].

———. 2018. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. New York: Public Affairs.

Zureik, Elia. 2003. Theorizing Surveillance: The Case of the Workplace. In *Surveillance as Social Sorting: Privacy, Risk, and Digital Discrimination*, edited by David Lyon, 31–56. London: Routledge.