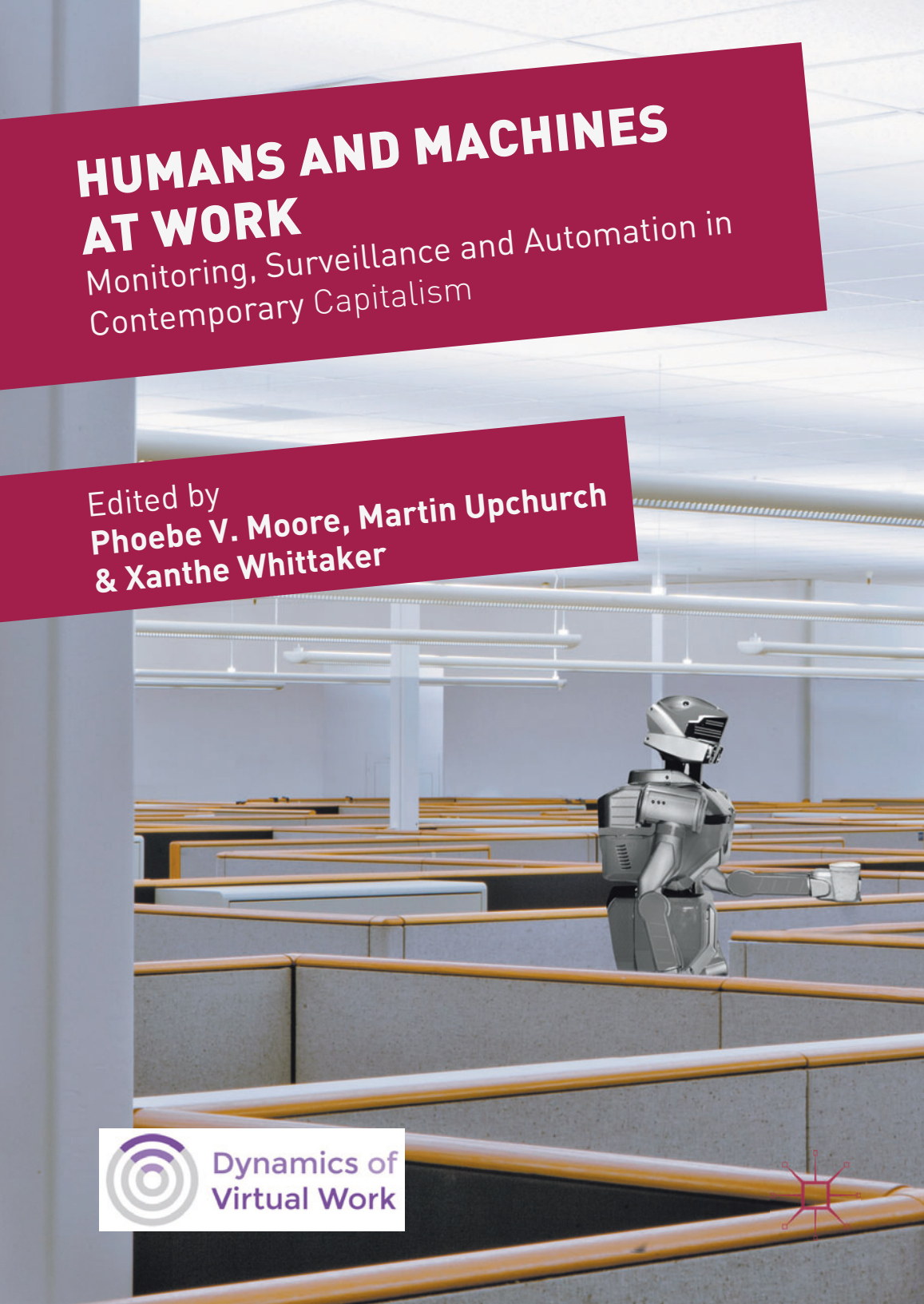
HUMANS AND MACHINES AT WORK

Monitoring, Surveillance and Automation in Contemporary Capitalism

Edited by
Phoebe V. Moore, Martin Upchurch & Xanthe Whittaker



Dynamics of Virtual Work

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Technological change has transformed where people work, when and how. Digitisation of information has altered labour processes out of all recognition whilst telecommunications have enabled jobs to be relocated globally. ICTs have also enabled the creation of entirely new types of 'digital' or 'virtual' labour, both paid and unpaid, shifting the borderline between 'play' and 'work' and creating new types of unpaid labour connected with the consumption and co-creation of goods and services. This affects private life as well as transforming the nature of work and people experience the impacts differently depending on their gender, their age, where they live and what work they do. Aspects of these changes have been studied separately by many different academic experts however up till now a cohesive overarching analytical framework has been lacking. Drawing on a major, high-profile COST Action (European Cooperation in Science and Technology) Dynamics of Virtual Work, this series will bring together leading international experts from a wide range of disciplines including political economy, labour sociology, economic geography, communications studies, technology, gender studies, social psychology, organisation studies, industrial relations and development studies to explore the transformation of work and labour in the Internet Age. The series will allow researchers to speak across disciplinary boundaries, national borders, theoretical and political vocabularies, and different languages to understand and make sense of contemporary transformations in work and social life more broadly. The book series will build on and extend this, offering a new, important and intellectually exciting intervention into debates about work and labour, social theory, digital culture, gender, class, globalisation and economic, social and political change.

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Dynamics of Virtual Work
ISBN 978-3-319-58231-3 ISBN 978-3-319-58232-0 (eBook)
https://doi.org/10.1007/978-3-319-58232-0

Library of Congress Control Number: 2017940621

Cover credit: Nikolaevich/DigitalVision/Getty

Printed on acid-free paper

This Palgrave Macmillan imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Image by Juanito Moore

Preface

My first memory of using a computer is one of failure. I was a high school student in Dallas for my final year and a paper I had written on a Dell somehow went missing after the machine had crashed. My memory is sitting in my father's office as he did all sorts of creative manoeuvring to retrieve it. When it came to light, I was of course, very relieved. My main memories are the preliminary anxiety, the period of tense waiting, then the incredible joy. The memory is not of the content of the paper or the class it was for. I don't even recall the PC itself. The memory is related to what I felt was a huge amount of work that had gone into writing the paper and the reliance I had on the machine to produce the work.

My family had moved around the world a lot for my father's job as an anthropologist and it just so happened that we were living in Dallas at the time. Little did I know at the time but these formative experiences would play into my lifelong interests in technology and work.

Some of my memories from that year revolve around the only car Yugoslavia had ever manufactured, aptly named the Yugo. My father had bought more than one: a sort of 'cheaper by the dozen' approach, where if one part on one of these tiny cars, broke, it would be replaceable with a

part from one of the others. *Cheaper by the Dozen* if, of course, the biography of Frank and Lillian Gilbreth published by their children in 1948. The Gilbreths, at the beginning of the twentieth century, led in research on time and motion studies, a technologically driven approach to work intended to make the work efficient and fast.

When the Gilbreths talked about 'cheaper by the dozen', they were of course making a joke about their rather large family, but in terms of time and motion research, *less* is, in fact, more, because efficiency should be improved by using technology to measure and dictate work performed. Scientific management has become a hallmark for thinking about early stages of manufacturing and industrialisation. But as this book shows, the debates about whether scientific management has been fully removed from working practices today, or not, continue to rage. The dangers that the trades unions who stood up to scientific management said in the early part of the twentieth century at the time, were automation, mechanisation and work speed-up. Many of these concerns are becoming ever more possible in the contemporary era as robots replace workers in the factory context and algorithms, cameras and checkpoints begin to replace physical bosses in service work like taxi driving, security and cashier work.

In 2015, nearly a fifth of employees in Europe had access to wearable technology at work. Now, one in three companies provides wearable devices to track activity, save money and allegedly improve employees' health and happiness. What has been called a 'quantified work environment' is one that resembles the world of athletes where technology aids people in identifying peak performance times and gaining rapid feedback. Accelerometers, Bluetooth, triangulation algorithms and infrared sensors allow managers to monitor workers far beyond traditional hours logged by swipecards in the current era. Call centre data reporting has long been used to view workers' emotional responses to customers but the types of monitoring and tracking this book outlines, take things a step further. The Global Corporate Challenge and JawBone Up offer self-tracking packages with dashboards that reveal compared data. A related product, Olivetti Research's Active Badge and its successors Sociometric Badge and Wearable Sensor Badge, can trigger automatic doors, transmit wearer identities and forward telephone calls.

Badges record workers' movements, speech, proximity and interactions, and analyse voice patterns and non-verbal cues to deduce mood and interpersonal influence. These new technologies reflect significant changes in management patterns and workplaces.

I have been working in this area for some years and have always researched the issues workers face in contemporary societies. One cannot discuss work now without considering technology, but I have never seen technology in workplaces as a neutral arbiter. My background in trade union work and international research adds a social justice approach and angle to my work and I was very quick to note the exploitation possibilities for introducing devices into working lives. What were the reasons for introducing new technologies? My research has shown that reasons range from monitoring hours and toilet breaks in factories, to health tracking in offices, to gamification, and even surveillance.

In April 2016, I ran a symposium at the International Labour Process conference in Berlin. I invited several academic colleagues who I knew were researching in the area of digitalised work: Sian Moore, Martin Upchurch, Xanthe Whittaker, Alessandro Gandini and the well-known trade unionist Pav Akhtar who leads the Global Union Federation's managers and professionals unions internationally and predominantly works with ICT workers. Pav has been fighting for workers' rights in digitalisation for years.

The symposium I ran in Berlin was entitled 'New Technologies of Surveillance at Work'. The panel description I had submitted and was accepted to the conference reads:

> A regime of total mobilisation and surveillance corrodes workers' health and safety, creating anxiety, burnout and overwork. Neoliberalism however requires portrayal of such problems as failures to ad- apt, personal psychological shortcomings, or educational deficits. We claim, rather, that surveillance in workplaces are a systematic effect of a particular labour process. Labour movements will need to combat such corrosion or risk the generalisation of the types of psychological collapse seen at the range of suicides recently seen at Foxconn. This symposium looks at a series of cases of surveillance in workplaces as new technologies provide the means to increase, posing the question: what we can do about it?

After a successful symposium, we realised we had enough new material to put together a publication. All speakers from that lovely day in Berlin appear in this edited collection. I am fully committed to supporting women in research projects, and we invited four further authors to contribute, those being Winifred Poster, Yujie (Julie) Chen, Penny Andrews and Rebecca Lemov, who all agreed. In terms of acknowledgements, my co-editors Xanthe Whittaker and Martin Upchurch merit a lot of praise for contributing to this process and never failing to communicate at key points and offering very valued, but under-recognised work that goes into book preparations. I would like to thank my authors for not being late with chapters in most cases and where these were late, they still arrived and were in great shape. We are clearly fighting for the same cause as the level of collegiality in this process has been exquisite. Ursula Huws and Rosalind Gill, editors of this series, and our anonymous reviewers, have been extremely supportive of this publication. Furthermore, Shazad Ali and Tommaso Ramella helped with the final editing processes. I also want to acknowledge my brilliant families, the Moores, the Carters, the van Somerens and my partner Dan for always standing by me. Someday I will probably have to thank robots, but for now, I will leave it there. I hope you enjoy this book.

London, UK Phoebe V. Moore

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Phoebe V. Moore, Martin Upchurch and Xanthe Whittaker

Introduction

In the era of the so-called Fourth Industrial Revolution, which is 'characterised by a fusion of technologies that is blurring the line between the physical, digital and biological spheres' (Schwab 2016), we increasingly work with machines in both cognitive and manual workplaces. Technology has had a double-edged identity in workplaces since the well-known industrialists F.W. Taylor and the Gilbreths at the beginning of the 1900s devised schemes to understand workplace productivity by linking it to human behaviour through technologically informed work design.

Indeed, the principle, influence and integration of technology in workplaces can be traced back to the beginning of the industrial epoch,

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_1

where efficiency and productivity gains were prioritised but sometimes with a parallel, albeit often contradictory, desire to uphold the well-being and health of workers akin to the Gilbreths' interest in fatigue and rest which informed the later school of Human Relations and reflected Elton Mayo's research. What is new, now, is the availability and inclusion of a range of unprecedented technologies that can be used to measure, track, analyse and perform work in ways hardly imagined during Taylor's and the Gilbreths' lifetimes. Most importantly for this edited collection, new tracking and monitoring technologies allow management to control work at ever-more intensified levels through the accumulation and use of data about ourselves that was not previously available. Many applications of the new workplace technologies remove management accountability and in some cases, traditional 'management' altogether. This book looks at what this means for workers.

Traditionally, non-routine professional work was delineated into discrete piecework that can now increasingly be performed by machines and artificial intelligence (AI) (Ford 2015; Brynjolfsson and McAfee 2014) in a process extending Braverman's observations in factories and offices ([1974] 1998). More recent researchers note that 'computers, which are meant to help [workers to] do the work more efficiently are also extremely merciless monitoring tools' leading to conditions where, 'work rates are close to the maximum that workers can manage' (Peaucelle 2000, p. 461), leading to high turnover rates and workplace stress. New technologies have also given extra opportunities to form a global division of labour, allowing for outsourcing of routine work and increasing pressures to deregulate labour standards. But workplace technologies of surveillance are apparent in both the global North and global South, from warehouses to art houses (Moore and Robinson 2016).

Innovation in workplace monitoring technologies has adapted older forms such as magnetic pendulums to track and record human steps by introducing new uses for technologies, such as RFID, GPS and cameras. Sensors can recognise faces and detect body odour and fingerprint time clocks are now regularly used for enrolment at work. Algorithmic measures are being used to make human resource decisions and people analytics have advanced so it becomes possible to cross reference with the use of 'dashboards'. So, what was called a 'new surveillance' by Giles

Marx in 1988 takes an even newer form, as intensified methods can be carried out on anyone, anywhere and at any time, for no reason at all. Digitalised surveillance thus introduces a 'step change in power, intensity and scope' (Graham and Wood 2003).

The recent innovation is that deeper and more broadly based forms of monitoring and investigation can be selected and mobilised, based on context, seeing places and spaces, in specific periods of times, creating analogues of digital networks, systems and categories of person (Marx 2002: 10), rather than a more traditional form where specific people whose identities are already known or suspected are rendered suspicious. Previously, we could differentiate between the observer and the observed and technologies facilitated rather than directed processes. Now, predictive policing techniques being developed in the USA and China give the state 'plenty of 'precrime' and 'thoughtcrime' data on its citizens to work with' (Adl 2016). Bizarrely, our perceived knowledge of ourselves could potentially be less than the amount of knowledge, that is, in fact, held about ourselves and that data may even be impossible for us to access. The newest forms of monitoring and observation are increasingly extensive and seen as comprehensive, including both individual and cross-referenced data and information that goes far beyond the traditional records kept by churches or schools that Foucault feared would lead to a 'control society'. Big data about individuals is now generated by algorithmic processes for automated identification and generation of analytics which remove a layer of human involvement, meaning we are undeniably experiencing a new era of technologically enhanced possibilities. As such, as our personal data is increasingly held by the corporate and state machine, we suffer enhanced feelings of powerless and lack of control and an intensified sense of alienation.

This book looks at what happens when a similar level of state-led surveillance and behaviour monitoring enters the workplace. Our primary research question thus revolves around the investigation of what changes is the use of technology bringing to the workplace and what is the impact of technological change on workers? This edited collection looks at a series of cases of surveillance in workplaces and digitalisation and datification of monitoring as new technologies and practices provide the means to increase output and discipline work, posing the questions: what are the

implications of the newest monitoring and surveillance techniques in the workplace? In what ways are they likely to/are they affecting and harming workers and what are the wider implications?

The distinctiveness of this book lies in authors' critical perspectives on new forms of datification and digitalisation of work involving surveillance and performance monitoring, which we link to automation and increasing intervention of machines into workplaces as advances in technologies take unprecedented forms within the rubric of deep automation. Chapters assess the ways in which neoliberalisation of work and workforces involve an ever-intensifying relationship with technologies. Neoliberalisation of the workforce involves technologies of control in the employment relationship. In this edition, we look at where surveillance, new forms of measure of work, and automation are occurring in a range of industries and work forms, asking what the implications and experiences are for workers and what is being done about it, whether by unions or in everyday forms of resistance.

Authors who have looked at surveillance and technological changes in workplaces include Zureik (2003), Ball (2010), Levy (2015), Pasquale (2010, 2015) and Rosenblat et al. (2014). Research on profiling and reputation self-management has become very common in the online labour market as freelancers seek work and as employers or clients actively profile employees with the use of new technologies (Pasquale 2010; Gandini 2016; Bodie et al. 2016). But, what these authors have not captured are the details of the processes of change nor discussed how workers have been impacted by such changes. This book captures the contemporary essence of this process, looking at where it is happening in specific industries and work forms, from media to real estate, domestic care work to Indian call centres, from taxi drivers in China to offices, asking what precisely is happening in these arenas, how people are affected, and what is being done about it. We look at recent trends, identifying how practices that may have been seen as relatively banal and standard in workplace regulation have intensified and become nearly ubiquitous. This collection takes a detailed look at the effect of new data technologies on the surveillance, measurement and management of contemporary work. Most of the chapters offer new empirical

research that engages with existing and emerging fields of social enquiry, in data science, on the quantified self and surveillance.

We present a series of cases of surveillance in workplaces, datification of monitoring, interface management in gig economies and the human costs. New technologies and automation practices provide the means to increase output and discipline work, introducing the questions: In what ways are datafied and digitalised workplaces harming workers? what are the implications of the newest surveillance, monitoring and tracking techniques in the workplace? Even with the extent of data possible, personal privacy is by no means the only contested issue. There are also distinct possibilities for the exacerbation of negative discrimination in the new workplaces which this book outlines.

Technology and Capitalism

To set the stage for this book, we first rehearse the relationship between technology and capitalism. In doing so we must be cautious, for as Govindan Parayil (2002: 39) has intimated in his expansive review of technology 'there is no unified approach to explaining technological change in the historical tradition'. We can discern different approaches in the neoclassical, Schumpeterian, Weberian, and Marxist traditions among others. In neoclassical political economy, Adam Smith recognised the importance of technical innovation as a spur to growth. For him, it was the source of increased productivity by making possible a division of labour. In an early draft of the *Wealth of Nations* (1776), Smith contemplated the introduction of the plough and observed that it was 'probably a farmer who first invented the original, rude form of the plough. The improvements which were afterwards made upon it might be owing sometimes to the ingenuity of the plow wright when that business had become a particular occupation, and sometimes to that of the farmer'. The neoclassicists thus viewed technical innovation as a form of progress which was engendered by capital accumulation. Capital was the input, and technology was the output of economic growth. Increasing capital stock would spur technological innovation incrementally, thus continuing the growth cycle (see both Solow 1956 and Swan 1956).

As such, technical innovation would be a product of necessity, created through the good ideas and technical knowledge of the craft worker or mill owner. In this perspective, advances in technology were engendered exogenously, and there was an assumed neutrality in its effects on the relationship between the workers and the owner of capital. There is an associated school of thought which contextualises the introduction of new technologies as the product of genius, or the inspired acts of individuals who applied themselves to redesigning work. Such individuals, rather than necessarily being central to the labour for which the technology is to be applied, are often inventor–entrepreneurs excited by science, who begin small with their own business, and then become big by exploiting technological advantage (see Hughes 1983, for a detailed historical account). Examples may be Bell and the telephone, the Wright Brothers and the aeroplane, Marconi and the radio. Indeed, as Bob Hughes as explored (2016) in *The Bleeding Edge* the inventions and innovations of individual enthusiasts have more often than not far outweighed those of the corporate sphere, who express more caution and are weighed down with bureaucratic conservatism and 'self' interest.

We see here a potential clash between an evolutionary perspective of technology, which emphasises incremental change linked to industrial progress, and a techno-deterministic approach, which views technology as the primary input to changes in the industrial process, the world of work and society more generally. Such a binary is not always helpful in advancing our understanding. We can also point to important technical innovations and inventions that were the result of a mixture of endogenous and exogenous factors, either created by inventor–entrepreneurs, owner–entrepreneurs or on a collective basis by applied research. We must also recognise that certain technologies have more impact on the world of work than others, sometimes producing a great leap forward in production processes. James Hargreave's spinning jenny, invented in England in 1764, transformed the process of weaving. Steam power allowed railway expansion and the cheaper exploitation of natural resources, and beam engines produced a transformation in textile production. A key example of non-digitised technical innovation in the modern industrial age is the automation of the production line made possible by electronically controlled (rather than manually controlled) machines. We can point to other

technical innovations that spurred processes of urbanisation, such as underground sanitation and water supply. Indeed, the external environment is often the prime motive for spurring new technology, as by-products of a wider goal. War is a time when technology takes a leap forward, as nation states seek to out-gun each other with technical weaponry. Eric Hobsbawm makes such as point in the Age of Extremes (1994: 264–265) whereby the war 'with its demands on high technology, prepared a number of revolutionary processes for later civilian use'.

The transistor (developed in 1947), the first civilian digital computers (1946), as well as nuclear energy were all products which sat alongside radar and the jet engine. Such technologies were part the 'technological earthquake' which heralded the 'Golden Age' of capitalism in the advanced industrial countries and saw the widespread introduction of television, domestic refrigerators, vinyl records (1948) and cassette tapes. During this 'Golden Age' the expansive growth rates in the advanced industrial nations of both the First and Second World appeared inextricably linked to processes of Taylorism, Fordist production methods and automation. Added to this, as the business historian Alfred Chandler (1977) has shown in *The Visible Hand*, was the creation of management and organisational structures that encouraged the exploitation of technology through the advantages of scale and scope. Demand from consumers fed the cycle of automation, most especially for goods in the home. But unpicking the causative relationship between technology, productivity, consumer demand and economic growth is not straightforward. Processes of reverse causation may exist, meaning that economic growth spurred technical development, rather than the other way around. This also applies to digital automation. Neither is it the case that we should necessarily adopt a fatalism about the advance of technology. While it may sometimes seem that technology steams ahead with a life of its own, this appearance can be deceptive. The impact of technologies may only be felt once a critical mass of technology has been accumulated over time (Shih et al. 2008). Finally, there is a 'substantive' perspective adopted by some commentators which views technology as an autonomous agent (Ellul 1964: 14), with the capacity to overtake us in its dynamic (Heidegger 1977: 17). If technology were to be an 'autonomous' agent then surely human agency would be dismissed, rather

than being integral to processes of invention, innovation and application. Thomas Hughes, for example, preferred to use the term 'momentum' to describe spurts of technology 'momentum remains a more useful concept than autonomy…it does not support the erroneous belief in technological determinism … (and) encompasses both structural factors and contingent events' (Hughes 1994: 80).

The integration of societal needs and desires (including war) within the process of invention and technological innovation would indicate that the introduction of new technologies is not simply a product of genius, neither is it a neutral agent of change or an autonomous agent out of human control. The relationship between 'technology' and 'society' is more complex, an insight recognised by many commentators who have rejected both technological determinism and the great inventor and substantive perspectives in favour of a more socio-technical approach (see the edited volume by MacKenzie and Wajcman 1985, for a review). We can point to a 'dialectic of technology', whereby its introduction is contextualised by instrumental factors (Feenberg 1991: 188). Economics will shape technology, or at least the application of technology, in so far that a new product will not be offered to the 'market' if a profit cannot be made. Thus, the conversion from water power to coal and steam power was predicated by the closeness of the mass of workers to coalfields. The geographical location of industry shifted from rural riversides to centres of coal production in Britain in as little as a decade as a result. 'King Coal' forged ahead and fossil fuels (coal, then oil) became the drivers of the economy under new patterns of corporate dominance (Malm 2016). Thomas Hughes used the example of Edison's light bulb, which could only be developed by Edison subject to generating electricity, installing lines and metres, and undercutting the price of gas, as well as making sufficient return on investment (Hughes 1983: 80). His success stands in contrast to the fortunes of the inventions of Edison's contemporary Nikola Tesla, who offered a more expensive alternating current (A/C) alternative to Edison's simpler but less efficient direct current (D/C) system. Tesla's funding was withdrawn when his financial backer, J. P. Morgan stopped supporting him. The social and political framework also helps determine if a specific technology is to be widely reproduced. For example, under the old Soviet system of central planning and

production targets, the key targets to be met were specified outputs within a given time frame. There may have been a disincentive to introduce significant technical advances as this may have upset timescales by the delays caused by retooling and retraining (Kaldor 1981). Only where the system was in direct competition with the west, such as in military technology, were technological advances more keenly initiated by the state. According to Bhaduri (1973) in peasant and semi-feudal societies, where the peasant is tied by debt bondage to the landowner, new technology in agricultural production will be delayed, simply because this would improve the lot of the peasant and lessen dependence on the landowner. In contemporary times, the challenges of climate change mean that political choices need to be made which shape the direction of new scientific research and its practical application, by shifting dependency away from fossil fuels in favour of harnessing renewable energy sources.

We must also question the supposed neutrality of technology. The classical Marxist perspective helps to clarify our understanding on how technology is utilised by capital in the workplace in its own interest. The prime motive is to compete with other capitals by introducing technology to lower unit costs and raise profitability. There is a constant tension between this need to compete and the desire of the capitalist to recoup the investment in new technology. This can only be achieved by increasing rates of exploitation of its workforce or by shedding labour. This process leads to a parallel rise in the organic composition of capital measured by the ratio between constant or fixed capital (itself a product of past or 'dead' labour) and variable capital (capital invested in employing labour-power), which activates the 'living' labour of workers in the production process. The steady rise of the organic composition of capital was considered by Marx as the key factor to explain capitalism's tendency towards crisis. This is because it is living labour, the activity of workers at work, that creates new value. Dead labour, embodied in machinery and previously extracted raw materials, creates no new value. It merely passes on its value in the process of becoming used by living labour. As the ratio changes in favour of fixed capital investment in machines, and capital-bias takes effect, then the relative share of labour in any one production process is reduced, and hence the rate of return on

capital investment (or rate of profit) falls correspondingly. So, while individual capitals are forced to adopt technical innovations to compete, and match or undercut the 'socially necessary labour time' within the product's sector, they are sowing the seeds of stagnation and decline by over-reliance on fixed capital at the expense of variable. Countervailing factors would have to be applied by capital, which would involve getting 'more for less' from individual workers. Instead of being a 'neutral' input, technology becomes instead a means by which to increase the rate of exploitation of those workers left behind in the individual workplace.

Technical innovation is thus laced with the promise of strategies of resistance from workers who may be adversely affected by its introduction. Marx, in considering this tension, related the formation and reformation of human society generally to the '…change and development of the material means of production, of the forces of production…' with the conclusion that 'the mode of production of material life conditions the social, political and intellectual life process in general' (Marx 1859). This is not a technologically deterministic conclusion, but one where Marx uses a dialectical approach, relating technology, and its use, to the social relations observable within a particular society. There is contestation implied between classes and indeed, resistance by the workers in the dying trades and occupations has often defined both industrial relations and the societal conditions of the age. Most importantly, we can observe that the composition of the working population continually shifts and changes with technical innovations. It would be 'vulgar' Marxism to assume that the introduction of a new technology, on the scale of the spinning jenny, the steam engine, or the electric light bulb automatically had the power to reshape society. Mediating factors are needed, which for E.P. Thompson sometimes crystallised around the common feelings of working people of a sense of moral outrage at the way in which ruling elites were abandoning and undermining long held practices and traditions of societal solidarity. In his essay, *The Moral Economy of the Crowds in the Eighteenth Century* (1971) he suggests, for example that the crowds involved in the food riots were 'informed by the belief that they were defending traditional rights or customs, and in general that they were supported by the wider consensus of the community'. The interaction between technology and society was integral to

a wider struggle of how classes saw themselves and acted to shape, or preserve, their world. This book crystallises both the contemporary moment of this process, where technologies sit along a continuum of deep automation and where workers' struggles to counteract the risks of these technologies and to try to preserve the scope to shape our own lives, continue to emerge.

Chapters

The next chapter in this collection lays the groundwork to look at machines and humans at work today, outlining the myriad of technologically developed precision techniques now being rolled out and the emerging power relations with a focus on workers' resistance and trade union responses. New monitoring and tracking technologies resemble mirrors that present specific images of ourselves but once timestamped and stored, uses of such profiles can be manipulated and tailored for better or worse. Surveillance and 'spying' in workplaces are now ubiquitous. The algorithmic boss is also no longer a fiction of science inspired novels. Electronic performance monitoring, people analytics, interface management, mechanisation and big data capture has led to work intensification and stress. Indeed, technology has failed to deliver on its promises to reduce work through automation, but instead creates new avenues for work, for fewer people, who use machines to do work that once others did; and has created a lot of new work for machines themselves observed in factories Moore has visited. Phoebe Moore, Pav Akhtar and Martin Upchurch look at the ways that warehouse, office and gig workers have expressed resistance to these new technological invasions, through documenting interviews with workers in warehouses, offices and involved in gig work. Then we look at the ways in which trades unions, nationally and internationally, are devising strategies and actions in the face of this trend.

The third chapter then focuses on the history of automation. Martin Upchurch and Phoebe Moore look at the relationship between technology, innovation and capital accumulation before focusing on computerisation and digitalisation as a distinct form of innovation. Alongside

digitalisation and advances in interactive web-based communication, we now witness advances in robotics, 3D printing, AI and self-tracking technology, such as Fitbit or smartphone apps that are invading the workplace. In this chapter, debates on technology, old and new, are reviewed, and a Marxist interpretation is presented. Attention is focused on how the concepts of socially necessary labour time and abstract labour may help us understand the real role of ICT at work. We conclude that computers and related technologies are not neutral agents of change but are used by capital as part and parcel of exploitative labour practices and capital accumulation.

Xanthe Whittaker, in her chapter 'There Is Only One Thing in Life Worse Than Being Watched, and that Is not Being Watched: Digital Data Analytics and the Reorganisation of Newspaper Production', looks at digital data as a by-product of digital transformations of production. She argues that the availability of digital data is not only reconfiguring consumer relations, but also has the potential to reconfigure workplace relations, where an increasing array of workers' activities and products leave digital traces that can be monitored. The chapter applies a labour process analysis to a study of a digital newsroom and examines the way in which data have been adopted into the news-making process and how they are shaping it, how journalists have incorporated data into their working practices, how they have resisted them and how data inform editorial decisions. Where data have created new visibilities for the performance of journalists' work it considers the extent to which they also become a tool of managerial control.

Sian Moore and LJB Hayes then discuss the use of electronic monitoring (EM) technology in the highly-gendered labour of homecare work. Their research is based on case studies in two councils in the south west of England where care workers are monitored by the private companies which employ them. Moore and Hayes take particular care to give voice to worker experiences, where EM has been used to delineate workers' time between paid and unpaid activities. The chapter examines the effect this has on both workers' pay and terms of employment in a sector that has been characterised by insecurity, informality and unpaid women's work as well as on workers' autonomy and discretion and the relational aspects of care work.

In the chapter 'Social Recruiting: Control and Surveillance in a Digitised Job Market', Alessandro Gandini and Ivana Pais turn their focus on the problems with online reputation as implicated in human resource decision-making, where social media plays an increasing role in the mediation of recruitment and selection. Drawing upon an extensive global study, they examine how both recruiters and job seekers are making use of social media and social networks and the effect this has on job markets. Gandini and Pais draw attention to the asymmetries of information and observation where recruiters have unprecedented access to online profiles which they can use to make judgements about and filter job applicants, often without the full knowledge of job seekers about the extent to which their online presence is being surveilled or how this informs decisions about recruitment.

Winifred Poster then discusses the globalised service economy where she identifies surveillance and control initiated in Indian call centres, where actions in surveillance are met with reaction and counter-hegemonic initiatives. The evidence presented in the chapter, gathered from interviews with employers, workers and clients, suggests an overwhelming pattern of 'multi-surveillance' is taking place from a variety of new technologies. The multi-surveillance view also shows us that surveillance in the global service economy is not monolithic. Client practices sometimes vary from, and clash with, that of other elites. Each agent in the off-shoring rubric appears to monitor each other, and these same people who monitor each other can also become partners in the surveillance of others, as they find common adversaries in the global service grid.

The Chapter on 'Hawthorne's Renewal: Quantified Total Self' delves into the realms of subjectivity, just one of the layers of lives lived that new technologies and those managing their direction are beginning to pervade. Using archival materials from the Hawthorne Experiments, Rebecca Lemov explores the history of subjectivity by looking at interviews held with a range of female workers in the 1920s and 1930s to identify ways to inspire productivity, in these cases without technology, but with something akin to the nudge techniques we see in management rhetoric today. It is as though nudge has become the job of a machine now. The quantified self movement heralds the use of sensory and other devices on various parts of bodies to manage selfhood in ways that

resemble these classical experiments, but take us to a new level of psychic investment at work.

In the chapter '"Putting It Together, That's What Counts": Data Foam, a Snowball and Researcher Evaluation', Penny Andrews introduces an interesting new term for the surpluses created by data generation 'data foam'. As is also theorised in 'Deep Automation and the World of Work' as a method of labour capture, data foam is symptomatic of ongoing power relations. Andrews looks at the relationship between those who use academic researchers' labour for profit and researchers themselves, demonstrating that the data gathered by data brokers (such as the employer or publishing houses) and their control over data flows and source combinations result in new products that benefit the broker only. What does this mean for the value of researchers' labour? Andrews deals with this by looking at the abundance of metrics tricks being used today to reproduce these unequal relations. Yujie Julie Chen then examines the labour performed by Chinese taxi drivers in the rise of Didi Chuxing and taxi-hailing platform economy in China. Based on the interviews with taxi drivers in China and a detailed discussion of the emergence of an alternative taxi hailing plaform to Uber, Chen outlines the tensions arising supposed market competition between traditional drivers and platform work and taxi drivers' pushback through everyday forms of resistance. Outlining three forms of work that emerge, these being connectivity labour, datafication and infrastructural labour, Chen explores how platform technologies, paired with big data analytics and algorithms, transform the nature and processes of driving as labouring.

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Digitalisation of Work and Resistance

Phoebe V. Moore, Pav Akhtar and Martin Upchurch

In this volume's second chapter, we outline developments in the uses and misuses of technology in workplaces today and everyday forms and trade union-led resistance. There is now evidence that, left unchecked, new technologies in workplaces can lead to overwork, loss of autonomy, the blurring of lines between life and work, intensified expectations for performance and what trade unions in the early twentieth century called 'speed-up'. While factory workers and delivery and truck drivers have been subject to movement tracking for years, technologies to do so have advanced in precision and scope for investigation. Now, new technologies, usually worn directly on the body, do not only read movements and location but spot physiological and physical activities such as steps and

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_2

heart rate. Other technologies are embedded into equipment, such as computers or on desks and chairs and read heat and movement. Radio-Frequency IDentification (RFID) enabled badges even read wearers' gestures and tone of voice. Employers are even beginning to measure emotion and 'unseen labour' (Moore et al. 2017).

This chapter discusses workplace tracking, monitoring and surveillance, outlining which methods are in the ascendant as self- and other-tracking become increasingly prevalent at work. We look at cases of resistance to this, in the warehouse, in gig work and office contexts. We note everyday forms of resistance and evidence of dissatisfaction emerging via interviews held with workers in each arena. Then, we outline some examples of trade union responses. To theorise, these new processes of worker monitoring and control, we argue that workers' concrete labour is now increasingly subject to abstraction as new ways to measure our previously unseen labour become apparent and more subject to commodification in the process. In warehouse and factory work, accountability is transferred to workers but data are not transparent. In professional workplaces, this new employer prescription eliminates any possibility for negativity by highlighting wellbeing (Davies 2016; Cederström and Spicer 2015). But the outcome is the same: intensified control mechanisms over workers.

Electronic Performance Monitoring (EPM)

In the early 1990s, a US Senator on the Labour and Human Resources Committee, in hearings on the Privacy for Consumers and Workers Bill (S. 516) warned that 'unrestrained surveillance of workers has turned many offices into electronic sweatshops … electronic monitoring should not be abused…Employees should not be forced to give up their freedom, dignity or sacrifice their health when they go to work' (Collins 1991). Nonetheless, by 2010, an estimated 75% of American companies were shown to monitor employee communications and other at-work activities (Ball 2010). The estimated change in the US market use of technology to monitor employees rose by 43% between 2007 and 2010 (quoted in Schumacher 2011: 138) and we are now in

a period of what seems to be 'limitless worker surveillance' (Ajunwa et al. 2017).

Electronic performance monitoring (EPM) includes email monitoring, phone tapping, tracking computer content and usage times, video monitoring and GPS tracking. Data produced can be used as productivity indicators; indication of employees' location; email usage; website browsing; printer use; telephone use; even tone of voice and physical movement during conversation (see wearable technologies section). Perhaps, the longest history of EPM is seen in call centre work (Taylor et al. 2002; see Winifred Poster's chapter in this volume) where various types of surveillance facilitate lean working practices. Even emotion tracking is standard activity in Indian centres (Van Jaarsveld and Poster 2013). The concern is that EPM can be used to micromanage employees and invade privacy, lower job satisfaction, increase stress and lead to low-trust, negative work relationships (Schumacher 2011), all of which can lead to poor working and worker conditions. EPM has the very real potential for uses of bullying and new surveillance methods (Rosenblat et al. 2014; Ball and Margulis 2011). As Rothstein pointed out, in relation to workplace monitoring:

> At work, human dignity is denied by treating the employee as a mere factor of production with fixed capacities and vulnerabilities determining her behavior and ignoring both the worker's individuality in the face of statistical probabilities and the human potential to overcome or compensate for physical obstacles. The worker's dignity is denied when she is treated as a mechanism transparent to the view of others at a distance and therefore manipulable or disposable without the ability to confront the observer. (Rothstein 2000: 383–384; also see Gantt 1995)

Now direct productivity monitoring, enabled by software installed into work and personal computers, brings a new EPM technique. Examples include RescueTime (used in the office case study presented below), Toggl, ATracker and My Minutes. Quantification and datification introduce pressures compounding a world of work where employees are 'always on', or even 'hyper-employed'. The constant onslaught of communications and information and expectations to personally manage

work that was once done by another specialist in the company in timetabling and accountancy has led to 24/7 working lives (Bogost 2013). The 'overwhelmed employee' checks her mobile devices up to 150 times a day and suffers from information overload, inability to find time to reflect and even just to think, leading to employee disengagement and undermining productivity (Hodson et al. 2014).

The power of tracking work with EPM is in the possibilities for aggregation of 'big data'. Implicit is that the type of activity and the length of time spent on activities can be inherently linked to a qualitative judgment about a worker's performance; information that could be used in appraisals or hiring and firing decisions. Intimate performance dashboards provided by most EPM technologies incorporate contextual information obtained from tracking devices, such as levels of physical activity, level of stress or presence and absence scores. The data itself is seen as the indicator of value. However, as pointed out by Angrave et al.:

> …the process of modelling and creating dashboards and traffic lights is not value neutral but depends on dominant paradigms and perspectives within accounting and operations management, which themselves reflect ideology, politics and power. (2016: 7)

These practices are rapidly superseding other forms of management methods as data produced is seen to be a reliable indicator of productivity. New EPM then is very different from traditional methods and can have very negative consequences (Jeske and Santuzzi 2015). Reliance on metrics from tracking devices potentially dehumanises workers and the associated pressures result in biased performance evaluations; pressures for increased work or work intensification; reduction of autonomy (Bhave 2014; Haque 2015) (linked to privacy concerns); and perceived intensified control over individuals' work (Jeske and Santuzzi 2015). These pressures lead to reduction of commitment and lowered job satisfaction.

In professional settings, sensory tracking devices are often provided in wellness initiatives. In 2015, nearly a fifth of employees in Europe had access to wearable technology at work (ADP 2015). Now, one in three

companies provides wearable devices to track activity (Jiff 2016), save money (Daws 2016) and improve employees' health and happiness. The 'quantified work environment' (Bersin et al. 2016) resembles the world of athletes where technology aids people in identifying peak performance times and gaining rapid feedback. As incorporation becomes normalised, employees risk feeling excluded from programmes if they choose to opt out, where both stigmatisation and financial penalty may incur for employees who opt out (Hamblen 2015; Rosenblat et al. 2014). Is 'opting in' or 'out' ever possible in any employment relationship? Quantifying the self, in the Quantified Self-movement which started in Silicon Valley in the first decade of the 2000s, is about self-discovery and personal pilgrimages. The quantified *worker* does not have the luxury of a fully private, authentically individualised platform because their labour is ultimately accountable to the employer or client.

Moore, Roper and Piwek have researched one company's Quantified Workplace (so-named by the company) wellness initiative as part of a British Academy/Leverhulme funded project entitled 'Agility, Work and the Quantified Self' (2015–2017), where the employer at a company in the Netherlands provided FitBits, RescueTime and gamified activities to employees. Researchers noted a high rate of resistance from the Quantified Workplace study. FitBit use decreased significantly throughout the project. Three participant comments indicated concern about what personal data management were viewing, increasing to 21 in the final interviews. More than half of the participants in the Quantified Workplace project expressed concern with the amount of personal data that employers can access via wearable technology. Most participants were cautious about corporate privacy practices. In the first survey, 66% of participants agreed that consumers have lost all control over how personal information is collected and used by companies; 62% disagreed that 'most businesses handle the personal information they collect about consumers in a proper and confidential way'; 43% disagreed that 'existing laws and organizational practices provide a reasonable level of protection for consumer privacy today' (Moore et al. 2017).

In terms of legalities of wellness programmes that introduce more intimate and detailed tracking products, lawyers are warning that the use of productivity and health tracking in appraisals is a grey area. Using

wearable technologies to decide on promotions and bonuses could significantly contravene US Federal law, for example. It would draw attention to the Americans with Disabilities Act which 'prohibits employment discrimination based on health status and generally forbids employers from inquiring about an employee's health status' (Sheppard Mullin 2016). Medical data is, for the most part, protected by law and health-related discrimination is illegal. A report in the National Law Review warns employers to take note of the following when pursuing a productivity-tracking system with wearable devices:

1. The Americans with Disabilities Act (ADA) prohibits employment discrimination based on health status and generally forbids employers from inquiring about an employee's health status.
2. The Genetic Information Nondiscrimination Act (GINA) prohibits employment discrimination based on genetic information and forbids employers from asking about an employee's genetic information.
3. The Health Insurance Portability and Accountability Act (HIPPA) establishes standards to protect the privacy of personal health information, which may include information collected by an employer to track employee productivity (Sheppard Mullin 2016).

Productivity data is an area of obvious direct interest to an employer and has different legal protection but many devices can now track many aspects of workers' everyday lives. The Personal Data Protection Agency, in the country where the Quantified Workplace experiment was run, put forward a series of queries to the local data analyst working on the company's study. The Agency asked in a quite incisive manner: 'Is the relationship between an employee and employer ever actually consensual?' (ibid.). The new constant-on nature of work; the rise of algorithmic distribution and selection of work and threat of automation leading to a 'technological fix' (Silver 2003: 64–66), and the use of wearable tracking devices have become significant concerns for workers' well-being. Employers have significant leeway to gather information about employees but new technologies available for human resource management have unprecedented possibilities for what employers can know about workers, inviting questions on regulation, privacy, data protection,

work intensification and datafied, data-based decision-making. Legal discussions in this area are lagging significantly.

Delivery drivers have been tracked for decades and the introduction of satellite technologies has allowed this practice to become ever more meticulous. Domestic workers are increasingly tracked and monitored which leads to stress and unpaid work (see chapter by Moore and Hayes in this volume). According to *The Week* magazine, one UPS driver told *Harper*'s that the employer uses new metrics as a 'mental whip', noting that 'people get intimidated and work faster' (The Week 2015). The use of new wearable devices that allow location tracking and speed of warehouse work has led to rationalisation of workforces, such as in the case of a retailer, Tesco, where wearable badges tracking working speed in warehouses were demonstrated to reduce the need for full-time employees by 18% (Wilson 2013). Employee tracking in Amazon warehouses has resulted in reports of heightened stress and physical burnout. Indeed, employee health and safety usually comes secondary to lean logistics and speed of work in depot work (Mulholland and Stewart 2013).

One warehouse operative, Ingrid (not her real name), who has worked in one warehouse in Britain for 11 years, provided information about a new worn device that was rolled out in her workplace in February 2016. All warehouse work floor operatives were unexpectedly required to use the hand-worn scanner. The current researchers asked what the workers were told the devices would be used for. Ingrid indicated that management told workers the devices would provide them with information about any mistakes made and who in the warehouse had made them, meaning that they can be used to help to not do this again.

In practice, however, Ingrid indicated that the technology has been used not only to track individual mistakes but also to track individual productivity and time spent working and on breaks. Workers were told that management would hold individual consultations based on the data, but this had not happened. Instead, at a specific interval in the months that followed the devices' implementation, workers were told that people would be fired within days and it transpired that data from devices were

part of the decision-making process for who to dismiss. Ingrid was not clear how the data was interpreted, however, as seen in her response here:

> Recently they sacked two or three people, and they decided this based upon who did least work. Maybe it was in May, when things get a bit quieter at work. They sacked three people: one of them was lazy, so I understand why. But the other two were very good. A week before the sackings, the management said, 'Everyone be careful because we are going to fire someone from the temporary staff'. So everybody speeded up.

Ingrid indicated concern that the data accumulation was in fact, being rigged. In one case, she and co-workers suspected that specific people were given easier tasks during a period of amplified monitoring. She and a co-worker visited the manager's office during a night shift, when s/he was not in the office, and observed paperwork on the desk that proved some of their suspicions. Even with this possible grievance on their hands, while warehouse operatives are permitted to join trade unions, Ingrid indicated that she is not part of a trade union and that she is not aware of any membership in her workplace. In any case, no consultation was held with relevant trade unions nor with workers before the technology was integrated. Ingrid stated:

> We're aware that the tracking might be used to put pressure on us to work faster, and it might be used to sack people. But lots of us feel that we don't care anymore. Because physically we just can't do any more.

Another example of resistance to surveillance and EPM is seen in Taiwanese outsourcing firm Foxconn, where an almost 1 million-strong workforce produce many of today's technological gadgets in a production regime which 'sacrifices dignity for corporate profit in the name of economic growth' (Chan and Pun 2010: 3). Stress and psychological breakdowns, as well as physical health problems, are routine effects of such production conditions. Workers report they are 'losing their futures' (ibid: 4). Among the characteristics of Foxconn's work regime are rigid internal surveillance systems, such as identity checkpoints, frequent body searches and the use of extreme forms of quality control

(Chan et al. 2013: 109). Wearable and quantified technologies (also discussed below) range from low-tech colour-coding of uniforms to the use of fingerprint scanners, electronic smart cards and alerting devices which are central to this regime. Harmful conditions and health and safety violations leading to fires and employee suicides are also well documented (Chan et al. 2013; Bieler and Lee 2016).

The Machine Question: Work at Risk and Reputation by Algorithm in Online Platforms

David Ricardo introduced the 'machinery question' in 1821, referring to the 'influence of machinery on the interests of the different classes of society'. The 'machinery question', he indicated, centered around the 'opinion entertained by the labouring class, that the employment of machinery is frequently detrimental to their interests' (1821). Marx, in defense of the working class, indicated that 'like every other instrument for increasing the productivity of labour, machinery is intended to cheapen commodities and, by shortening the part of the working, day in which the worker works for himself, to lengthen the other part, the part he gives to the capitalist' (1867/1990: 492).

Research on the capability of machinery to carry out human-like activities started in the 1950s when a researcher first coined the term 'artificial intelligence' in a report, where the author wrote that progress can be made in getting machines to 'solve kinds of problems now reserved for humans' (McCarthy et al. 1955). The term artificial intelligence was abandoned after the 1950s as people discussed 'expert systems' and 'neural networks' (Ford 2015) but resonates with simultaneous social concern that machines could actually steal paid work from humans. Ted F. Silvey, from the National Headquarters department of education staff of the Congress of Industrial Organizations (CIO) and American Federation of

Labour (AFL), pointed out that 'machines and instruments can do almost everything except buy what they make!' (1958). He noted (1957) that:

> Instruments substitute for man's mind, just as the rest of the machine takes the place of his muscles. Machines are acquiring the skill of human beings, but they must work faster and more accurately than anything of flesh and blood—and they never tire.

In this context, trade unions were concerned in the early Western era of manufacturing that the technologies involved in mass production worked to 'trivialize' man by its 'repetitive performance of bits. His craft skills, his creativeness, his human dignity, his uniqueness were, at best ignored and at worst, stomped on', causing the 'destruction of the workers' dignity as people' (Silvey 1956: 3).

This same trade unionist also optimistically pointed out the possibilities that mechanisation would reduce the work week and work year, 'both with full wage or salary income' (1958) and claimed that 'automation promises a time when a comparative handful of people will have to work in factories at the dull, repetitive tasks demanded by mass production' (1957: 30). Silvey's optimism as well as pragmatism are remarkable: he states that 'in the long run, automation will make more jobs…but the challenge is to solve the problem in the short run, to give immediate aid to the worker whose fingers are caught in the door when it is slammed shut' (1957: 29). In the 1970s, Braverman (1974/1998) hinted at the origins of algorithmic processes as a feature of the development of machinery, indicating that 'when the tool and/or the work are given a fixed motion path by the structure of the machine into that machinery in the modern sense begins to develop' (130). The machine's ability to run itself has become almost accepted in contemporary life, but what happens when humans begin to make decisions based on the specific aspects of the machine's operations with little or no external interference?

Today, the machinery question is 'back with a vengeance' (Economist 2016: 3) because this question is infiltrating professional workplaces where all kinds of work can be increasingly automated. In 2012, the ImageNet Challenge set people to programme computers to recognise images. These 'challenges', or contests, coordinated by top researchers

and corporations became a measure of success in the field, contributed to the rapid improvement in what is called 'deep learning', and the computer's ability to recognise images has now surpassed humans. This, and other experimentation, is bringing about the realisation that tasks once considered the exclusive remit of humans are now at risk of automation, mechanisation and digitalisation. Frey and Osborne's more recent report (2013) demonstrates that both repetitive and non-repetitive jobs are now susceptible. Tele-marketers, tax preparers, insurance underwriters and library technicians are at a high risk of automation, at 0.99 probability (1 = certain). Work in the professions as health care and social work (0.0035) and recreational therapy (0.0028) are also under threat. A great deal of legal casework research can now be done by computers using deep learning algorithms (Ford 2015). Non-routine work such as driving and deciphering handwriting are now being made possible by machines (Frey and Osborne 2013: 17).

So, the threat of automation in factories has been updated by new patterns of labour selection in new work design models such as the 'sharing economy', facilitated by new methods of work selection and distribution called people analytics (PwC 2015), which facilitate a process of identity management (Ajana 2013) and what Ajana calls 'digital penetration' (2017: 3), evident in new online platforms in the demand economy (AFL-CIO 2016), where people buy and sell labour. The sharing economy or work in the 'human cloud' includes, such platforms as Upwork, ODesk, Guru, Amazon Mechanical Turk, Uber, Deliveroo and Handy which are called 'online platforms' in the Digital Single Market European Commission terminology (2016a, b). Huws (2015a, b) and Cherry (2011) label this type of exchange and work 'crowdsourcing' and Huws defines it as 'paid work organized through online labour exchanges' (2015a, b: 1).

Crowdsourcing has facilitated companies' outsourcing of labour as well as introduced new platforms for freelance and self-employed work. The Office of National Statistics in the United Kingdom reported in July 2016 that the number of self-employed workers increased from 3.8 million in 2008 to 4.6 million in 2015 (ONS 2016). The platform economy relies on self-employed contracted labour in both the UK and internationally and, as such, workers on these platforms have no access to

regular employment benefits such as health care or maternity leave. Workers have very little legal protection either and platforms are designed to reduce employer liability.

When these kinds of platforms were first introduced, workers used them to top up incomes and the work was mostly in more advanced countries. However, over time, workers with no other incomes in both the global North and South have become heavily reliant on these spaces. They facilitate outsourcing of work to the global South where the price paid for human labour is lower and labour market regulation is localised and limited (Bergvall-Kåreborn and Howcroft 2014). But now even professional tasks on these platforms are being 'broken down by their least common denominator…' and 'the way that tasks and human capital is being viewed and handled is… one that almost serves to dehumanize workers' (Cherry 2011: 30). Companies have tended to follow minimum standards, particularly, in the global South (Estreicher and Cherry 2008) and often adopt unenforceable Corporate Social Responsibility models, which affects how outsourced labour occurs.

On the 'crowdwork' (Berg 2016) platforms Amazon Mechanical Turk and Upwork, people place available job contracts online and workers contact clients to pick up work. Work is often distributed in a piecemeal fashion to various workers as part of outsourced labour. The work offered by such platforms ranges from graphic design to programming, but communication between the worker and client is usually very limited, leading to a distinct lack of transparency. This can raise ethical questions as 'workers are unable to make judgments about the moral valence of their work' (cited in Bergvall-Kåreborn and Howcroft 2014: 218). Further to this, intensified reputation self-management is standard practice in the online labour market as freelancers seek work and as employers or clients actively profile employees with the use of new technologies (Pasquale 2010; Gandini 2016; Bodie et al. 2016). The chasing and utilising of social capital to enhance and further careers and to find work and employment is not itself new, but the type of reputation formed that allows freelancers and the like to find work on online platforms is 'based on algorithmic-based third party elaboration that translated the opinions of others into reputation proxy' (Gandini et al. 2016) (also see Gandini and Pais' chapter in this volume). So reputations

are acquired through the number of tasks a worker took on board and ratings by customers. For example, Uber drivers report that if they receive customer 'star' rankings below 5.6 or 4.5 they can be fired, despite some aspects of a journey can have nothing to do with a driver's performance such as traffic and 3G or the soiling of the car by another passenger. Drivers receive no help from the firm for related issues and often receive much less income than they were promised upon becoming drivers (Brownstone 2015). The paradox and fiction of algorithms is that they are 'absent' of 'human bias' (Frey and Osborne 2013: 18). However, Bodie et al. point out that 'workers want to be treated as people, not ranked as fungible data sets or assessed as cost centres' (2016: 75).

Human behaviour profiling and resulting data allow management to make judgments about who people are as well as to predict future behaviour. Computer-generated data is expected to be reliable, neutral and to help with forecasting (Amoore 2013; Cheney-Lippold 2011). The assumed neutrality and utility of data for these purposes is what is at stake in workplace power relations, whether the workplace is one of a freelance worker or a full-time employee. Workers are increasingly easily selected and discarded; replaced and disposable in this 'profane' referencing system (Gandini et al. 2016). Reputation in the online labour market has become incredibly important for work that happens in digital spaces, so-called 'virtual work' (Huws 2014, 2013; Holts 2013) and 'digital labour' (Fuchs 2014).

Online platform work is largely unregulated, leading it to resemble a neo-Darwinist arena of uncertainty, where discrimination is fully experienced offline but is generated online, where social relations of work are masked and anonymised. Accountability is heavily skewed towards workers, which is exacerbated when casualised work is on the rise. Virtual work has already been proven to perpetuate precarity and pressures people to overwork (Huws 2014; Moore and Robinson 2016) and facilitates a process Dyer-Witheford calls 'cyberproletarianisation' (2015). The platform Upwork's website provides a link to a section called 'Am I Safe Working Here?'. The 'I', however, refers to safety for clients rather than workers. Upwork provides a Work Diary which is a billable time system recording all work completed. The diary takes a screenshot of a freelancer's screen every 10 min to verify work and counts keystrokes

during work sessions. Upwork Messages also provides an online messenger system allowing real-time discussion if desired. Upwork ensures clients their 'right to ownership of intellectual property' and will provide dispute assistance (Upwork 2016).

Amazon Mechanical Turks' Participation Agreement limits its role in the transactions between 'requesters' and 'providers', putting the emphasis on both ensuring legality of transactions and appropriate taxing. This Agreement indicates clearly to providers that: 'you will not be entitled to any of the benefits that a Requester or Amazon Mechanical Turk may make available to its employees, such as vacation pay, sick leave, insurance programmes, including group health insurance or retirement benefits; you are not eligible to recover worker's compensation benefits in the event of injury' (AMT 2014).

Present author Moore was privileged to be invited to speak at the Royal Society of Arts in 2016, where the group was writing a booklet on gig work. Mags Dewhurst, who is both an active member of Independent Workers Union of Great Britain, was also invited to speak. Dewhurst is a same-day medical pushbike courier for CitySprint UK Ltd. Moore asked her about some of the changes she has witnessed over the 5 years she has done this work. Dewhurst indicated that there is a rise in technology such as use of handheld computers (XDA/PDA like Palm Pilots) or apps—both in the courier industry and food delivery. These technologies have digitised what used to happen on paper and are used primarily for the collection of signatures to authorise pick up and collection of parcels. However, the related devices also allow companies to GPS track all couriers' movements live, as well as live process of collection and delivery at every stage. Dewhurst stated that:

> …your every move and action are tracked in a digital audit trail. This is quite different from the days when couriers used to work off paper and rely solely on the use of the radio (wallow talkie) to receive jobs. Now everything is digital there is much less freedom and much higher amount of control, thus meaning we are much less 'independent', even though our contracts say we are totally free and independent.

Moore asked Dewhurst, in her view, what is the biggest threat to workers' rights, in this context? She noted that bogus independent contractor/subcontractor contracts are prevalent in gig economy work. She indicated that the rise of digitalisation, automation and algorithmic management have risen, stating that: 'Used in combination, they're toxic and are designed to strip millions of folks of basic rights'. Moore asked: 'Which rights are being stripped, in your context of work?' Dewhurst indicated, 'All of them. The only bit of legislation that protects me would be the Equality Act, but that would only protect certain characteristics and would be hard to win anyway. Holiday pay, NMW[1], sick pay, pensions, parental leave, redundancy, tax and in contributions … is removed via IC contracts'.

Moore asked what kinds of organising she and colleagues have done, and Dewhurst indicated that they have:

> Built a branch of the IWGB UNION. This is the mechanism we have found most effective for creating change - as it helps consolidates a fragmented community and gives people hope and strength in numbers and through collective fights. So far we have won three major pay rises of 20-30% at London's big three courier companies; City Sprint, Ecourier and Absolutely Couriers. We also won at Gophr a small app company but they recently backed out of the agreement. We are also in the process of challenging our IC status in the courts at four of the big courier companies. We've also had limited success with the Deliveroo strike in August. Although we didn't manage to stop the new pay structure coming in, we helped the workers escalate their strike, created loads of positive publicity and helped to shine a big light on the gig economy and exposed the contradictions inherent in it — which are all present in the courier industry as well obviously.

Moore asked what more can be done to organise and reform work and what is stopping people from doing it? Dewhurst indicated that the difficulty with unionising gig economy workers is that it is hard to get access to workers who are on the move constantly, where their work is scattered across large areas. Dewhurst noted that 'if we can't get legislation to force companies to let unions in from the off, which is highly

likely, then unions need to try harder'. She noted that a problem is that unions often have a very negative attitude that only serves to prevent action. Dewhurst related that she often hears big unions complaining about anti-trade union legislation, lack of participation and blames the government for why they are not winning. In her mind:

> …this is the wrong attitude and is a recipe for inaction and is defeatist. If this is the attitude, of course nothing will happen and of course you won't convince anyone to take action. What was great about the Deliveroo strike was that it was autonomous: the drivers did it by themselves, we merely assisted once it got going. It exposed the failings of government, business, and the unions!! Now slowly, the big guys are waking up and gearing up but I doubt much will happen. As ever we will rely on workers to have the courage themselves to take action and force change and that is where the real power lies.

Trade Union and Legal Responses

This section outlines and trade union responses to the types of worker surveillance and monitoring outlined above. UNI Global Union has actively campaigned for workers' digital rights since 1998. Its trade union affiliates recognise how the use of technology has facilitated a 24/7 working culture. The UNI Global Union ran its fifth annual work–life management fortnight from 7 to 20 October 2016, the theme of which was: *Achieve more with less stress* and focuses on technology and work–life balance. Trade unions recognise that it is not technology *in itself* that has fostered the most negative aspects of how technology is applied in the workplace, but it is the *use* of these technologies. Previous to this, research carried out by UNI Global Union affiliates in 2015 demonstrated that the negative aspects of 24/7 mobile working lifestyles arise not only from the presence of technology at work but also because of workplace management cultures. In Community Business' survey (2012) of workers, almost a quarter of people said they use mobile devices and technology for work outside office hours because their bosses expect them

to. Almost one-fifth said it was because their clients expect them to. So, it seems that it is not phones themselves that are preventing workers from relaxing, it is other people. Workers may need to do early morning or late-night conference calls, but they may be happier to do so if flexible working patterns let them cut their commuting time or juggle home and work commitments. Office workers may need to think about their own habits too. One reason colleagues and clients can so easily reach us out of hours is that those being contacted are already on their tablets or phones, using social media or checking the football scores. People are more likely to hear the ping of an email arriving, so they more likely to deal with it. The sender then assumes individuals are happy to work out-of-hours and bombards them even more in future. So it is not just employers and clients who need to learn the lessons about technology. Presenteeism (either at the desk or at the end of the phone), and how we can work most productively, is also a process of workers' recognition of the pressures we are facing and pushing back which, as we have observed above, is already happening in various contexts.

Trade unions and employers' organisations in many countries are increasingly debating or proposing guidance, policies and codes of practice on workplace digitalisation and have begun to discuss proposals for updating workplace-specific data protection and privacy legislation. Despite the lack of multi-employer bargaining on privacy and technology use, there are examples of where trade unions have successfully negotiated with legislators and employers, or won judicial victories, in defence of workers' rights to privacy and the right to be protected against the risks that come from poorly regulated or managed use of digital technology encroaching on workers' private lives. A notable example is from Belgium, where the 2002 National Collective Agreement on protection of employees' private lives (No. 81) with respect to controls on electronic online communications data (earlier agreements covered matters such as workplace video monitoring) called for information to be provided at both individual and collective level. Trade unions in Belgium were instrumental in getting government backing for 'well-being at work' legislation in 2014, just as Swedish trade unions played a key role in getting the government to pass a new 'health and safety, stress and violence' law in 2014, in an attempt to mitigate against the most

egregious consequences of technology-related stress in the workplace. The Argentine trade unions impressed upon their government the need to issue a 'decree on health workers and stress' in 2015, while the French trade unions presented a united front in support of the 'right to disconnect' clause within the El Khomry labour law reforms of 2016 to tackle work-related burnout from stress based on digital technology spilling over into employees' private lives.

In 2001, the Confederation of Danish Trade Unions (Landsorganisationen i Danmark, LO) and Danish Employers' Confederation (Dansk Arbejdsgiverforening, DA) adopted a 'basic agreement' which concerns new control initiatives at the workplace. It states that any new control arrangements or mechanisms at the workplace must be announced at least 2 weeks prior to their introduction. In Greece, the National General Collective Agreement refers to protection of personal integrity requiring: 'contracting employer organisations [to] underscore to their members the obligations for enterprises as regards the protection of the individual relative to matters of a personal nature, aimed at protecting workers' personal integrity'. In Germany, the Federal Constitutional Court and Federal Labour Court ruled in favour of the trade union position that any 'secret' monitoring, i.e. without the worker's consent is an intrusion into a worker's private life.

At the international level, trade unions have focussed on the issue of workplace privacy. The central 'basic agreement' between the Norwegian Confederation of Trade Unions (Lands-organisasjonen i Norge, LO) and the Confederation of Norwegian Business and Industry (Næringslivets Hovedorganisasjon, NHO) contains an agreement on monitoring activity in enterprises (there are similar rules in other basic agreements between social partner confederations). The agreement stipulates a range of conditions under which monitoring and control measures may be implemented by the employer, emphasising the principles of objectivity and proportionality. The introduction of such measures should be discussed with union representatives as early as possible prior to implementation. Employees should receive notice of the proposed measures before they are implemented (on the objective of monitoring, its consequences, etc.). Trade union representatives should be consulted regarding handling and registration of the information acquired through such monitoring. The agreement also refers to the Act relating to the

processing of personal data. If provisions of the agreement are ignored prior to implementation of measures, the measures may be deemed unlawful by the Labour Court. So, we see that the integration of new technologies into workplaces has been neither neutral, nor undisputed process. Worker and their representatives have carried out both passive, everyday and more direct forms of resistance. Now, we conclude that more must be done in the face of the risks and dangers that we face at work resulting from new technologies of control.

In Conclusion

Even the World Economic Forum is publicly expressing awareness of the transformations that new technologies are creating for current social life. Founder of the WEF, Klaus Schwab (2016), writes that:

> We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society.

Industrie 4.0, Schwab goes on to say, is 'characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres'. We argue that these incredible transformations, which are seen to be just on the horizon, should be discussed seriously in corporate, trade union and employer association circles, considering the significance of the new technologies available to employers and which are dominating labour markets in some areas, as we have detailed above.

In conclusion, we outline a suggested code of conduct that emerged from a UNI Global Union conference in Brussels in 2000 on the legal and practical issues raised by the use of electronic media at work. Based on contributions made at the conference, and the experience of companies and unions that have already implemented 'electronic facilities'

agreements, UNI drew up a code of practice on online rights at work, designed to 'establish an internationally recognised yardstick of what constitutes good practice'. The code is in four parts:

a. *Trade union communication*. Works councils, trade unions and their representatives should have the right to access and use enterprise electronic facilities for works council or trade union purposes, both internally and externally. This includes the right to send relevant information to all employees. Employees should have the right to use enterprise electronic facilities to communicate with their trade unions, works council and their representatives. This part of the code seeks to extend to electronic means of communication the provisions on workers' representatives' facilities contained in the 1971 ILO Convention 135 and Recommendation 143. It notes the nature of communication has changed, with employee representatives in different branches of a multinational company now needing to be able to cooperate and coordinate work across international borders. Moreover, an increasing number of employees are working from home, from remote telecentres or on the move.
b. *Non-business communication*. Employees should be permitted to use enterprise electronic facilities for non-business purposes, both internally and externally, provided that this is not detrimental to their work responsibilities.
c. *Monitoring and surveillance of communication*. The employer is obliged to undertake not to subject employees' use of the enterprise's electronic facilities to clandestine surveillance and monitoring. Communication should be subject to surveillance and monitoring only if: this is permitted by collective agreement; the employer is legally obliged to do so; or the employer has reasonable reason to believe that an employee has committed a criminal offence or serious disciplinary offence. Access to surveillance and monitoring records relating to individual employees should take place only in the presence of a trade union representative or a representative selected by the employee. UNI states that these provisions take into account various international and European law and guidelines on workplace privacy.

d. *Conditions for use of electronic facilities*. Employee rights to use enterprises' electronic facilities should be subject to a number of conditions: communication must be lawful and not include defamatory or libellous statements; enterprises' electronic facilities shall not be used as a means of sexually harassing other members of staff or spreading offensive comments or intolerance; and the employer can require a disclaimer when employees are communicating internally and externally, making clear that the views expressed are those of the author alone and not those of the enterprise.

We suggest that this kind of code of conduct should be updated to deal with Industrie 4.0 issues such as employers' access to health information made available by FitBits and other similar devices, storage of data, transfer of data, data protection, privacy and worker access to the data they generate.

In our new world of work, people are faced with a range of new issues and pressures introduced along the continuum of machinic possibilities. From electronic performance monitoring, the threat of automation, to algorithmic management platforms, we are faced with a range of urgent questions. What should my boss or client know about me? Who decides what they know and should know about me? What protections will exist in a world where it is increasingly difficult to switch off and log out? Technologies like Olivetti Research's Active Badge and successors such as the Sociometric Badge and Wearable Sensor Badge can do far more than a traditional swipe card. It can trigger automatic doors, transmit wearer identities and forward telephone calls. Some can also record workers' movements, speech, proximity and interactions, and analyse voice patterns and non-verbal cues to deduce mood and interpersonal influence (Lindsay 2015; Mohan et al. 2009: 45). In early 2016, employee presence recorders were attached to desks in *The Daily Telegraph* newspaper offices without employee consent, which was received badly by the employees. Ironic, really, the journalists thought, as they should be on the 'beat' to get good stories, so why was their desk-time being monitored? These workers were in a good position to do something about it, the OccupEye devices were removed after journalists publicised the issue widely (Mance 2016). In another example, an employee was told by her

US employer to keep the GPS tracking device on her phone switched on even when she was out of office hours. The employee was fired for disabling it out of hours. The employee sued her employer for economic and non-economic damages (Kravets 2015). The potential for displacing management accountability for workers' stress levels and the support for decision-making on redundancy on the basis of data is very real in these contexts. As we show above, workers are not passive agents during this period of change and have already begun to resist the related pressures that new forms of tracking and monitoring introduce, from 'art-houses to warehouses' (Moore and Robinson 2016: 2778). What will happen next depends on how transparent datafication processes are introduced in workplaces, how inclusive communication is, and the ever-important role of trade unions in this process.

Note

1. National Minimum Wage.

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Deep Automation and the World of Work

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Recent technical advances in digitalisation, robotics and artificial intelligence (AI) have seen a flush of applications in the world of work. The technologies span interactive web-based communication such as social media, as well as 3-D printing, wearable self-tracking devices, autonomous cars, smartphone apps, machine learning (ML) and mobile robotics (MR). These developments are conjoined with an expansion of computer algorithms, which have a triple use of predicting behaviour based on the stored data and flowcharts, recording performance against targets and enhancing the flexibility of robots. Various terminologies have been applied to the new developments. Phrases, such as 'gig economy', 'app economy', or 'platform economy', are now applied to the reorganisation of work, whereby services can be ordered through smartphone apps. which range from delivering food, hiring a taxi, renting

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_3

a walk for your dog, or booking a night's bed-and-breakfast accommodation.[1] Those who own and control access to the app. provide no service other than linking consumer and worker, while the worker is not employed by the app. but is (albeit controversially) 'self-employed'. Some predictions suggest that the technical advances mean that almost half of all jobs in the USA may be under threat of disappearance in the next two decades (Frey and Osborne 2013). Therapists, choreographers, surgeons and social workers are recorded among the occupations least likely to lose their jobs, while clerical workers, telemarketers, watch repairers and librarians are most likely. The combined processes have been suggested to be akin to 'deep automation' whereby society is transformed with the introduction of new social classes in a different type of economy (W. Brian Arthur 2011). The dramatic transformation in work is taken further when considering robotics and AI, with one popular commentary predicting that we are entering an era 'defined by a fundamental shift in the relationship between workers and machines … machines themselves are turning into workers, and the line between capital and labor is blurring as never before' (Ford 2015: xii). A vision of technological 'Singularity' is apparent, whereby our intelligence, it is argued, would become 'non-biological' and creativity would be unbounded by human limitations. Machines would dominate production through processes of self-improvement, re-writing their own software to outstrip the functional capabilities of the human brain (Kurzweil 2005).

Many of these visions present a potentially catastrophic vision for human labour, and scholarly analysis of the type of society that digitalisation and associated aspects of 'deep automation' might usher have been widespread. Most prominent, is the view that we are moving towards a society based on the immaterial labour, whereby material production has evaporated into the ether of a weightless world. Instead, we are becoming bounded by a world where power lies 'both everywhere and nowhere', dominated by service work and immaterial labour embracing universal cultural 'products', knowledge and communication (Hardt and Negri 2000). It is a new era where the accumulation of knowledge usurps accumulation of capital as the driver of the system, and makes computerisation and digitalisation 'different' from other technologies, such as the telegraph, telephone or jet engine, which have

similarly condensed time and space in the past. Indeed, the new alleged immateriality challenges the classical Marxist view of value creation through the labour process. For if value creation is now to be both 'free' and a 'weightless' product of culture and knowledge, rather than of the exploitative interaction between the forces of production and the social relations of production, then are we also to move to a world where human labour becomes redundant, where 'knowledge-driven production tends towards the unlimited creation of wealth, independent of the labour expended.' (Mason 2015: 136).

We also recognise that prospects for resistance to new technology and automation are integral to capitalism, precisely because technology is not a neutral, exogenous factor for change, but is rather a tool for capital that will be utilised in a double dynamic–to boost competitiveness and to control or suppress labour autonomy. Contemporary examples of resistance in the UK illustrate this point. They include the unofficial stoppages by dockworkers in the 1970s against the technology of containerisation which threw them out of work. Prior to containerisation ships spent almost half their time in dock, and the sacks and pallets that contained the goods were taken off ship by crane and hooked ashore by individual dockworkers. Containerisation allowed for mass transit via overhead platforms, onshore storage of goods and direct loading to lorries and trains. It also required deep water ports to accommodate larger ships using economies of scale. Consequently, many small ports closed or work shifted seawards away from river inlets to deeper water. The number of dockworkers in the Port districts of east London, for example, fell by 150,000 in a ten-year period between 1966 and 1976 (El-Sahli and Upward 2015 p. 2), and the class composition of the area changed accordingly. A vivid example of the immediate impact of the introduction of new technology also came in the 'old' media in the 1980s as hot metal compositing and typesetting was replaced by computer-based digital input. The Wapping dispute in 1986 followed the defeat of the miners a year earlier and was led by Rupert Murdoch against the traditional print unions (the journalists' union, NUJ, had already voted to support the move to the new plant, the few dissenting voices were also sacked by Murdoch). 5500 men and women, working on Fleet Street, were dismissed as they struck against plans to shift newspaper production

(of *The Times*, *The Sun* and *The News of the World*) to the new plant in London's east end docklands. The new plant was fully geared to using new technology and the solidarity picketing at night near the gates of the plant proved unsuccessful in stopping Murdoch as he brought in scab labour with support from the electricians' union EETPU. Disputes such as this proved to be defining moments in creating new ways of producing and organising work. Spirited resistance from collectivised labour, however, has not always been enough to prevent technological change.

This chapter seeks to explore the technology driving deep automation, but also to critique the academic debates that have arisen in its aftermath. A classical Marxist perspective is employed, first to review the relationship between technology, capitalism and the labour process, and second to explore the evidence for claims that digitalisation and deep automation means we are moving to a weightless world of work. Having briefly reviewed the main perspectives on technology within historical frames in our Introductory chapter, we can also begin to ask a key question. That is to what extent is the contemporary new automation technology, spawned from advances in computerisation and digitalisation different from, or the same as, other technologies? To help provide an answer, we first review debates about digitalisation and deep automation, before examining the evidence of change.

The Early Challenge of Digital Automation

The first computers, originating from tabulating machines but with digital technology, began to be developed at the end of the 1940s. It was an incremental development, the adding, sorting and tabulating functions of tabulators were enhanced by electronics and circuits made from vacuum valves. Production in the 1950s was dominated by firms such as International Business Machines (in the USA), who were market leaders in punch card tabulating machines invented by company founder Herman Hollerith in 1890 (see DeLamarter 1986, for a critique of IBM's market dominance). It was not until the late 1960s that the first computer-based information systems began to enter the workplace. This was spurred by the continuous development of integrated circuits on

microchips, which entered the mass production stage after being used in the US Minuteman missile and Apollo space programmes. The early workplace computers were confined to a whole room in terms of size, and it was not until 1965 that a free-standing computer the size of a typewriter, the *Programma101*, was developed by the Italian company Olivetti. Olivetti had managed the technological breakthrough with the development of a programmable magnetic card, the forerunner of the 'floppy disk'.[2] Mass production and mass usage of desktop computers did not take place until the late 1980s, spurred by further advances in microchip technology and lowering of costs.

Alongside the rise of computerisation, the immediate post-war period also saw the growth of robotics and associated technologies of artificial intelligence (AI). If we define a 'robot' as a machine with flexible moving 'arms' we can record that the first such mechanised mannequins or musical automata were recorded as long ago as the third Century BCE. An early humanoid robot, blowing a trumpet, was made in 1810 by Friedrich Kaufmann in Dresden. However, the construction of more complex and autonomous robots, programmed to mimic human movement and neural responses, is extremely difficult, and is linked to developments in artificial intelligence. The first electronic and autonomous robots were made in Bristol, England by William Grey Walter in 1948, and it was not until 1954 that a programmable and digitally computerised robot—*Unimate*—was made in the USA by George Devol, which was subsequently used by General Motors to lift and stack hot metal in its New Jersey factory from 1961 (Waurzyniak 2006). The link with AI focusses on the robot's ability to 'think' in increasing degrees of complexity which mimic and even surpass human brain power. We will discuss robot 'thinking' as a form of consciousness later in the chapter but in the early days of development such 'thinking' was measured by the degree to which the robot or computer passed the 'Turing Test' (after the celebrated British computer scientist Alan Turing). The test is based on the proposition that a machine would be able to think if it could hold a conversation that was indistinguishable from one with a human being (Turing 1950). In purely technical terms, the prospect of a world where machines did all the work (computers, robots, AI and algorithms) has been termed a state of 'technological Singularity' by commentators

following the Hungarian mathematician Neumann János Lajos (John von Neumann) from as early as the 1950s. Such a world would envisage not only human-less factories and paper-less offices but also driver-less cars, and homes with robots fulfilling housework and other domestic chores.

As its usage spread through the 1950s and 1960s computerised automation began to be presented as a fundamental break with old technology, allowing for a different world of work based on cybernetics and its associated feedback loops which enabled more efficiency in decision-making. Excitement with new technologies at the time infected political discourse, famously with the speech given in 1963 by the leader of the British Labour Party, Harold Wilson, who called for a new scientific revolution based on the computerisation, automation and the 'white heat of technology' so that social democrats could 'replace the cloth cap [with] the white laboratory coat as the symbol of British labour'.[3] Alvin Toffler's (1970) best-selling *Future Shock*, predicted a massive transformation of work, entailing the deconstruction of the 'traditional' job, or the introduction of more leisure time for workers in aggregate as work 'collapsed' and the unemployed drifted into leisure. During the 1970s, the fashion for predicting a 'leisure society' embraced sections of the trade unions, with the 1979 publication of *The Collapse of Work* by Clive Jenkins and Barry Sherman of the UK white-collar union ASTMS. In academic circles Daniel Bell's *The Coming of Post Industrial Society* in 1973 predicted a society driven by new 'intellectual' technology with scientists and engineers in occupational ascendancy. Bell's vision was expanded by Jeremy Rifkin two decades later in 1995 who foretold the 'end of work', and by André Gorz's postulations of the end of a 'wage-based society'. The common denominator in all these studies over a 30-year period was an emphasis on the rise of 'knowledge work' and its replacement of manual labour and the 'traditional' working class. Manuel Castells, in his monumental trilogy *The Information Age* (1996), reinforced the tendency towards technological determinism and placed information technology as the *root* of modern social change, arguing that the net replaces hierarchies as the dominant form of social organisation, and the individual constructs her self-identity within the same technologically based process.

However, the predictions of a brave new world heralding the end of work or a leisure society did not materialise. Average working hours in the advanced industrial economies fell considerably in the immediate post-war period from 1950 to around 1980, but since then, as computerisation has become a widespread feature of work, we find that the downward trend has been reversed and in many countries (such as the United States) has shown a tendency to *increase* (Lee et al. 2007: 32; Pradella 2015).[4] Second, any leap in productivity, deemed necessary for digitalised automation to enable the end of work, has also failed to transpire. There will be an increase in organisational and worker productivity after the introduction of newer forms of ICT, as there was in the late 1990s, or from putting more of the business online. However, such boosts to productivity appear to be unsustainable (Henwood 2003). Once the employee has learnt how to use a computer and email, for example, the boost in her ability to process work more speedily subsequently plateaus. As with working hours, the evidence over the last two or three decades would suggest a *worsening*, rather than improving trend. US Conference Board data analysed by the economist Michael Roberts, shows us that between 1960 and 1980 average productivity growth per year in advanced economies was slightly over 4%, it averaged approximately 2% between 1980 and 2000, but fell further to 1% and less after 2000.[5]

We can point to reasons for the failure of digitalised automation in its first flush to produce either a leisure society or a great leap forward in productivity. First, capital has no incentive to introduce any labour-saving technology for benevolent reasons that may enhance the public good. Individual employers will need to recoup the cost of investment in new technologies by ensuring the necessary reduction in unit labour costs is achieved. As we have already described, the introduction of technology within an enterprise will also induce a tendency over time to reduce surplus value as capital-bias takes effect, and so to maintain competitiveness with its rivals an individual capital must use countervailing tendencies, such as extending the working day, or intensifying work. The industrial sociologist John Child elaborated on this and concluded in his review of the evidence published in 1975 that computerisation was used by employers *not* to reduce work hours but

rather to extend routinisation of tasks by digital means so that the 'logic' of advanced information systems 'would appear to extend the routinisation, indeed bureaucratisation of work to clerical and even managerial levels where this may hitherto have been absent' (Child 1975: 149). Child's initial findings of de-skilling and routinisation were confirmed by many others within the labour process theory school of analysis during the 1980s and 1990s (see Boreham et al. 2008 chapter 'Digitalisation of Work and Resistance' for a review). Second, it is not the case that there is ever increasing supply and demand for new technological innovations. The 'runaway' scenario, discussed in our Introduction, is severely tempered by the rigours of the market, which can be saturated and constrained by personal income restraints and income inequalities. The 'adoption' rate of many new technological innovations aimed at consumers illustrates this perfectly. There is usually a sharp upward curve in adoption rates of new technologies, followed by a plateau effect as demand is saturated and new products, sometimes but not always upgrading the earlier ones, enter the market. So the post-war boom in cars, refrigerators and landline telephones flattened out in advanced western economies by the 1980s. Similarly, the 1970s boom in credit cards and colour televisions lasted just two decades.[6] Is there any reason to expect that consumer behaviour towards smartphones and digital wearables will be any different?

Irrespective of the clear miscalculations of the anticipated impact of computerisation and computerised automation in its first wave of development, we have seen new debates and predictions arising from the second wave, associated with the internet and further advances in robotics and AI. It is to these debates that we now turn.

The Second Wave of Digital Automation

The second wave of digital automation places increased use of information networks at the centre of a (new) new transformation of work. This new era of digitalised automation has variously been called Industry 4.0 or the 'Second Machine Age' (Brynjolfsonn and McAfee 2014) to indicate a departure of historic significance such as a fourth industrial

revolution. It is worth rehearsing the speed of events. The onset of everyday usage of the internet (at least in the Global North) began as the first text message was sent and received two decades ago. Hypertext enabled web-based communication, and was created in 1989, the Google search engine appeared in 1998, Facebook in 2004, and YouTube in 2005. Twitter was launched in 2006, but now records over 600 million daily tweets, while Facebook recorded its one billionth user by October 2012.

This second wave was accompanied with academic analysis which introduced the concepts of digital, immaterial and free labour. Indeed, a new lexicon entered academic discourse on the crest of this wave. The 'digital' or 'gig economy' has become a mixture of computer-based networks serviced by 'digital artisans', producing and distributing information and knowledge for free as part of a 'shared' or 'gift economy'. There is no doubt that such platform-based services, for example, often linked to home-based crowdwork, are expanding. A recent report from researchers at the University of Hertfordshire, for example, found that crowdwork was 'growing fast' across its selected European countries, with 'evidence that this model is spreading to other diverse areas including health services, teaching, legal services and a wide variety of manual and maintenance tasks' (Huws et al. 2016: i).

Much of the driving force for the new discourse and related aspects of 'immateriality' came from a theoretical standpoint associated with an autonomist or anarcho-communist tradition. Some of this vision is drawn from the *operaismo* approach of the Italian autonomists of the 1970s, in which society is portrayed as a 'social factory' where work has shifted out of the factory, 'thereby setting in motion a truly complex machine' (Negri 1989: 92). Paul Mason (2015: 218), in tangent, links the concept of the network society to the work of the early Russian Bolshevik Alexander Bogdanov. The ideological ties with Bogdanov come from his philosophical outlook promoting the concept of a society based on knowledge and integrated systems. *Proletkult* was constructed by Bogdanov as an effort to raise the scientific and technical education of ordinary workers to a level whereby a future communist society could be introduced on the foundation of such knowledge-driven inter-linked systems.[7] Michael Hardt and Toni Negri in *Empire*, take the concept

further and describe an epoch of 'postmodernisation' in which material production has evaporated into a weightless world. In this perspective, the 'cultural' aspects of labour power become central to the process of accumulation. As Tiziana Terranova (2000: 33) argues, cultural and technical work is integral to the internet, it is free in that it involves 'the activity of building Web sites, modifying software packages, reading and participating in mailing lists, and building virtual spaces on MUDs and MOOs'.[8] Rather than create a new swathe of leisure, however, as was predicted in the earlier debates, the boundaries between work and non-work might become blurred, as digital communication (e-mails, smart phones etc.) means that we can never 'switch off' from work.

Coupled with the blurring of work and non-work is an association between an increasingly digitalised economy and precarious labour. Nick Dyer-Witheford, in *Cyber-Proletariat*, proposes a 'post post-*operaismo*' perspective 'taking as its starting point neither 'worker' nor 'multitude' but 'proletariat' whereby the proletariat, induced by cybernetics, embraces workers beyond the workplace as the key transformative agency' (Dyer-Witheford 2015: 12). We find also that mainstream management theorists have leapt upon the rise of networks based on the internet and digitalisation as an opportunity to re-invent organisational decision-making structures in the workplace to the advantage of capital. Thus, Web 2.0 in the workplace offers opportunities to 'flatten hierarchies and promote open and egalitarian workplace arrangements' (Attwood-Charles and Schor 2015). Such arrangements are not, however, designed to challenge management prerogative, but are rather intended to tap into worker creativity under the guise of 'post bureaucratic' management and corporate competitiveness.

Proponents of post-modernisation, or post-capitalism refer to Marx's 'Fragments on Machines' in the *Grundisse*. In this work, which is essentially a series of notes recorded by Marx before he produced *Das Kapital*, Marx refers specifically to the potential of mechanisation to dominate the production process. The machine appears as an all-powerful force, both in fragmenting the input of the individual worker and engendering a subservient relationship to technology through the division of labour.

> But, once adopted into the production process of capital, the means of labour passes through different metamorphoses, whose culmination is the machine, or rather, an automatic system of machinery (system of machinery: the automatic one is merely its most complete, most adequate form, and alone transforms machinery into a system), set in motion by an automaton, a moving power that moves itself; this automaton consisting of numerous mechanical and intellectual organs, so that the workers themselves are cast merely as its conscious linkages. (Marx 1973)

Marx, however, foresaw mechanisation of the production process not just as a conceptual end-point of the logic of capital accumulation but also as a driver of alienation, after which liberation could only be achieved by workers taking back power and control of production. Those in the autonomist tradition, however, tend to leap to this end-point without assessing the social upheaval and revolutionary process that Marx insisted upon. Power is assumed without taking power in a utopia of 'fully automated luxury communism'. As such, there is an implied chronological inevitability of transformation within the autonomist/anarcho-communist/post-capitalist interpretation. Rather than challenge capital directly through revolution, as Marx argued, the power of capital in this vision is subverted in diffuse forms, either through networks of the dispossessed, or in its reformist version, through processes of state investment in new technologies supported by ever-shorter working hours and a universal basic income (Srnicek and Williams 2015). Marx's associated premise of 'communal production' is then translated as a progressive outcome of cyber-inspired 'full automation,' rather than as an intended outcome of workers throwing off the shackles of capital and taking control of the means of production.

Furthermore, *en route* to the new epoch of post-capitalist utopia, it is also suggested that the accumulation of knowledge usurps the Smith/Ricardo/Marx view of the accumulation of capital as the driver of the system. Such a world, Richard Barbrook (1998) argues, allows many workers to 'escape from the petty controls of the shop floor and the office'. Rather than being dependent on a single employer, office space may also be shared in new co-working spaces, where digital artisans, developers, designers and translators hire a space to conduct their work

activity that is marketed across the ether. Capitalism, in this view, shifts from the factory and the collective workplace for its wealth creation to one based on the accumulation and dissemination of knowledge of individuals through the internet. Hence, a shift from 'material' to 'immaterial' labour. Of course, such a concept of 'immateriality' remains open to question. Rather than see a dispersal of power associated with the networked digital economy we have seen a *concentration* of digital capital. Microsoft and Google dominate the industry through processes of exclusivity and buying-up smaller competitors. The smartphone app. company Uber has sought to assume market dominance at the expense of small taxi companies dependent on a switchboard and short band radio rather than an app. Facebook are now owned by venture capitalists and have swallowed WhatsApp, while Google has bought YouTube.[9] More tellingly, rather than being 'weightless' or 'immaterial', the production of services and products remains rooted in the material circumstances of the workers that produce them. This is no more apparent than in the case of the ultimate example of 'weightlessness', that of cloud computing, which rather than being ether-based is housed in energy-hungry mainframe computers owned by corporate giants such as Google. As Cook (2012) pointed out in a report prepared for Greenpeace: 'If the cloud were a country it would have the fifth largest electricity demand in the world'. Neither is the concept of 'free labour' without its problems. As Diane van den Broek has argued in her critique:

> digital labour is neither free or immaterial, because it is not the content of labour itself, but rather its relationship with capital that gives it 'weight' and value…., labour remains heavily bound by an employment relationship and a labour process, whether work is performed in cyberspace or other more 'grounded' locations. Indeed, given the mutual dependency between wage labour and capital, both concepts become meaningless without the other. (Van den Broek 2010 p. 123–124)

This was only too well recognised by cyclists employed as part of the 'platform economy' when working on food delivery in London for Deliveroo. It was by collectively organising and taking strike action in 2016 that the cyclists forced a decision by Employment Tribunals that

they should be considered as 'employees' rather than as self-employed contractors. A similar legal decision judged that the 40,000 Uber taxi drivers in the UK are also workers and not self-employed. The tribunal ruling in October 2016 came despite the Uber employers arguing their case that the company was merely a technology platform and not a transport business.[10] Workers in 'shared' labour spaces, often utilising their creative labour, also suffer similar material and exploitative treatment from capital, prompting German unions to begin to organise such 'crowd workers' in Berlin (Knaebel 2016). However, it is not only in the field of digital labour that deep automation has occurred in this second wave. Progress has also been made in the field of robotics and artificial intelligence. It is to this that we now turn.

Robotics, 3-D Printing, AI and Algorithms

In his book *The Rise of the Robots* author Martin Ford depicts:

> a new era that will be defined by a fundamental shift in the relationship between workers and machines. That shift will ultimately challenge one of our basic assumptions about technology: That *machines are tools* that increase the productivity of workers. Instead, machines themselves are turning into workers, and the line between the capability of labor and capital is blurring as never before. (Ford 2015)

The reasons for the great leap forward in robotics and another computer-based technology such as 3D printing identified by Ford are twofold. First, is the technical progress made in computing the algorithms necessary to enable robots to recognise shapes and images in both two-dimensional and even three-dimensional form. This enhancement in visual perception allows for the robot to determine the position and shape of a box, for example to be better able to handle and stack the box. It allows for an expansion in the ability of a robot to work in a warehouse or at the front end of retailing or services such as fast food serving. Second is the advances made in 'cloud robotics' which allow for robots to remotely access computer programmes and images from a central

computer location without having to carry a programmable pack. This will make the robot lighter and more mobile and more speedily adaptable to new tasks guided by the cloud computer. These two advances go alongside mechanical innovation which allows for robots to imitate the precision of the human limb, enabling a robot to perform such precise operations as laser eye surgery.

Combined, these innovations have led to an impressive growth in the number of robots made for industrial, agricultural and domestic purposes. Indeed, so much is suggested of the potential for robots' advance that MEPs in the European Parliament commissioned a report (European Parliament 2016), and consequently called for comprehensive rules for how humans will interact with artificial intelligence (AI) and robots. The fear expressed by the politicians is that advances in AI could elevate robots to the status of an electronic 'person' with rights and privileges in law. In terms of numbers, the International Federation of Robotics (IFR), report that more than a quarter of a million industrial robots were supplied in 2015, with China operating 27% of the total.[11] Robot sales have increased in the Asian markets at a great rate, with the highest robot density recorded in South Korea, but also at a lesser rate in the USA and Europe. The only country in Europe which saw a decrease in sales in 2015 was the UK. Within manufacturing, they have been used in China on an increasing scale in batch production as an alternative to a diminishing pool of labour. As robot costs decline, and real wages rise in the Chinese industrial districts, the 'payback' period for capital for investment in robots has fallen (Bland 2016).

In the western industrialised nations, both robots and 3D printing have allowed for increased factory automation and lower unit costs in more advanced mechanical operations, such as automobile assembly, leading some companies to consider 're-shoring' production after decades of 'off-shoring' to cheaper labour areas of the global economy.

Advances in robot technology might lead us to the conclusion that predictions of 'Singularity' are near. In this world, our intelligence would become 'non-biological' and creativity would be unbounded by human limitations. Machines would dominate production through processes of self-improvement, re-writing their own software to outstrip the functional capabilities of the human brain. A parallel phenomenon to

Singularity would be the rescheduling or even destruction of Marx's labour theory of value. This is because of an assumption that the marginal cost of production will be driven towards zero, as 'stuff that can be made with tiny amounts of human labour is probably going to end up being free, shared and commonly owned'. (Mason 2015: 164). This 'post-capitalist' utopia (or dystopia), challenges the permanency of the labour theory of value (whereby all added value is created by human or 'living' labour) by suggesting that the organic composition of capital (enhanced in this instance by the absolute amount of capital enshrined in robot and AI form) can rise so much and to such an extent that human input is negligible or even absent from the production process and surplus value then shrinks towards zero. An orthodox economic explanation is offered for this phenomenon by Carl Shapiro and Hal Varian (1998) who suggest that information is costly to produce but subsequently cheap to reproduce. The cost of producing the first copy of information may be substantial, but the cost of producing (or reproducing) additional copies is negligible. It is in this 'reproduction' phase that the marginal costs associated with digitalisation may tend towards zero as 'economics of abundance'. The scenario of Singularity does, of course, signal a complete collapse of human employment, a possibility that has excited the imagination of many commentators in both the academic and journalist communities. Few jobs or occupations would escape the ravages of computerised automation. While most routine jobs would disappear, the destruction would also overlap into professional work. Doctors, for example, may be replaced by smartphone apps that diagnose a patient's symptoms and robots that perform operations (Kirkup 2016). The collection of big data and its processing by algorithms (machine learning) may enable correlations of behaviour, genetic disposition, or symptoms to predict a person's health. Even IT specialists would not be safe, as much of the 'knowledge' which enables them to hold down employment may be transferred to a central cloud computer accessible by all from any location.

However, claims of total singularity may well prove to be a false dawn. To begin to tackle this question we need to examine the limitations of the technologies and return to our socio-technical analysis. First, on the *technology* itself, we find that despite the impressive technical progress in

robotics and associated algorithms, the moves to 'conscious' robots are constrained. Returning to the 'Turing Test' the ability of robots to 'think' as humans do is only a remote possibility. Turing also identified a 'halting problem' whereby a computer using AI may never 'know' when it is 'right', and so will continue to compute (Walsh 2016: 34). For more complex tasks, robots still need to be minded by humans lest they break down or miscalculate precision movements, which reduces their potential contribution to productivity enhancement and hence investment by capital. Efforts by a leading robotics manufacturer to create an affordable 'plug and play' robot capable of mimicking human movement for widespread use in the industry also appear to have stalled. The company producing the new robots, *Rethink Robots*, announced redundancies of nearly a quarter of its staff in 2013 (Tobe 2013). A simple way of understanding the problem is to imagine a robot attempting to catch a tennis ball in flight. Not only the speed and angle of flight need to be finely calculated in a split second, but also the weight of the tennis ball (which a human would have remembered from previous experience) will determine how hard the robot needs to grip the ball once caught to avoid the ball bouncing back out of the hand. Such a seemingly simple task for a human is a logistical nightmare for a robot. Mercedes–Benz, which is a lead player in developing autonomous cars, has now begun replacing its robots with humans in its factories due to this very lack of flexibility in the robotic machine (Gibbs 2016). Problems of robot inflexibility in the auto industry (a key player in robotics) are confirmed in a study published in 2016 by Sabine Pfeiffer of German automotive factories. She found that the use of robots meant that humans performed extra work which involved constant monitoring of the robots:

> During a normal and otherwise smooth shift, a worker responsible for the ballet of eight welding and handling robots intervenes 20 to 30 times per shift—not because of technical incidents but in order to prevent them. Although human work declined quantitatively over the years, its qualitative role increased with automation. (Pfeiffer 2016: 16)

Moves are now afoot to develop 'cobots' as an alternative to robots, which operate side-by-side with humans to enable flexibility and creativity to flourish.

The robotics industry is attempting to overcome these problems of inflexibility by researching ways in which a robot can mimic the human thought process by understanding and utilising artificial neural networks. These robotic 'deep learning systems' are now able to recognise speech patterns. Big data can also be used in algorithms to map employees' behaviours, both physically and socially (in terms of emails and correspondence etc.) so that a robot, once fed this information, may be able to 'behave' like a responsible employee. However, while algorithms might replicate past human behaviour in robotic form they are a long way off from 'consciousness' and the ability to 'think' at the level of a human. The algorithms they feed from remain subject to human input in programming and coding and repeat the mistakes and false assumptions that humans may have made in the past, but may *consciously* check against in the present. So, for example, the algorithm-fed robot *Beauty.AI* only chose women of light skin when asked to judge an international 'beauty contest', suggesting an unconscious (or even conscious) racist agenda among those humans creating the algorithm (Levin 2016). The main hurdle, therefore, remains the problem of consciousness, which enables a human to reflect and to understand context before deciding. This is where Turing's second test, the ability to know when a 'right' decision has been made and to stop further computing, comes into play. This may be near to impossible to replicate in AI. A robot may be programmed to perform new tasks, but it cannot transfer knowledge gained in one task to another. The robot has no imagination, emotion or consciousness and remains a machine. Daniel Dennett has explained the conundrum well in *Consciousness Explained* (Dennett 1991: 431), when suggesting that computers work very differently from the human mind–computers process increasingly large numbers of information serially, while the mind involves the simultaneous interaction of different mechanisms and processes. When a human looks into a mirror she sees herself, when a monkey looks into a mirror it sees a monkey. But what does a robot 'see' and what does it 'recognise'? In fact, the robot does not 'see' unless it is

pre-programmed by human intelligence to record a specific image in distinction from other images.

The further obstacle to full automation and singularity we need to address is that of *economics* and the related political implications of choices made by capital. Even where the upgrades include robotic innovation directly replacing human labour the overall impact on productivity, growth and jobs appears less dramatic than might otherwise be assumed. While the last few years have seen a considerable growth in the use of robots the actual density of robot implantation in manufacturing remains small. Data from the International Federation of Robotics shows that even in the highest density country of South Korea, there are still less than 500 robots for every 10, 000 manufacturing workers. While there are approximately 1.5 million industrial robots in the world in 2014, this has to be compared to a worldwide workforce of over 3 billion (IFR 2016).

On productivity, key evidence published in 2015 from a dataset of companies in 17 countries gathered between 1993 and 2007, suggests that while productivity increases with robotic innovation and some semi-skilled and lower skilled jobs are abandoned, 'there is some evidence of diminishing marginal returns to robot use—'congestion effects'—so they are not a panacea for growth … this makes robots' contribution to the aggregate economy roughly on a par with previous important technologies, such as the railroads in the nineteenth century and the US highways in the twentieth century.' (Michaels and Graetz 2015). In terms of economics we must consider, as the Marxist economist Michael Roberts reminds us, that robots remain a machine, and as such:

> Robots do not do away with the contradictions within capitalist accumulation … a capital-bias or labour shedding means less new value is created (as labour is the only form of value) relative to the cost of invested capital. There is a tendency for profitability to fall as productivity rises…. So an economy increasingly dominated by the internet of things and robots under capitalism will mean more intense crises and greater inequality rather than super-abundance and prosperity. (Roberts 2016: 10)

Furthermore, *if* it were possible to move to a world of 'full luxury automation' where robots reproduced themselves (robots making robots making robots) then we *would* have a world of zero profits (as there would be no value creation through human labour), combined with super abundance and leisure with robots akin to slaves (or masters). However, the implications for a contest between capital and labour *en route* to this *nirvana* would be enormous. As we have stated earlier in the chapter, there is a dialectical interplay between society and technology, and in this case worker resistance to the capitalist dystopia of permanent joblessness would surely ensure that the road to 'full automation' if it is ever constructed, would be a very rocky one.

Neither is it automatically the case that capital will choose to invest in technology even when it is available. As reported by the OECD (2016: 3) '…the introduction of new technologies is a slow process due to economic, legal and societal hurdles, so that technological substitution often does not take place as expected'. Thus, the development of autonomous or driverless cars is subject to regulatory concerns over insurance liability, which will act to slow down or even impede development. A major point to consider is that computers are a relatively small proportion of capital stock, and furthermore, investment in computers has been declining since the height of the 'IT Revolution' of the 1990s (Goodridge et al. 2012: 34: Mishel and Shierholz 2017). While upgrades in software and hardware are always likely to occur, the aggregate effect of such upgrading is likely to be small compared to the initial investment. Individual capitals must also consider what Marx described as the 'lifespan of fixed capital', whereby an individual capital, and capital in aggregate, may delay purchasing of new technology until they can be sure of a sufficient rate of return on investment. In the meantime, individual capitalists will attempt to extend the physical life of pre-existing fixed capital (including both computer hardware and software) as a way of reducing costs (see Weeks 1981 p. 186 for a full explanation of this particular contradiction). Indeed, the technological and competitive advantage produced from ICT investment may be a one-off event, not sustainable over time. As the management specialist Michael Porter (2001: 62) suggests, 'as all companies come to embrace internet technology, the internet itself will be neutralised as a source of advantage'. The US-based economist Robert J. Gordon is a long-term and

mainstream critic of the position that ICT has substantially raised overall productivity. In his latest major study (2016) of the US economy, *The Rise and Fall of American Growth* he pours cold water on any claim that ICT had a fundamental effect in raising productivity in the decades since computerisation entered the workplace. Gordon's argument is directed at the 'techno-optimists' and states that the IT revolution led to less significant changes in productivity than a host of other technologies including the telegraph, the electric light, or indoor plumbing and urban sanitation.

The final point to consider is that of the economics of supply and demand for 'full automation' within the real economy. The 'full automation' and post-capitalist schools of thought assume an ever-increasing thirst for new digital technology and a limitless supply of the necessary hardware and software. Yet, these assumptions need to be questioned. Predictions of the coming of Singularity have been based on the extrapolations from co-founder of *Intel* Gordon Moore's 'law', by which the number of transistors that can be inserted into a computer doubles every 2 years, both lowering the cost and vastly increasing computing power. However, this depends on a finite supply of rare earth metals, and Moore has himself acknowledged that there will also be a physical limit to how many transistors you can squeeze into an integrated circuit.[12] Efforts to stack microchips one by one to form a 'slab' or cube may prolong Moore's Law, but only at the expense of decreasing efficiency of battery life in smartphones and tablets as ever more powerful fans are needed to cool the chips.[13] Despite these physical limitations, the prospects of a 'last ultraintelligent' machine ever being constructed, which will 'surpass all the intellectual activities of any man however clever … (so that) the intelligence of man would be left far behind' (Good 1965), have continued to fascinate many. A sober analysis, however, has been undertaken by William Nordhaus at Yale University. Using econometric methodology on both the supply and demand side for digital technologies and AI he attempts to predict when singularity might occur. He argues that two 'accelerationist' mechanisms could develop, either from accelerating supply or from accelerating demand, and then applies a series of time-linked tests to both hypothetical scenarios, focusing on the key input variables such as wages, productivity growth, prices, intellectual property products and R&D. Five of his seven

tests for the likelihood of singularity proved negative (including that for 'accelerating productivity growth' and 'rising wage growth') while the two that proved positive (including a 'rising share of capital') indicated that singularity, if it did occur, would be at least 100 years away (Nordhaus 2015). And as we have previously positioned, a rising share of capital may simultaneously lead not only to decreasing rates of productivity growth, but also trigger a crisis of profitability for capital in the long term. The dream of Singularity would thus be faced with a simultaneous collapse of the underlying dynamic of capitalism. The only surviving 'human' industrial sectors might be defence and space exploration, to guard against terrorist or foreign hostile cyberattack, and against attack on humans by the super intelligent machine![14]

Some Conclusions

In this chapter, we have traced controversies on the history of technology and then reviewed the academic debates on computerisation and digitalisation that first arose in the 1960s and 1970s and their revival in amended form in the new millennium. The first wave produced predictions of the 'end of work' or the 'leisure society' premised on a massive increase in productivity. The debates from 2000 onwards introduced new concepts of digital, immaterial and free labour, alongside claims, predictions or prescriptions (in varying degree) of the coming of a new era of full automation or post-capitalism. The second wave debates borrowed from autonomist theory made popular in the 1970s by the Italian *operaismo* tradition, supplemented in the new millennium by a focus on Marx and his musings on the 'Fragments of Machines' in the *Grundrisse*. The theoretical strands connecting the first and second wave assumed an optimism towards the benefits of automation, by heralding a better society brought about by the benefits of digital automation. The more pessimistic predictions of the surveillance society, the perils of big data or digital de-humanisation (alienation 2.0), are accordingly given less prominence. The optimistic scenarios evident in both waves were predicted in the first wave by an assumption that digitalisation would release workers from work as productivity continued to rise. However, as

we have illustrated in this chapter there was no generalised increase in productivity during the heyday of the first wave, rather there was a decline. Secondly, there was a misreading of employer motive for introducing technology, which was not benevolent, in that leisure was offered as an alternative to work, but was repressive, in that workers were squeezed ever more as employers needed to recoup the cost of investment in technology.

In the second wave, the theoretical critique of the coming of the good society is more complex. Both the full automation and post-capitalism scenarios challenge the labour theory of value, and suggest that the marginal cost of production will shrink towards zero as robots, computers and AI move further towards technological singularity. However, we have suggested that such a scenario may also prove to be a false dawn. In preferring caution, we have returned to a socio-technical appreciation of technology, and argued that while digitalisation, AI and robotics is a *different* form of technological input in the production process, it is *still subject* to technical, economic, social and political barriers and constraints to its implementation. The technical limitations of both digitalisation and robotics suggest a finite rather than infinite future. For digitalisation Moore's Law may be near its limit. For robots, the problems of inventing a 'conscious' robot able to 'think' and to pass two crucial Turing tests remain remote. In terms of economics, we reject the concept of immaterial or free labour, and recognise that however 'shared' or 'free' such labour may be, it is still rooted in the material sweat and blood of real people undertaking real work for others to exploit. Neither is it the case that demand or supply of digital technology is totally elastic, a condition necessary for full automation to evolve. Intervening factors, of wage inequality, lagged investment decisions, and the negative effects of capital-bias on profit are all real. In terms of politics (or political economy), our historical overview indicates that there is a dialectical relationship between technology and society. Tension and resistance are inherent, and the place of technology within society is subject to social forces which act to shape and reshape society in the light of technical innovation.

All this is not to say that we reject that 'deep automation' is not a feature of modern industrial society. Capital will always seek to enhance

labour productivity, reduce unit labour costs, and increase profit ratios with the help of new technologies. Digitalisation, robotics and AI are part of that ongoing process, with the attached negative side effects of big data lack of privacy, extra monitoring and surveillance in the workplace, and a new sense of alienation from each other in the cultural sphere. But these processes are still subject both to the logic of capital accumulation and its associated contradictions and pitfalls, meaning that the 'full automation' is only a very distant prospect.

Notes

1. Food delivery comes through companies such as Deliveroo, Uber is the most prominent taxi app., Tailster is a dog walk app., and AirBnB dominates the app. market for accommodation.
2. http://royal.pingdom.com/2012/08/28/the-first-pc-from-1965/.
3. http://nottspolitics.org/wp-content/uploads/2013/06/Labours-Plan-for-science.pdf.
4. See also FRED, Economic Research, Federal Reserve Bank of St. Louis accessible at https://fred.stlouisfed.org/series/M08354USM310NNBR.
5. https://thenextrecession.wordpress.com/2014/01/20/productivity-deflation-and-depression/.
6. See research from http://marketrealist.com/2015/12/adoption-rates-dizzying-heights/.
7. Bogdanov was expelled from the Bolshevik Party in 1909. Lenin supported his expulsion on the basis that the 'systems theory' proposed by Bogdanov was at odds with the dialectical materialist approach of classical Marxism.
8. Note: MUDs and MOOs are online virtual reality systems to which multiple users (players) are connected at the same time.
9. See http://whoownsfacebook.com/ to be updated on corporate ownership of the dot.com giants.
10. https://www.berwin.co.uk/blog/when-is-a-worker-not-a-worker.
11. http://www.ifr.org/industrial-robots/statistics/.
12. See the interview with Gordon Moore in 2015 at http://spectrum.ieee.org/computing/hardware/gordon-moore-the-man-whose-name-means-progress.

13. http://gizmodo.com/5981195/scientists-have-made-the-first-truly-3d-microchip.
14. See also the warnings given in https://www.theguardian.com/technology/2015/jan/28/artificial-intelligence-will-not-end-human-race.

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There Is Only One Thing in Life Worse Than Being Watched, and that Is not Being Watched: Digital Data Analytics and the Reorganisation of Newspaper Production

Xanthe Whittaker

Digital data—data and metrics generated by social media and online interactions—are increasingly present in the working lives of journalists as result of the development and extension of digital technologies but also part of a social process of digitalisation. The use of data and analytics in business and organisation is not new; what recent advances in digital technology have provided is an extension of the scale and scope of data available. As Nick Srnicek (2016) argues, data are key to revenues in the digital economy as well as to monopolisation in the emerging platform landscape that seeks to monetise and profit from online activity. This proliferation of data is likely to have implications for the organisation and control of work; in some cases it has already. The research presented in this chapter looks at how digital data are put to use in digital newsrooms and aims to suggest an approach to the study of data and algorithms in the labour process. The chapter builds on discussions within labour process theory (LPT) about technology, particularly as a function of

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_4

managerial control, where it embeds managerial prerogatives and, in the process, has the potential to objectify and obscure relations of domination and control (Edwards 1979; Callaghan and Thompson 2001). In view of this, it argues that technologies of measurement fit within a broader managerialist agenda of measurement linked to performance and that, even where they are not expressly linked to an employee performance agenda, they encourage comparison, which can lead to competition and, in the case of the newsroom studied, they reorganise priorities for journalists as well as reorganising their work.

An important objective of this chapter is to disentangle human from machine; to examine, with reference to a case study, how metrics and measurement change both how we work and how we think about work, but also to look at the ways humans—journalists and news production workers in this case—react, adapt accommodate and negotiate the introduction of these data technology into the labour process. To build on the critical studies that examine the application of digital data in the workplace in this volume, this chapter situates the discussion of data and analytics at work within broader sociological discussions of metrics and algorithms, developed largely in response to the growing use of big data, and will consider this in light of labour process approaches to the study and understanding of work together with empirical findings from a case study of newspaper journalism.

Data, Metrics and Algorithms at Work

The conversion of work processes and outcomes into quantifiable and measurable data that can be used by management to organise and rationalise labour is, of course, not new, but the development of new ICTs brings with it the capacity for new and more precise means of measuring. The quantification and measurement of work can be traced from the scientific–technical approach of time and motion studies (for a good overview see Braverman 1974: Ch 4) to performance management and KPIs as measures of effective and productive working. Discussions of knowledge work and creative labour have tended to note the difficulty of quantifying—and hence controlling—this work (Smith and McKinlay 2009),

yet, it is precisely these forms of labour which have been increasingly subject to measurement and targets (Taylor 2013: 17; De Angelis and Harvie 2009; Moore and Robinson 2016). But to trace this history is not the objective of this section. Digital data have been enabled by new and more powerful network, storage and processing technologies and their entry into the labour process poses questions of whether the extended technological capacity to measure, combined with a new orientation towards data and their predictive capacity, changes the nature of work and managerial control.

Technology and Control from a Labour Process Perspective

One of the key and enduring insights from *Labour and Monopoly Capital*, was Harry Braverman's insistence upon a 'social approach' to technology (1974: 184) and, as all chapters in this volume iterate, technology should be viewed not as a neutral instrument, but in its relation to human labour and as a social artefact, and, in particular, as an instrument of management organisation and control. For Karl Marx, whose discussion of machinery, large-scale industry and the labour process formed the basis of Braverman's research, the machine in capitalist production is both a means for producing surplus value and, in its organisation within the division of labour, the means by which humans are subordinated to capitalist relations of production, alienated from their labour and these relations mystified: 'The social forms of their own labour—both subjectively and objectively—are utterly independent of the individual workers. Subsumed under capital, the workers become components of these social formations but these social formations do not belong to them and so rise up against them as the *forms* of capital itself, as if they belonged to capital' (1976[1890]: 1054).

Labour process studies of technology have tended to pursue ideas about technology and its relationship to control—although without Marx or Braverman's revolutionary outlook—through a set of core propositions (Thompson 1989). These identify the key dynamic of the capitalist labour process as driven by the 'indeterminacy of labour';

the issue for capitalists of converting living—or human—labour into productive labour power in order to extract a surplus; a situation of exploitation which labour has an interest in resisting. The 'structural antagonism' (Edwards 1990), built around this uncertainty and the possibility for worker resistance, is inherent to the employment relationship and links the management agenda to a need to direct and discipline labour—the 'control imperative', where this tension sits alongside management's need for cooperation in the labour process. In the case of technology, a LPT approach to understanding how technology will be adopted and put to work in the labour process would suggest that management will develop or adopt technology in line with these underlying structuring forces, which can result in a variety of worker responses, from resilience, to the reworking of technology to resistance (Katz in Coe 2015), as well as attempts to find cooperation or consent (Burawoy 1979). Indeed, in chapter two of the present volume, Moore et al. look at some examples of resistance to these new initiatives.

LPT has had a long engagement with discussions about control and computerisation and ICTs, particularly with reference to empirical studies of call centres (Taylor and Bain 1999; Callaghan and Thompson 2001). Whereas much of the discussion about power and control in relation to ICTs at work has taken Foucauldian approaches, which highlight the relationship between surveillance and self-discipline (Fernie and Metcalf 1998; Zuboff 1988; Sewell and Wilkinson 1992), the call centre discussions in LPT have made a case for less totalising and more complex understandings of the dynamics of surveillance and control at work in the labour process (van den Broek 2002; Bain and Taylor 2000; Thompson 2002). More recently, Elliott and Long (2015) have attributed the use of tracking technologies and data to the automated micro-management of the tasks of warehouse workers which they demonstrate leads to isolation and individualisation of workers. These debates have emphasised the role of worker agency and, in particular, worker resistance in response to the use of technology to control their efforts, as well as recognising the way in which control through surveillance is only effective where it sits within broader structures of dominance—in the workplace that might take the form of direct supervision, bureaucratic control or other more self-regulatory or less coercive means

of control. In an overview of the engagement of LPT with technology, Hall has discussed the general tendency in contemporary work towards the use of hybrid forms of control, where technological control most often combines with bureaucratic and normative control (2010).

Measurement and Performance Management

Performance management has been theorised from a human resources management (HRM) approach as the creation of incentives, as well as judgements and potential punishment, for workers through the development of goals and targets which align individual workers' activities with the objectives of the organisation they are working for. It tends to be characterised in the HRM literature as the mutual alignment of goals and interests between management and employees which can secure cooperation and commitment from employees (Thompson and Harley 2007). Quantifiable goals and targets have often been developed for workers who have a high degree of discretion in their job, especially in professional, service and managerial work, where work processes can be unpredictable and the product intangible, although it is increasingly extended to other forms of work (Bach 2013; Taylor 2013). There is an assumption underlying much prescriptive performance management literature, that individual performance is a result of individual behaviours, actions and exertions and that there can be a clear line drawn between input, output and outcomes. While evidence for whether performance management improves organisational performance is scant and inconclusive (Bach 2013; Storey 2007), it is often cited as a justification for performance management regimes.

Critical discussion of performance management and measurement has tended to stress both the problem with its underlying assumption of mutuality of interest as well as the challenges to its implementation in a context where competitive market processes continue to place pressure on organisations to minimise costs and to secure profits. As discussed above, measure has long been a preoccupation for management in its attempt to create efficiencies, remove wasted effort and rationalise the production process with the aim of increasing productivity. Critiques of

performance measurement have focussed on the difficulty of measuring performance and the subsequent contestation over performance criteria, or the development of proxy criteria that cannot measure what they are intended to measure (Bach 2013: 228–230). These can over-and undervalue aspects of work, redirecting efforts and potentially distort the way a job is carried out—a phenomenon particularly studied in relation to public services (see, for example Carter et al. 2013; McCann et al. 2015). The subjective nature of performance measurement and, in particular, appraisal of workers against measures, has led to claims of the potential for arbitrary, biased or unfair management practices during appraisal (Grint 1993). Phil Taylor's extended research report for the Scottish Trade Union Congress examined the effect of performance management regimes in several industries and found that it was linked to work intensification, stress and ill-health for workers and was frequently used to 'manage exits' of workers (2013).

Big Data, Algorithms and the Social Construction of Data

With the advent of social media and the conversion of social interactions, internet searches and other online activities into quantitative data-driven algorithms this use of data, or 'datafication' has become both widespread and normalised (van Dijck 2014). The availability of large amounts of data has led to its growing use in social science and commercial and marketing research to answer social questions and predict behaviour (boyd and Crawford 2012; Moore and Piwek 2016), despite the fact that data science is the best correlative and rarely explanatory; it tends to tell us what has happened and, as a result of what has happened, what might happen, rather than *why* social phenomena or events occur. Studies of big data and algorithms in the emerging field of data studies have been preoccupied with examining and revealing the ways in which data are socially constructed, how the rules that inform algorithms contain values and choices that are ultimately social and how this effects the way they act on the world. This has some parallel with discussions in LPT about the tendency for technology to embed or objectify capitalist social

relations while giving the appearance of neutrality (Braverman 1974; Edwards 1979; Callaghan and Thompson 2001) and in particular Richard Edwards' argument that what he termed 'technical control' could displace relations of direct control and the resulting conflict between workers and supervisors. Critical data scholarship has examined the specific ways and moments at which these processes occur and how data impacts on society and our lives.

Data, when it is conceptualised as data, requires the categorising and accounting of some things and not others (Gitelman and Jackson 2013); what counts as data and which data is collected requires, as José Van Djick points out, 'an interpretative frame [which] always prefigures data analysis' (2014: 201). Data is captured because it is required to answer specific questions, for example data could be captured via Facebook about a defined demographic and would be used differently depending on whether they were put to use by a government for health planning, a marketing company for ad targeting or an insurance agency to set policies and premiums. Similarly with algorithms; they seem to remove subjective and value-laden decision-making and replace these with computational processes that, while giving the appearance of being based on the objective, mathematical reasoning, actually work to encode, and therefore reify, subjective decisions about that which they classify and categorise. While data are presented as facts or assumed to be objective, all data must be subject to interpretive processes. And in order for algorithms to make use of this data, complex processes must be simplified (Kitchin 2014) and certain practices and knowledges codified. Wendy Espeland and Mitchell Stevens suggest that in order to determine how data or numbers act on the world, we should look at the work and the conventions that are used to 'make' them (2008: 406).

In her work on data and border security, Louise Amoore (2011) draws a connection between the use of data and the automation of decision-making through rules, what she sees as the removal of meaningful decisions on the part of those workers directly carrying out the work. This is an idea with close parallels to Braverman's (1974) discussion of the management prerogative in the capitalist labour process towards the codification of worker knowledge into technology or work

processes—the separation of conception from execution—where worker knowledge and control over a process becomes embedded within machines or technology, automating decisions, removing workers' autonomy over processes and centralising decision-making with the management and technical staff who design and calibrate those machines. Part of the question for LPT in its engagement with data at work must be whether there is a qualitative difference when these practices are codified into data and algorithms, rather than into machinery.

Espeland and Stevens (2008) emphasise that numbers are used in two main ways: to mark and to make objects commensurate. It is the latter which is invoked in the creation of objects, processes or outcomes into quantities or metrics—and, once expressed as such, new relations between things are created which are expressed as differences of magnitude. This, Espeland and Stevens argue, is 'at the heart of disciplinary power' (2008: 414). But this also opens up the question of whether turning things—the products of work in this case—into quantifiable data and reducing differences to points of magnitude have any identifiable inherent effect.

David Beer (2016) focusses on the relations that exist between measurement, circulation and possibility as he tries to locate and understand what he terms 'metric power'. He argues that metrics—which are systematic collections of data—are part of a neoliberal project to insert market-like conditions between those things that are subject to measurement and metrics, and where metrics enable competition. Other studies have investigated the power and interests that are vested in big data. For example, the power asymmetry with big data and the relationships of ownership and control that define the relations between those who collect, aggregate and analyse data and those whose data is collected (Andrejevic 2014); how big finance and Internet companies who develop algorithms have vested interests in maintaining secrecy about the data they have and the way they use them, as well as the potential this has to affect outcomes and opportunities for people—from credit ratings, to insurance premiums to determining a potentially unreliable employee (Pasquale 2015); or the way algorithms shape knowledge as well as public discourse and cultural forms (Gillespie 2014).

As data have come to define and determine ever-greater aspects of our lives, some of the work in critical data studies has asked whether there are certain innate or necessary features or effects of datafication, measurement or algorithms and to think about the implications of this; others have tried to understand data and algorithms as rooted in, and the result of, the social, political, legal and economic systems in which they have been developed and operate. But overwhelmingly, these enquiries have been directed at the level of society in general and empirical studies have focussed on the production of knowledge (boyd and Crawford 2012); the public consumption of social media and other data and algorithm-led platforms (Andrejevic 2014; Bucher 2012); how social and political discourse is enabled and constrained by algorithms (Gillespie 2014), and the use of data by big business and government (Moore and Piwek 2016; Amoore 2011; Pasquale 2015).

These analyses provide a useful starting point for conceptualising data and algorithms and creating a methodology that can draw attention to the values or relations that are embedded in data, and to whose interests they serve. Although, while critical data scholarship has tended to focus on the power relations and agendas embedded within the construction of data, LPT, while similarly acknowledging that technology and the technical organisation of the labour process both reflect and embed existing social relations, emphasises that the extent to which technologies realign the frontier of control in the labour process will not only depend on its design but also will be conditioned by the balance of power between management and workers when and where it is applied. Discussions about data, algorithms and metrics and their relationship to power and control need to distinguish between different kinds of metrics, what they are used for and in what context; research on the use of data in the labour process needs to look at the specific application of data, algorithms and metrics into specific contexts to see how existing structures, organisational logics and social relations are articulated through code in order to understand and to locate the source of the rules or the power that enables data to act on the world. LPT points to an approach to studies of work that account for the way that relations are structured through the labour process and which establishes a clear relationship

between the managerial drive to measure and its control imperative in the context of both capital accumulation and capitalist competition.

Finally, Rob Kitchin has highlighted that the reality of how algorithms operate may depart from their intended function both as a result of programming and 'a lack of refinement, miscodings, errors and bugs' (2014: 22), as well as the unexpected effects of their interactions in the contexts in which they are placed. In particular, he characterises the subtle forms of interdependence between people and algorithms where people internalise an algorithm and where the behaviour of the algorithm is 'conditional on the input it receives from the user' (2014: 22). One thing that abstract or logical discussions of measurement and data cannot necessarily determine are the limitations to their ability to affect and direct our daily lives and work or the social structures and forces we operate within.

The following sections will describe research conducted in a newsroom to describe how journalism has been made measurable through data analytics. It looks at what is measured—what counts and what does not count—and how this affects the work of journalism. It considers whether the digital data that are being used in newsrooms, and the analytics derived from them, are not only measuring audience preferences but are also acting as performance indicators for those workers writing and producing stories.

Context

Journalism—which is used here as shorthand for the production of news which involves reporters, editors, subeditors, content editors, moderators—offers a key site from which to study the process of digitalisation and the role that data technologies are playing at work. The digital disruption created as a result of the shift from newspaper production to the production of news, stories and other content for online news sites has reorganised the environment within which news agencies operate, exposing them to greater competition, often from new competitors, including non-news actors in the information sector and social media platforms as well as non-commercial and citizen journalism. As

noted in a *Business Insider* article on 5 September 2016, Alan Rusbridger —former editor-in-chief at the *Guardian*—claimed in September 2016 that Facebook redirected nearly £20 million (US$27 m) of the newspaper's digital advertising revenue in the 2015–2016 financial year. While it is not clear how Rusbridger made this calculation, it is clear that digital ad spending is growing but it is now technology companies who take the largest portion of it (65%), not journalism organisations (PEW Research Center 2016).

Pressures on revenue have driven traditional news outlets to develop and experiment with new revenue streams, business models and ways of organising work, with shrinking newsrooms a long-term trend. Since 1997, US newsroom staff at daily newspapers has declined by 20,000 positions or 39% (PEW Research Center 2016). In the UK, all national news agencies have had successive rounds of redundancies since the onset of digitalisation; since 2014 the National Union of Journalists, NUJ has kept a roll call of newspaper closures and job losses to reflect this.[1] These are just some of the results of sectoral shifts in the news media economy that have been prompted by the development of new networked technologies. While digitalisation has had a dramatic influence on the organisation and dynamics of the news sector as a whole and much has been written about it in academia and the media (for a good overview, see Franklin 2014), it has also affected media workers as producers and affected the circumstances of production.

Data analytics, tools that track reader behaviours on news sites, have become a standard feature of contemporary digital newsrooms. The digital data captured for use in these analytics are like big data in that they are constituted of voluminous, continuous flows of data but, unlike big data in that they are structured by the technical architecture of the news sites in order to capture particular values. But, for such a seemingly minor introduction into the changing landscape of digitising newsrooms, these data are having a significant effect on the work of producing news as well as reflecting a general shift in the decision-making and priorities that direct journalists' work. News organisations have designed technological infrastructure that captures data such as the number of page views an online story receives; attention time;[2] where the site's traffic travels from and to; where viewers are located and what kind of devices they are

using. And increasingly, this data is visualised through real-time dashboard displays that are available to journalists and others involved in the news-making process.

Methodology

The research for this chapter is based on a case study that examined the development, use and interpretation of audience data analytics in the digital newsroom of a *Digital Paper*. The study looked at the way audience data analytics are used by journalists in this paper in which all employees have access to a data analytics dashboard. It looked at the kind of data collected and displayed and the way in which data was circulated within the organisation, how editors and reporters interpreted that information and how it informed their work and decision-making.

Data were collected principally from semi-structured interviews organised around themes which were recorded and transcribed, as well as from fieldnotes taken during non-participant observation of union chapel meetings and an NUJ-organised summit on digitalisation. Interviews were conducted with 13 journalists working across *Digital Paper*, including, 10 reporters and editors—who are responsible for decision-making about stories but who do not have managerial responsibility over other staff; two managing editors and a technical editor. Rather than seeking a representative sample, interviews were selected in order to examine whether experiences differed according to the perspectives and priorities that attach to positions within the division of labour and organisational hierarchy. Themes identified in early interviews were used to inform the lines of questioning in subsequent interviews. Interviewees were asked about whether or how data inform their work; whether they were provided with guidance or instructions about the use of data; who determined whether a story was 'performing well' and how; whether audience data are the subject of formal or informal performance discussions with managers or of disciplinary procedures.

While the number of interviews was limited, it was sufficient to identify common themes and to compare and analyse contrasting

accounts. Interview data was combined with an analysis of dashboard charts and organisation reports on audience data. Interviews with journalists in the case study interviews were supplemented with data drawn from five interviews with journalists at five other national newspapers to determine whether business models or organisational differences might account for findings at the case study organisation. The research also drew upon interviews with three organisers from the National Union of Journalists (NUJ) and a representative from the NUJ's Newspaper and Agency Industrial Committee (NAIC), who were sought due to their expertise in representing and negotiating with news agencies over collective issues tied to digitalisation.

Findings

Digitalisation has resulted in extensive and unprecedented change within the newsroom of this formerly print-only newspaper. It has led to the reorganisation of the newsroom, first with the convergence of digital and print sections of the news organisation, and then with the introduction of technical workers focussed on the development of digital technology for news-making and the introduction and expansion of audience, or search engine optimisation (SEO), teams in the newsroom. Journalists have been called upon to develop new skills, and to multi-skill, in a context where there has been an overall decline in the number of editorial staff which has not been matched by a decline in the number of stories produced. For example, a section editor may work alone to compile a story; scanning sources, writing and proofing the story, packaging it with other material—such as photos, graphics or links to other relevant articles—then launching it and publicising it on social media. Digitalisation has reduced or removed some roles—sub-editing and in-house photography has been particularly affected—and made the work of many editorial staff much more desk-based; journalists have increasingly become what ethnographer Dominic Boyer (2013) refers to as 'screen workers'. Considering this scope of change, the development of data analytics would seem a small aspect of digitalisation, yet it has had a powerful effect on the organisation of work in the digital newsroom.

In *Digital Paper*, gaining audience numbers has become part of the process of production for editorial staff. Every member of editorial staff, regardless of their role, can access the analytics dashboard and checking it has become part of news workers' daily work practice:

> It's not just chasing traffic. But sometimes you can see that … the headline is wrong because it's not getting any traffic. And I think, "Well why is it not getting any traffic?" And then you think, "Well yeah, can people actually tell what it's about from the headline?" And then you can just tweak that [the headline] and see what effect that has. I'm using it all the time and … if you see something that a lot of people are obviously landing on but then not clicking on anything else then you say, "Well is there anything else I can link to or package it with?".
>
> —*Online Editor, Interview, 16/09/2015*

Stories are monitored by editors reporters and as well as managers and, if they are not performing well against the editor's expectations, will be revised; given a new headline, tagged differently, 're-packaged' with links to different articles or promoted differently on social media. Journalists regularly monitor and update stories with the effect that it extends the process of producing an article. Compared with print, where the intensity of work increased through the day towards a daily deadline, this process of monitoring online stories has removed that, resulting in a heavier workload and more constant workflow. Deadlines persist but rather than the working day building up to an end of day deadline, data derived from audience analytics have informed the creation of new deadlines, based on the 'news spikes'—moments in the day when audience numbers have tended to cluster—but there may be up to two or three deadlines throughout the day, the number and timing of them varying depending on the desk.

Journalists have a keen sense of the tensions between data-driven decisions and editorial decisions and of the temptation to chase traffic:

> I do try hard to stop myself from just following the traffic and just from constantly doing things that I think will generate a lot of traffic, because

> the nature of what I do means that to do my job well I think I have to do some things that are not going to reach massive audiences.
>
> —*Section Editor, Interview, 10/11/2016*

They tended to combine the use of data to inform their work with maintaining a reliance on their own news values to determine which stories to run. The analytics data were regarded by most journalists interviewed as a useful confirmation of what they felt they already understood about their audiences. One reporter commented:

> We wouldn't commission something if it was a load of total rubbish or we thought it was a load of total rubbish but "Oh it's just going to get huge traffic", and we wouldn't not do something that was of interest to a niche audience—our audience but a niche section of it—if we knew the traffic wasn't going to be good but it had worth in other ways. So we wouldn't be dictated in the case of "We'll just do click bait all the time to get loads of traffic". But in terms of being aware of how well or not pieces are doing yeah, I mean I guess it must have an influence, in that it's nice to see when something does well.
>
> —*Reporter, Interview, 29/04/2016*

Journalists are critically engaged in trying to interpret audience data, despite the limitations of what they can tell about the audience and its interactions with a story, and are aware of the challenge it potentially poses to their decision-making and of the effect that 'following traffic' could have on news quality. But, as the quote above suggests—more through its vagueness or omissions—is that, although these measures may not reflect the values or objectives journalists attach to the products of their labour, there is less questioning of the assumptions that underlie the kind of data that is collected and presented, or the way it is interpreted. A publicity comment from Ian Saleh, audience development editor at Guardian US, about the Guardian's in-house analytics programme, Ophan, is characteristic of how technical developers understand data: '[the] analytics dashboard … allows editors and reporters to see the effects of their actions on reader behavior as well as on overall site

performance and provide actionable intelligence on deepening engagement with readers, creating new content and building audience.'[3]

Here, it is clear that at least two assumptions are at play: first, the idea that the individual efforts or actions of editorial workers are responsible for different levels of audience traffic—as opposed to factors relating to the story itself or other contextual factors, such as the algorithms operating on the social media where it circulates —and, second and relatedly, that there can be a clear line drawn between input, output and outcomes. This 'intelligence', drawn from data analytics, is built on limited information about an aggregated audience; data such as median time spent on a story, geographical location, devices and search terms used. In order to inform future practice, it must then be interpreted with reference to factors such as the content of the story, its release time and how it is tagged and packaged. At *Digital Paper*, this practice is institutionalised in reports that are circulated around editorial desks via email, either daily or weekly, and which highlight data about top-performing stories or recommend best-practice:

> There's quite a lot of best practice meetings and that kind of thing so people will discuss if something works or not; that kind of thing. So you can see what other people are doing and each week there's a team email so people can see this has done well.
>
> —*Content editor, Interview 28/04/15*

> People used to share…"best practice"…I'm quite a cynic on this kind of thing. You'll find loads of people who will just preach to you about exactly how to get more Twitter followers and get more hits. I just don't buy into it personally, but I'm probably in a minority who don't.
>
> —*Reporter, Interview, 28/08/15*

In *Digital Paper*, the use of data analytics has become a common-sense solution to understanding how online journalism should work. But, while it has reorganised journalists' work and changed work practices, the question to which it is the solution is more opaque.

When the The New York Times' *Innovation* report was leaked in May 2014, it revealed much about the way legacy news organisations were thinking about and attempting to respond to digitalisation (Sulzberger et al. 2014). The report located competitive advantage in digital journalism as a race to develop and adapt the newest technology and recommended business strategies based on the monetisation of audience data as well as the shift from advertising revenue to a subscriber base. This audience-based business strategy—favoured by many newspapers with a large online audience, such as *The New York Times* and the *Guardian*—aligned business and editorial objectives and has resulted in organisational restructuring that draws together a closer collaboration between marketing, digital product development and editorial (Sulzberger et al. 2014: 57). This closer collaboration is reflected in the design of data-capturing technologies and analytics, which were previously the preserve of commercial or marketing departments have become central to the work of editorial.

To return to the question of what is and is not counted, the data analytics at *Digital Paper*—the data which are collected, circuited and meaningful to journalists—are those which capture audience views and the time spent on a story (median time) and what the incorporation of these data into journalists' work practices achieve most unambiguously is the drawing together of commercial objectives with the day-to-day of editorial decision-making—the kind of concerns that formerly would have resided with management. In this way, data can be seen as a key contributing factor towards the alignment of goals and interests between the commercial side of the news operation and editorial. It has the effect of shifting journalists' priorities towards the organisations' commercial goals, and potentially their responsibilities also.

Data analytics have also created new visibilities for journalists' work that are more individualised than previous measures of a newspaper's success, which raises the question of whether these are being used as a performance measure for journalists' work. Reflecting on the contrast between the organisation of work before the analytics system had been developed and today at *Digital Paper*, one managing editor commented:

> Nobody could measure…We didn't really know how much stuff we were putting up online. …We just didn't know and people were just putting stuff up there. And now we absolutely know, not just exactly how many words there were on everything we put online and when it went up, but exactly how many people hit on that story and where they came from.
>
> —*Managing editor, interview, 15/10/15*

In this quote it becomes clear that the internet architecture and the data it captures have a dual function; first, they measure outcomes in ways that are well-understood—those which count audience views and interactions with the site. But what it also confirms is that these data are explicitly measuring journalist outputs—at the least number and length of stories and launch times. *Digital Paper* journalists who were interviewed claimed this data has informed restructuring processes. While there was no confirmation of this from management or the unions, even the perception that data analytics were being used in this way, could create a powerful adherence to data analytics, especially where the newsroom had been through three rounds of redundancies in the seven years between 2009–2016.

Apart from organisation-wide restructuring, editors also described how columns written by freelancers had been discontinued as a response to poor audience traffic. Whether rationalisation of the news-making process was the original purpose of the analytics system or not, data make the relationship between audience numbers and journalists' work more visible and, in the hands of management, who have pressures to contain costs in a difficult financial environment, seem to be an objective basis upon which to reorganise and rationalise.

Although their use is widespread across the organisation's editorial operation and staff had a clear idea about the audience numbers they should be aiming for, which differed across sections, targets around audience data had not been explicitly integrated into performance appraisal for the journalists interviewed and none knew of any instance where individuals had been disciplined on the basis of analytics.

> There are no guidelines and no one has ever said to me, "Oh yeah you should use it in this way" or "You should look at it and do this."
>
> —*Reporter, Interview 17/09/2015*

But the setting of web targets is not unknown in journalism; at one English regional news publisher, management talk about 'winning the Internet' and journalists are given web targets and web lists of stories that will go online each day (Fieldnotes, *NUJ Newspapers Summit*, 25/01/15). Management at regional news publisher, Trinity Mirror, tried to introduce web targets at five of its regional daily titles but were forced to back down after journalists voted to strike over the measures.[4] In contrast, at *Digital Paper*, the use of data has been encouraged through mechanisms such as best practice sharing, daily and weekly audience traffic reports to editorial staff and the development of a culture that places data and technology as the future of journalism. While some journalists have embraced data, others have been more resistant:

> To be honest, when I was doing that content coordinator stuff, I think I was meant to use [the analytics dashboard] . I just never actually worked out how to use it. So I just never did.
>
> —*Reporter, Interview, 28/11/15*

One journalist described a section of the news organisation that was staffed largely by people who had been working on the print paper since before the advent of digital and where she described a culture of resistance to the changes to work associated with digitalisation:

> They have really different attitudes to journalism I think, and it's quite interesting going there and hanging out with those people who are a bit older and don't actually care about traffic or couldn't give a shit what time things go online. (Laughs). I say that about the journalists, obviously the production people are very good at their jobs and very (laughs) —I'm sure they care a lot about when they go online and I'm sure they have things to stick to, but the reporters, I don't think they're too bothered about that type of thing.
>
> —*Commissioning editor, Interview 22/10/2015*

Discussion

The research examined the role of data and analytics in journalists' decision-making, not to pursue an argument about the relationship between data and click bait, or declining quality of news, but to assess whether knowledge, tacit or otherwise, about what makes a story, might be being supplanted with machine thinking about what has done well, which then gets interpolated into predictions about what will do well. Audience data analytics, while they provide the basis for this kind of automation, have not been extended into decision-making at *Digital Paper*. Best practice, which is derived from data about stories that 'do well' is shared in the newsroom but how journalists analyse and utilise it is left to their discretion. Instead, what data analytics have done on a generalised level is create a new basis upon which decisions can be made and judged. Audience data has been accepted and legitimised by journalists as a useful and objective measure and, to that extent, journalists have internalised it as a good measure of audience engagement but also of their work. What the focus on data has also done is reinforce the idea, common to big data science, that data can usefully be employed to determine what factors will improve the likelihood that a story performs well and that journalists can, through their individual actions, affect this. The use of audience data throughout the editorial process instils a much keener audience-centred approach to journalism, much like customer-focus in service work. The day-to-day alignment of business objectives with editorial objectives has become embedded technologically and, as a result, decentralised responsibility for audience numbers into the day-to-day practices and consideration of journalists.

Beer asserts that the visibilities afforded by metrics have a disciplining power, where seeing is the first step to controlling (2016: 214). This line of argument closely echoes those accounts of surveillance of work that were influenced by Foucault and subsequently dissected by empirical studies of the labour process. But what are the subsequent steps to control and how necessary are they; is control part of the logic of visibility or just a possibility afforded by visibility? There has always been an element of visibility, or the desire for visibility, in journalism, at least for

writers and reporters, although data analytics technology has changed this from one focussed on the broad measure of appearing the paper, or on the front page, to a much more careful accounting of the outcome of individuals' efforts or, more accurately, audience response to journalists' efforts. But in newspapers, surveillance is, if anything, a by-product of visibility.

For Beer, measurement works as a system of governance, and self-governance through affect: 'The anticipation, the expectation, the worry, the concern, the fear of failure, the insecurity that comes with potential visibility' (2016: 201). But, in order to operate as disciplinary mechanisms, data analytics require engagement, and unless they are coupled with other kinds of disciplinary frames, such as web targets and performance management, engagement cannot be assured. In the case where analytics and web targets have been devised and linked to performance appraisal, it has resulted in more direct antagonism between journalists and news managers, rather than creating indirect control through technology.

In terms of the technological pacing of work and intensification, journalists increasingly are required to ensure the wide distribution and the circulation of a story. But journalists' workload becomes intensified not just because they are required to take on these additional tasks—although these play a part in work intensification—but because ensuring a story performs well according to the data analytics involves constant monitoring of real-time data and manicuring of stories in response. One key difference between static measures and real-time data is that real-time data has the potential to create a sense of continual movement, if not urgency and stress; it paces work, not in a rigid, mechanical way but because it ceaselessly produces information to which there is a normative expectation that journalists will consider and respond.

Together with this effect of real-time data, work intensification also arises from what the data doesn't count and, in the case of audience data, what is not visible is the work that lies behind the page views. The process of producing a story is complex and variable, where it can be difficult to predict in advance and account for the time and effort it will take to compile a story. As a result, like with other forms of creative and professional work, journalists are given a large degree of autonomy over

the way they compile stories; newsrooms or individual journalists may develop practices or routines that help them compile stories quickly, but there remains an element of uncertainty and reliance on external factors outside the control of journalists in the news-making process. What data analytics do is to abstract these complex processes into a quantitative outcome, where the particular concrete practices or labour that journalists must perform to compile a story become effaced. Espeland and Stevens (2008) show that quantification works to make disparate objects or actions commensurate. In the case of data analytics, one set of data about page views is made commensurate with another regardless of the time, effort or skill required to produce it; what matters is how well it performs with the audience.

When this focus on data analytics is indifferent to, or obscures, the work required in production, and is then coupled with journalists being made individually responsible for improving the circulation and readership of their stories, the journalist becomes disciplined by the audience via the audience data, even though their capacity to affect the data may be limited, or worse, illusory. When a story is not performing well, as long as the journalist sees it as both her individual responsibility and something she can change by her actions, there is the potential for workloads to mount. This lessens the need for direct managerial control, where issues about workload—which previously were areas of conflict between reporters and editors, or editors and news managers—become subject to the indifference of calculation. The struggle is no longer between management and journalists but between journalists and their ability to improve their data, where poor data can be seen to be an individual failing.

But, even in this case, journalists can only be disciplined by the data in this way as long as they accept it as their individual responsibility to maximise audience and believe that this audience growth can be achieved through their own exertion. In the newsroom studied, even the general acceptance and heavy reliance on data analytics has not removed the possibility of its contestation by workers. Journalists' news values and ability to find a good story are still considered at *Digital Paper* as key defining features of journalists' work and their organisation's product.

As a result, journalists have been able to exercise discretion over how they interpret and use data in their work and assert their professional values against the imposition of decisions driven by data.

Conclusion

In many ways, this discussion extends earlier observations and discussions from LPT about technology, control and autonomy into discussions about data analytics at work. The relationship between audience data and productivity is not arbitrary or coincidental; the development and growth of data analytics in newspapers have arisen out of a period of financial and technological uncertainly for newspapers, where managers have been under pressure to determine what aspects of the product can be monetised and which are making returns. The technology, or digital architecture, that has been developed in newsrooms to collect audience data has enabled managers to drill down to obtain detail about journalists' output, including audience response to it, and to assess the work of individual workers. This has been utilised in both the intensification of work and its reorganisation, much as with the situation recounted by warehouse worker, Ingrid, to Phoebe Moore in Chap. 2, where data is being used to justify layoffs, or at Tesco, where studies by Moore and Robinson have found that data from wearable armband devices is used to reduce the need for warehouse workers on the floor (2016).

As far as their ability to act as a mechanism of control within the workplace, data are put to use in particular configurations of power; they have no power in their own right. When data and metrics come to circulate in the set of social relations and forces of production within the labour process, it is necessary to examine the specific constellations and contexts into which they operate in order to make an assessment about from where—or whom—their power to discipline arises and through what mechanisms. In this case, journalists, as a group of workers with a high degree of autonomy over their work have been able to maintain discretion over how they interpret and incorporate data into their work and decision-making processes. But this is not the whole story because the use of data as visible markers of journalists' outputs in the newsroom

has also created new responsibilities and accountabilities for journalists and contributed to the intensification of work.

Unlike machine pacing, or other forms of technological control, journalists' subjection to discipline by data is heavily reliant on data in a context where there are other normative pressures at work; in this case, where data have been legitimised by journalists as a measure for their work, combined with the idea that journalists can affect audience numbers and interactions through their efforts—an effect that is neither necessary nor guaranteed.

Notes

1. Full list is available at: https://www.nuj.org.uk/news/roll-call-of-newspaper-closures-and-job-losses/ Accessed on 7/02/2017
2. How long a reader spends on a page, usually presented as median attention time.
3. http://mediashift.org/2015/03/7-media-metrics-analytics-and-impact-projects-to-present-at-collabspace-austin/ [Accessed 13/01/2017]
4. Details of the dispute can be found at *Hold the Front Page*: http://www.holdthefrontpage.co.uk/2015/news/trinity-mirror-shelves-plans-for-individual-web-targets/ Accessed 7/01/17

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The Electronic Monitoring of Care Work—The Redefinition of Paid Working Time

Sian Moore and L.J.B. Hayes

This chapter explores the electronic monitoring (EM) of homecare work in the UK in terms of its impact upon care workers and the employment relationship. It considers the rationale for the use of EM and how far EM is designed to protect workers (Ball 2010) and service users, but may, in the context of the local authority commissioning process, involve not only the surveillance of workers but also the reconfiguration of paid and unpaid working time. This reconfiguration can redefine homecare workers' labour in both quantitative and qualitative terms. Commissioning on the basis of 'client contact only payments' (where providers are paid only for the time that care workers are in the service-user's home) excises so-called 'unproductive' labour and undermines worker autonomy and discretion, but also the relational aspects of care.

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_5

Homecare workers provide personal care to older and disabled people in their own homes. The scaling back of state-funded support and the marketisation or refamiliarisation of welfare provision has involved shifting the workforce from the public to the private sector (Dominelli and Hoogvelt 1996; Ungerson and Yeandle 2007). Whilst once delivered directly by local authorities, homecare is now overwhelmingly commissioned and, at the time of writing, was deemed to be in crisis with public spending on adult social care set to fall to less than 1% of GDP (Kings Fund 2016; UKHCA 2015).[1] Budgetary pressures on the commissioning of care have produced measures designed to increase productivity through reduced costs and intensified labour. The homecare sector is highly gender segregated and characterised by the employment of workers on zero-hours contracts (ZHCs); in 2016 it was calculated that 58% of homecare workers were on ZHCs (Skills For Care 2016). Under ZHCs there is no obligation upon the employer to provide work or on the worker to accept work, accordingly both working time and pay are unpredictable (Adams and Deakin 2014). ZHCs reflect employer preferences for work-on-demand scheduling (Jacobs and Padavic 2015) which they argue is justified by the significant weekly fluctuations in demand for care. Homecare is further marked by the non-payment (or inadequate recognition of) travel time between care visits (estimated by the UK Homecare Association at 19% of homecare workers' time) and by episodic or intermittent working (Supiot 2001) in the form of unpaid gaps or 'waiting time' between visits and indeed ZHCs facilitate this unpaid labour.

It is important to note the gendered history of homecare which provides the context for what might be seen as the restoration of women's unpaid care work. Homecare was only established as formal employment from the 1970s, with regular fixed hours, written contracts, employment security, access to an occupational pension and latterly to equal pay, along with paid training and supervision (Dexter and Harbart 1983). Since the demand for homecare peaks at certain times during the day (mornings, lunchtimes, evenings and bedtimes) so-called 'down time'—when demand is reduced—has been seen as problematic and as an unnecessary 'cost' for homecare services. It is this so-called paid 'down-time' between homecare visits that has been removed in the

transfer of homecare workers from direct employment by the local authority to the private sector. ZHCs have provided the contractual basis for the removal of 'down time' and accommodated fluctuations in local authority demand for homecare.

Private providers are increasingly required by local authorities to use EM systems to track the real-time location of homecare workers. Time sheets are replaced by integrated computer–telephone technology to record service user visits. Logging in and out may be done through service-users' telephones (as in the case studies discussed here), but homecare workers may also swipe tags on clients' files with smartphones or use mobile telephones with GPS technology. The system matches the care worker's unique number to the database of service users at the EM supplier's call processing centre, logging the time the call was made and aligning this to the roster/schedule of care—the care worker repeats the procedure when leaving.

EM has been marketed as a protection for service users and workers but as Rosenbat et al. write 'the line between workplace surveillance as coercive and protective/performance-enhancing is in constant tension in labor relations, especially as work shifts beyond a specific, bounded location and spills over into a multiplicity of spaces and sites that are neither entirely private nor explicitly the purview of employers' (2014:14). Whilst Himmelweit (2005) suggested that there have been difficulties in increasing productivity in care, EM introduces a new level of managerial control into an occupation where previously, because of its location, managers had only limited remit and attendance was certified by the service-user (Dexter and Harbart 1983). In fact, EM may substitute for the costs of supervision and management, which are not fully funded by local authority contracts. Many homecare workers rarely see a supervisor or manager or colleague and receive their rotas via mobile telephone. EM in homecare has the potential, as Levy proposes for drivers in logistics, to abstract labour from its local and biophysical contexts operationalising job performance as a set of metrics governable by remote parties. The context of work is redefined to legitimate certain types of experience and knowledge and to create new meanings and social orders (2015). In its reduction of the 'care package' (a description suggesting a commodity

rather than a relationship) to a series of tasks and number of minutes, EM may threaten the relational aspects of homecare and undermine the discretionary effort that sustains it. The legacy of gendered domestic labour has underpinned the notion of discretionary labour in care work. For Glucksmann and Lyon 'care is significant as an activity that is simultaneously work and non-work' (2006). These arguments have been used to explain reliance on discretionary effort in care work suggesting that care does not fit well within established labour process mechanisms as a commodity for exchange (Bolton and Wibberley 2014). Rubery et al. argue that current HR practice relies upon care worker 'goodwill' since the structure of the homecare market hampers the potential for effective HR strategy to alleviate inadequate wages and high levels of staff turnover at the level of the individual firm (2015).

Brown and Korcynski's research on the impact of EM in public sector homecare services found that whilst labour was intensified it did not reduce discretionary effort (2010). However, their workplace survey involved homecare workers directly employed by the local authority, EM had not so far affected their working time or income, suggesting the importance of the wider context in considering how technology shapes the labour process, including social relationships (Prichard et al. 2014; Ball 2010). However, Rubery et al.'s 3-year study of the recruitment and retention of the wider social care workforce in the public and private sector (commissioned by the Department of Health between 2007 and 2010), anticipated that EM in homecare could reduce pay by 'restricting paid work time, to time actually spent in people's houses' (2011)—this chapter takes this proposition as its starting point.

The chapter is based upon case studies of homecare commissioning, encompassing the perspectives of EM suppliers, local authority commissioners, care providers and the experience of care workers. It captures variation in the use of EM between local authorities committed to ethical homecare and those authorities paying for care on the basis of contact time only or minute-by-minute commissioning. Such variation reflects the tension between the rhetoric of worker safety and workplace surveillance as coercive (Roseblat et al. 2014). The case studies show that whilst the narrative underpinning the use of EM is its facility to ensure compliance and to safeguard service-users and care workers, it is also

being used to instigate local authority savings by delineating paid and unpaid working time, with ZHCs providing the contractual basis for the removal of so-called 'unproductive' work from the remit of paid labour. The chapter privileges the voices of care workers who perceive EM as an attack on their autonomy and discretion and as involving the degradation of their work.

Research Methods

The study draws upon a number of case studies of the local authority commissioning of homecare. Primarily, it is based upon case studies of two neighbouring local authorities (Authority A and Authority B) in the South West of England between 2014 and 2015 and particularly, the recommissioning of homecare in one of them. This research was funded by a British Academy/Leverhulme small grant and sought to explore the impact of electronic monitoring on wages, hours and the employment experiences of homecare workers. These case studies were selected because of the proximity (at the time) of the researchers and access to key local actors. This study is supplemented by more recent research in 2016 on the implementation of UNISON's Ethical Care Charter based upon nine case studies, including seven local authorities that had adopted the Charter. These case studies considered whether and how EM was used in the provision of homecare, but particularly, in authorities that were committed to improving pay and conditions for care workers.

The case study method facilitated a combination of data collection methods from a variety of sources (Dooley 2002). The role of EM in the commissioning process was captured by textual analysis of supporting documentation in the form of commissioning strategies, consultations, tender documents, along with sales and publicity material for a large supplier of EM systems. The perspective of the technology supplier and technology design is advocated by Collin-Jacques and Smith (2005) and illuminates possible rationales for the adoption of EM. The South West case studies involved interviews with two representatives of the supplier of electronic monitoring software and systems; seven in-depth interviews with six local authority officers involved in the commissioning of

homecare services and service management; five interviews with senior managers or owners of three homecare providers; plus 14 in-depth interviews with female homecare workers working for different homecare providers and with experiences of EM in the area covered by the local authorities. Since the recommissioning process in one authority was prolonged and encountered difficulties, the research took on a longitudinal perspective with reinterviews with commissioners and providers to capture the tendering process and its outcomes. The UNISON case studies were similarly based upon interviews with 18 local authority commissioning or service managers, nine providers, 11 care workers and 13 UNISON representatives. All interviews were face-to-face, based upon informed consent and recorded and transcribed. The authorities are anonymised to ensure that respondents cannot be identified.

Whilst case studies are not representative, the comparison of local authorities subject to the same national budgetary pressures is instructive in capturing the scope for variation in the adoption and application of tendering requirements including EM. Triangulation was achieved through analysis of EM in the homecare strategies of a range of local authorities found on the web which confirmed the use and rationale for EM. Micro-level textual analysis pinpoints the discursive construction of EM in marketing and publicity material as well as in council documentation, which articulates a purported rationale for the implementation of EM systems. Critical discourse analysis of both interview and documentary texts (Roper et al. 2010) captured dissonance between theory and practice, particularly, in the discussion of budgetary issues. Social and political contextualisation was brought by macro-analysis of the wider socio–political practices evoking the political economy of care. This context was informed by previous research on the way ZHCs reconfigured paid working time and a desire to understand how the introduction of EM would affect this trend (Bessa et al. 2013; Low Pay Commission 2013). The reporting of extensive interviews with care workers and the local authority officers and providers that mediate its use is designed to privilege subjectivity and supports the widespread use of the actors' own words below. This is important since, as Zuriek puts it, the subject of surveillance on exposure to the observing gaze is dissolved and 'reconstituted in the abstract' through performance metrics (Zureik 2003: 39).

Electronic Monitoring in Care

EM is used to track missed, late and over-running visits, but also where scheduled visits are cut short. The real-time data is visible to the homecare worker's employer and, where local authorities require providers to use a particular EM system, to local authority officers. Here, the authority owns the intellectual property rights to all information on the Electronic Monitoring System, including care worker data. Ironically whilst local authorities no longer directly employ homecare workers, a computer screen in a council office can identify each worker and their location and calculate the costs of the service as they are delivering it. Whilst EM allows for the analysis of care visit data, it additionally generates invoices directly for payment processing. Related systems provide an integrated scheduling, monitoring and financial management solution which, in the case of one supplier, promises to 'take worker productivity to a new level' improving the management of work. Electronic Scheduling allows providers to allocate the most appropriate care worker for each care plan or visit based upon a range of factors including availability, location and skill set.

Authority A had required Framework providers to adopt EM since 2008. Authority B had previously only expected larger providers to do so, but it was now a requirement under the recommissioning process. Commissioning documentation and interviews with local authority representatives drew, often simultaneously, upon three narratives legitimising the use of EM: worker and provider compliance; safeguarding for both service users and care workers, and cost savings. Local Authority A required external providers to use its specified EM system and stated that it had introduced it for a range of reasons including to promote safety for lone workers and service users, to improve the quality and visibility of the service, to reduce administration costs and to ensure invoices from providers were linked to actual hours of care commissioned and delivered.

In terms of safeguarding local authorities and suppliers emphasised that EM can protect workers from service-users' complaints that they had not turned up or were late or left early, as a Commissioning Officer in Authority A stated:

> The other thing that EM has done for us is it's been very useful with safeguarding and it's been useful for complaints. So if we have complaints where people say the care worker's not turning up and the providers say actually they are, we're able to check that. And we're able to check visit times where safeguarding is an issue. For example, we've had instances whereby there's been an issue of neglect, perhaps somebody has not been given medication, perhaps quite serious medication that they need. So we're able to check on EM whether staff were there and clearly what we're not able not to do with EM is to check that people have had their medication, but we can at least check that people are there.

For Rosenblat et al. the rhetoric of safety may be one justification for surveillance technologies, 'although safekeeping is seldom their sole purpose or effect' (2014: 3). Publicity material for the leading supplier of EM technology states it is designed to improve efficiency and quality assurance in homecare. Whilst safeguarding service users and staff, the supplier also promises financial benefits and EM has been promoted on the basis of significant savings. For local authorities the system offers a three-way analysis of commissioned (purchased) time, versus planned (scheduled) time, versus actual or delivered time so that providers may be paid only for 'contact time' with service users. As a marketing manager explained this means authorities no longer pay for the time between actual and scheduled visits, discouraging shortened visits that might be the result of call-cramming (back-to-back visits):

> What's commissioned compared with what's planned, compared with what's actually delivered, is totally different. The difference between commissioned and planned quite often is somewhere between 10 and 20 per cent. So quite often the planned package once it goes out to an external provider will be somewhere between 10 and 20 per cent different from what was commissioned largely based on the ability of the care provider to actually deliver for that service user based on all the other business that they have to manage. And that's understood within the market to be a key dynamic. However, then what's actually delivered will depend on how effective the provider is at actually planning the time of their care workers and all the issues in the market, things like not allowing for travel time, call-cramming as a result of that. With the best will in the world,

> and allowing as much time as you possibly could to run a commercial business and still make a reasonable profit, visits do start to run late once you get to the back end of the day. And as a result of that, the half an hour visit often becomes an 18 minute visit or a 20 minute visit. The difference between commissioned and actual delivery can be anything up to 40 per cent difference. And that's really why a lot of councils, and we came back to drivers, for many councils it was about making sure that they were only paying for the care that was delivered once they'd outsourced the bulk of their home care to the external provision.

The EM supplier in question reported working with 65 local authorities and publicity material confirmed direct cost savings between organisations paying on commissioned time and those monitoring and paying on actual delivery of upwards of 37%. The UK Home Care Association (UKHCA), which represents homecare providers, notes that with very few exceptions councils pay providers by reference to 'contact time' only, leaving the provider to meet the full costs of the service and placing severe pressures on the payment of all working time including travel and training and supervision costs. The UKHCA believes this is a universal practice to reduce the transactional costs of invoice processing for councils (2015: 15).

It was reported that in Local Authority A, since it had begun paying providers for only the care delivered, it had made 10% savings in its Adult Social Care purchasing budget. Its Framework Agreement obliges providers to transfer rostering information five days in advance to the council's system. Invoices are produced from the EM and are paid only if they are submitted via EM (in exceptions the provider is charged by the council for processing invoices). Payments are made where the total visit time is within the parameters defined by the council, where they are in excess of this time there is an investigation by council officers, but payment will not be authorised where they consider variation to be outside the agreed requirements and providers are instructed not to provide visits in excess of contractual arrangements without authorisation by the Council contracts team. The Council commissions in half hour bands as a minimum and then 15 minute blocks after that. A care worker reported on the implications of the banding system:

> You'd be out on say like £8 an hour, and if you were in there quarter of an hour out of a half hour duty, then you'd only get quarter of an hour. If you were there 20 minutes, you wouldn't get 20 minutes pay, you'd still get your quarter of an hour. But if you stayed there 30 minutes, you'd obviously get your 30 minutes. They basically rounded it up or rounded it down to the nearest quarter of an hour or to the nearest half an hour. So in my eyes they were penny pinching. They were trying to save money. That's why I left because I felt I would end up rushing the job instead of actually caring about the work and in my eyes that's not caring. [Careworker6]

The commissioning officer for Local Authority B confirmed that, as in Local Authority A, the introduction of EM has yielded financial benefits for the Council:

> We've had a cost saving since we've introduced Electronic Monitoring. What we were doing was we were paying providers on what we commissioned. So if we commissioned 'x' number of hours, they would then be paid for 'x' number of hours, what we now do is we pay providers on what we call actuals, so the actual time they've spent with the service user, because we were paying too much, because often what was provided wasn't what was commissioned - perhaps the service user's needs changed or whatever or often it can be the case that they would say to the provider: "I don't want you today because my daughter's here," or whatever. There's a legitimate reason for turning the provider away.

The quote demonstrates the contingent nature of homecare and here providers and ultimately workers absorb the risk represented by the fluctuations in the demand for care, which might (as in the quote) be down to changes in service users' plans, or be as a result of hospitalisation or death. In Local Authority A, if a service user is admitted to hospital on an emergency basis the provider may charge for the next planned visit within 24 hours if the provider was unaware of the admission—no further charges are made until the service resumes—recommencement of the service is required within 24 hours.

In Local Authority B, the requirement to adopt EM in its recommissioning process involved a move from a banding system,

where workers would be paid (as in Authority A) to the nearest 15 minutes, to being paid to the minute, as a provider anticipated:

> If they do minute-by-minute billing, and that person leaves early, they will only get paid their 20 minutes. Whereas at the moment if the girls stay over 23 minutes they are paid for a 30 minutes call; so it comes into sections of time about how much they get paid and if they stay 22 minutes they only get paid 15 minutes - there's a cut-off point.

Whilst EM can be used to ensure that visits are not cut short, in this case it was also designed to guard against care workers 'hanging around' to the cut-off point to make up their pay. The commissioning of care on 'actual' contact time suggests that any time not spent in the engagement of care tasks in the service-user's home is not productive and therefore does not have to be paid for. This includes training, management and supervision. It also includes provider overheads and another provider reflected upon the downward pressure on cost in the retendering exercise on top of the impact of minute-by-minute commissioning:

> Well they're saving, if the carers are going in and it's a 30 minutes call and they go in for 20 minutes, they only get paid for the 20 minutes. So in a week if that happens, it all adds up doesn't it, and if you're doing a lot of calls it's going to add up somewhere along the line isn't it? You are going to have to be much tighter on your scheduling and make sure that you have allowed adequate time for everything, travel time, traffic, all eventualities so that that person can be allowed the time that they've actually got for that person otherwise they are going to lose money. When you think what has got to come out of that hourly charge rate it's frightening – we put in the cost of the manager, the cost of the coordinator or two coordinators, the cost of senior carers, the cost of an office, the cost of the company HR all of that – then there's the IT, the EM system, the expenditure on that – that's all got to come out of the £14.20; the hourly pay rate – the lowest rate is £7.45[2], national insurance, pensions –you try and work out the maths because I can't!! The person from the bid team that was doing it came back to me and said: "Are you having a laugh?" And I said, "No, I'm not—that is the highest we can bid at." She said, "You just can't do it." The most frightening thing about the whole process

> is the charge rate. They've set it and the maximum they've set it at is £14.20, which is a cut for us. We're trying to pay our homecare workers a living wage, we're trying to pay appropriate mileage, travel time and on the margins that you've got on the charge rate that [the local authority] are setting you can't do all of that – it is impossible.

In fact, this provider lost out in the recommissioning process, reporting that one of the four successful providers had tendered at £12.20 an hour– a rate which the director of the company stated was 'unviable' and the exit of large providers from the publicly funded care market has been documented ADASS (2015). In the case studies of authorities that had adopted UNISON's ECC there was a general rejection of minute-by-minute commissioning, which was perceived as incompatible with ethical care and in particular the payment of a Living Wage and travel time. Here, there was acceptance that to deliver the ECC charge rates had to reflect these costs and, where the Charter had been successfully implemented, authorities had provided extra investment. Only one of the seven authorities paid providers on contact time to the minute. Significantly, one of its providers reported that it absorbed the difference between contact and scheduled time in order to protect care workers' pay and suggested that providers often accommodated such costs to avoid the costs of staff turnover.

ZHCs effectively remove both waiting time between visits and travel time from the remit of paid labour, however, since the worker is available to the employer during those times the line between paid and unpaid labour may be blurred. EM represents a step change as it clearly delineates productive and apparently 'unproductive' labour time for the purposes of pay. One key aspect of this is that workers are penalised for running late, whether through call-cramming, the unexpected demands of service users or travel difficulties. For homecare workers employed by providers in Authorities A and B, EM was perceived to have resulted in cuts in pay, one said she had lost pay because call-cramming meant she would arrive late to visits and was sometimes earning only £120 a fortnight. Another care worker recalled that her co-worker had calculated that EM had meant a reduction in pay of £50 per week and she described how each visit introduced new sources of unpaid time that added up over the day.

As other care workers reported, whilst EM meant they would not get paid for cutting calls short, they were also not paid where calls overran scheduled time because of unforeseen circumstances:

> When I started with them there was no clocking in, but that did come into play. And if you moaned about not having enough travelling time, they would just take those clients off you and then you would have a big gap. So you would sit and wait for an hour and a half before your next one or an hour. And then they brought the clocking-in time as well, it was supposed to allow for travelling time. And on our call sheet it would have 'Client 1: Address' and then they would put a five minute gap. They said that you would have five minutes to get there. That actually happened for about two or three months and then the time sheets were coming back normal, just like before, with no travelling time and clients' time starting in the middle of the previous client's time. You were driving from A to B and just manic, dangerous driving because you're rushing to get there. And then the poor clients—because you're 15 minutes late, and it's not fair on them—and then you've got to leave on time. So you're clocking in late because you've got no travelling time and you're clocking out on time but only getting paid then 15 minutes for a half an hour call. But you are actually still working and then, they said to us if we went over our time with a client we wouldn't get paid because that's not the contracted hours. The council won't pay them, so the agency won't pay us. So if we did an extra hour, which happened quite often if somebody has had a fall or somebody wasn't well, and you stay on because it's your duty of care, we wouldn't get paid that [Careworker8]

The extent of unpaid labour is underlined by another careworker:

> The last shift I did from 7 till 2 I had six calls and I had 3 ¼ hours so availability is 7 hours and I got paid 3 ¼. But I had my uniform on obviously I couldn't do anything else. That was a fairly typical day, getting paid for about half the time I am available for work. If I had a full day, it would be from 7 in the morning till 10 at night and then you probably might get 6-7 hours' pay out of that. [Careworker12]

For Ehrenreich (2001), time and tracking technologies can be used to constrain employee attempts to 'steal' time from employers and, in the case of homecare, this extends to providers. Local Authority B anticipated that the requirement to utilise EM would cut 'illegitimate' manual entries based upon the commissioned time, since the council could monitor centrally on a real-time basis. Whilst there was some acceptance that failure to log in and out could be legitimate, there was also suspicion that both providers and care workers could manipulate the system as one commissioning officer commented:

> The providers can override the system so, for example, some service users would not let the care worker use the phone for whatever reason. And then it has to be a manual entry back at the office. We just need to be very careful about making sure that those manual entries are legitimate. If the care worker logs in at a service user's house then it says how long they've been and how long they haven't been there. The ones that are done back at the office we don't know whether they're legitimate or not. We can do spot checks with those, what we do is we've analysed the providers so we check how many are doing the manual entries back at the office. And some providers will stick out like a sore thumb.

For care workers back-to-back visits ('call-cramming') and insufficient travel time between them drives them to cut visits short to ensure they get to the next service user ('clipping'); this is further encouraged where travel time is not paid in order to minimise the extent of unpaid labour and because of the direct relationship between contact time and pay. One provider described how care workers may attempt to claw back unpaid travel time or paid time lost through call-cramming by cutting visits short:

> I think people forget to log-out, and in some cases genuinely. I think other cases they're trying to work the system. So you've got a 30 minutes call, you might have only stayed 20 minutes but you haven't logged out so you're at the next client's. Whereas if they'd have stayed their full 30 minutes—you can't be at Gladys's at twenty past seven when you only got to Bert's at 7,

> and it's a 30 minute call. So they're shortcutting the calls, so it can be worked—it can be abused, shall we say, not worked—and, obviously, we have to, as providers, clamp down on that and try and address those things. I think some of the girls will try and work it so that they're shortening their calls but trying to get the full 30 minutes. And it's not helped when you've got people in that round that either won't let you use their telephone, because we've got some people who won't let you use their phone. Or they haven't got a phone so you can't always track it as closely as you would like to.

Care workers confirmed that service-users could be reluctant to let them use their phones, having to be reassured that they would not be charged, or that phones might be in use when they needed to clock in or out. Yet, in Authority B no payment is made where visits have not been logged correctly. Rather than workers stealing time, care workers reported losing pay when they forgot to or could not clock in, which was often a result of rushing from one call to another:

As Levy (2015) describes for fleet management systems used to track drivers, real-time monitoring removes the ability of workers to reconstruct their time, which may be to demonstrate or manufacture compliance. EM thus undermines informal worker power as well as their formal autonomy at work. As one care worker describes, it also removes discretion, forcing workers to stay in service users' homes where they judged that they were not needed:

> If the house visit was for, say, half an hour, you had to log in when you got there, say 12.30, but you weren't allowed to log out; you had to stay there. If I went in for 30 minutes and they didn't want anything, they just wanted a cup of tea, a bit of toast and butter and I was only there 15 minutes, I would only have got paid for the 15 minutes. So I had to stay there right up until two minutes before I left so that I could get that pay. [Careworker2]

The removal of discretion was particularly felt in the context of the contingent and unpredictable nature of homecare work, in the context of

variable travel and transport conditions and the vulnerability of service-users:

> You could leave dead on time but they don't give you any time for travelling. You can be stuck in traffic 20 minutes, half an hour but you don't get paid for that. And then they're questioning you: "Why are you late?" And you've got traffic lights, you'll hit traffic, you could be stuck for ages. It's not a case of skiving off anywhere: you're stuck. Some people can spend half an hour on the loo or they could have had an accident where they mess themselves and you've got to stay there and clean them. You can't walk away. My argument is—which is what I've argued with them—you cannot walk away from a service user or a client whatever you want to call them, if they've had the accident where they've messed themselves or even if a client's had a fall. I went to a service user who had a fall and I rang an ambulance to get the person up and checked out. Then I rang in work because I was running really late. [Careworker9]

As an officer responsible for quality assurance reported homecare workers perceived the surveillance of their work as indicating a lack of trust, once again drawing upon narratives of safety and service quality to support the implementation of EM:

> I think at the beginning, some of the care workers found it a bit of a faff; felt it was a bit big brother-ish, which you can understand. Also you can understand some of them might have felt that it was there because of a lack of trust. But I think there's an understanding that if we are not able to monitor then how do we know this won't happen? In quality assurance, if it's not written down and somebody doesn't say what's happening, then it hasn't happened. It's better for the staff because of the fact that they can prove they've been there. They can prove they arrived and when they left. They can't prove what they did in between but at least they can prove something. I don't think it's a way of saving money—that's my feeling—but I work on the quality assurance side. Obviously it could be used, it can be used for that, but that's where people aren't meeting their business targets and what we expect of them in the contract. But that's not the primary function. The primary function is to make sure that people are

> turning up and reassurance that people are going to turn up on time and that something happens if they don't.

The narratives of care workers do not suggest that employers were able to initiate the type of organisational discourses to build trust in technology that Prichard et al. identified as key to mediating the extension of managerial control through technology in healthcare call centres (2014: 821). This may be because of the dispersed nature of the work and limitations on managerial time, however, Prichard et al. also found that workers were able to exercise some discretion in the operation of the technology, lending legitimacy. A care worker suggested her frustration at the lack of trust EM intimated, but also that paid work depended upon use of the technology:

> With the clocking in on the phone, I used to forget to do it a lot of the time. I phoned the office to say I've forgotten to log in, she used to say: "Oh, I'll do it for you," but if she didn't I wouldn't have got paid. And I think it's wrong really because they damn well know you're there and damn well know you're at work. Because if you're not there, when you're supposed to be there, that service user would ring the office and say that I hadn't turned up today. [Careworker2]

The notion of 'big brother' was invoked by a number of respondents, with EM generating a palpable sense of the 'management gaze' and remote signal of control that communicated expectations of compliance (Rosenblat et al. 2014), as one provider reported of the workers she employed across both authorities:

> They don't like it and we had a huge resistance when it was first introduced. And, in fact, they introduced the electronic monitoring and what happened was that it affected the quality, the relationship between the carer and the client. It was clock-watching and you hear the "we need to come on, get a move on" sort of thing and "I've got to get to the next person". Well we don't have a choice in it, we won't have any work if we don't comply, the authorities felt that they were paying more, they could pay less. It was financial.

Here, the rationale for EM was identified as financial, with concerns raised about its impact on the quality of care shared by a service manager in Local Authority A. He refers to 'the flags' that come up on the computer screen to track the relationship between planned and actual visits and which signal non compliance:

> I think it was introduced supposedly for quality purposes although my personal opinion is that it doesn't monitor quality. It's finance-driven actually because before we would pay for what we'd commissioned. So now we pay for the actual, so if they were there for 29 minutes we pay for 29 minutes. For me, the most important thing—what it should do—is be able to monitor the difference—so the closeness to what we've commissioned to what's actually been provided. We actually don't get a report on the difference between commissioned to provided until the invoice stage which is actually quite late in the process. So we could have commissioned hourly visits but the provider knows that they can't deliver hourly visits so they plan different. And the flags that come up are based on the planned - all it does is tells you that somebody turned up, it doesn't tell you what they did. It doesn't talk about the attitude to the way that they provided care, it just tells you that they were in the house for half an hour, they could have been sat there.

Care was seen to be reduced to the correct operation of the telephone system and to watching the clock, as one worker reported:

> I found personally—and loads of other people do think this as well—that when you have to clock in and clock out, when you're in a client's house to do the job, you're constantly looking at the time. So you've got half an hour duty to do, you clock in at 10: "Right I've got half hour to get out". And that's what's going through the carer's mind. Because you're not paid if you go over your time by five minutes, you're only paid half an hour. If you go over by 10 minutes you're paid, I think you're paid quarter of an hour extra. But then they want to know why it's taken that length of time. Which is fine and understandable I suppose, but I felt like it's big brother watching you. They're rushing all the time. There's no

> time for human care if you like, not personal care but the human contact care where you can spend time and say; "Are you alright? How you doing?" That's what it's like. [Careworker 6]

As suggested here, care workers perceived that EM constrained the relational aspects of care (Brennan et al. 1999) that are embedded within the commodified care relationship (Ungerson 1999), another care worker confirmed this:

> I think if you go in and you've still got your jacket and you're still running around, you're not there with them really. You're just there to feed them and give them a hot drink. I always used to go and take me coat off and put me bag down and ask if they're ok first. And my trouble is I chat too much and, of course, when you're chatting with them and then you make their drink, they don't want you to go. But you know you're looking at that clock and – the chatting, it's companionship, it's definitely part of care. [Careworker2]

Care workers reported returning to clients outside of the EM system to do tasks that they had been unable to finish within paid working time, although others were unwilling or unable to engage in such discretionary labour. Here, the reduction of care to a series of tasks in the Taylorist fashion may undermine the discretionary effort upon which homecare has been dependent since EM makes it absolutely clear that it is unpaid work, as summed up by a provider:

> We have had cases where someone has stayed to have a chat – well, the authority aren't going to pay us for you to stay and have a chat with them, that's your time. Log out of your time and then stay and have a chat if you like but you need to go on to your other clients.

This may address Folbre's question as to whether, in the context of a gendered and ethically driven propensity to care, reliance on extrinsic rather than intrinsic motivation might affect the quality of care in the labour market (2012), with contradictory outcomes for women's care labour.

Conclusions

Empowerment and disempowerment are defining features of workplace surveillance (Zureik 2003: 66). This account embeds workplace surveillance in the employment relationship, demonstrating that EM goes beyond the recording of working time (Cockburn and Ormerod 1993) and has little potential to empower workers. The case studies of local authorities in the south west of England demonstrate that homecare workers perceive EM as undermining their autonomy and discretion in what is contingent and unpredictable work. They also suggest that it damages the relational aspects of care work. The narratives of the care workers do not suggest that employers have built trust in EM, but articulate their experiences of EM in terms of managerial control and the degradation of their work. They make it clear that they understand EM as a system which sets limitations on their pay, anchoring paid time within service-users' homes.

Unpaid work has become embedded in the organisation of homecare; in combination, ZHC and EM strip so-called 'unproductive' labour from care work. ZHCs provide the contractual basis for episodic work and the non-payment of travel time—here the relationship between paid and unpaid elements of work is unclear because the care worker is seemingly available to the employer when not in the service-user's home. Bell and Tuckman assert 'the homogenisation of working time', extending the real subsumption of labour and capital's permeation into free time (2002), with labour increasingly available to capital. The line between time expended in 'labour' (where labour is sold as a commodity), and 'free time' outside of that contract (uncommodified outside of exchange) is blurred. In these case studies, EM delineates, rather than blurs, paid and unpaid labour enforcing a spatial and temporal demarcation between the two whilst simultaneously demanding unbounded availability from the care worker. EM facilitated the payment of providers for client contact only, particularly on a minute-by-minute basis, removing further elements of work from the remit of paid labour. Care workers are penalised if they overrun on calls because of the contingent nature of service user need or if they subsequently run late because of

such contingencies or because of call-cramming and insufficient travel time. At the same time, they are prevented from leaving before the end of scheduled visits even if not needed which, in the absence of paid travel time, is the only way they can claw back paid working time. Whilst hourly rates for homecare workers may be formally at or above the level of statutory minimums (and, in some cases, the Living Wage) an increasing proportion of working time is unpaid bringing paid working time below these minima. In Marxist terms, EM achieves an increase in the rate of relative surplus value through reconfiguring the ratio of unpaid to paid working time and consequently results in an intensification of work in pursuit of higher productivity (Mavroudeas and Ioannides 2011).

As Zureik maintains the surveillance of work cannot be severed from the surrounding political and economic environment (2003). This study of EM in homecare is located in the political economy of care, where in the context of the retreat of the welfare state, the creation of a market in care and cuts in public spending, local authority commissioning processes place severe competitive pressures on providers to deliver at lower prices. This emphasis on political economy avoids a technologically determinist approach (Howcroft and Taylor 2014) and the reference to case studies of authorities that have adopted UNISON's Ethical Care Charter suggests that whilst financial pressures have shaped implementation, there is a commitment to ensuring that care workers get paid a Living Wage and for travel time. Political and financial commitment from council members (or in the case of Scotland, the government) in response to national and local trade union pressure appear to have made some difference. Here, EM was used more for the purpose of safeguarding and compliance and ethical care was generally considered incompatible with minute-by-minute commissioning. Significantly, however, these case studies showed that the issue of working time and ZHCs is more intractable[3] in the context of budgetary constraints that remove so-called 'down-time' or define elements of work as apparently 'non-productive'; the 'work-on-demand' model.

The state, in the form of local authorities, engages in third-party surveillance within the homecare employment relationship to benefit from the extraction of unpaid labour from care workers. As Hayes and

Moore (2016) have suggested, EM communicates political suspicions that public money may be wasted in paying for care and has to be subject to stringent controls. This challenges the legitimacy of care as a public responsibility and plays into gendered expectations of women's unpaid care labour.

Notes

1. The Association of Directors of Adult Social Services, described services as at a tipping point where social care was 'in jeopardy' (2016). The Chair of the Local Government Association (LGA), Lord Porter reported that social care faces a funding gap of at least £2.6 billion by 2020 and that councils would receive nearly one third (31%) less Revenue Support Grant to run local services in 2017/18 than 2016/17 (LGA, 15/12/16).
2. The National Minimum Wage in 2014.
3. Some authorities have attempted to introduce Guaranteed Hours Contracts to move away from ZHCs, but early evidence suggests these are not fixed-term contracts, but continue to be based upon workers being available to employer demands for variable working time.

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Social Recruiting: Control and Surveillance in a Digitised Job Market

Alessandro Gandini and Ivana Pais

The way the Internet intervenes within the domain of work has been the object of an interdisciplinary body of research across the past two decades. Most recently, this scholarship has focussed on a variety of issues, including questions of value and exploitation (Fuchs 2014), the rise of online labour markets (Gandini et al. 2016; Kässi and Lehdonvirta 2016), the diffusion of self-tracking devices to measure work productivity (Moore and Robinson 2015), job automation (Frey and Osborne 2015) and its long-term sociopolitical and cultural implications (Srnicek and Williams 2015). Within this context, significantly less attention has been given to how digital technologies are coming to mediate processes of job seeking and recruiting. In fact, the way job demand and supply meet in the labour market has undergone equally relevant changes in just more than a couple of decades. The diffusion of Internet job boards and listings across the late

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_6

1990s and early 2000s has been followed by the rise of the social network ecosystem and the success of a dedicated professional social media, LinkedIn, which records almost 500 million users worldwide at the date this chapter is finalised.[1] A plurality of websites, platforms and aggregators of job ads is now available for job seekers to browse as well as for recruiters to use as valuable tools in their daily work activity.

Research on this topic has been, however, relatively scattered. An initial wave of works coincided with the coinage of the term 'Internet Job Search studies' (Kuhn and Skuterud 2004; Vicknair et al. 2010; Marchal et al. 2007; Fountain 2005). Nevertheless, despite stimulating an early scholarship around the topic, the discussion around the use of the Internet in recruiting and job seeking has remained largely secondary, with the mainstream debate unfolding around the various theoretical perspectives that have been adopted to interpret this changing scenario, most notably the notions of 'virtual work' (Huws 2009) and 'digital labour' (Fuchs 2014; Scholz 2012). Recently, we have witnessed a renewed attention to the matching of demand and supply of workers across the Internet by an interdisciplinary literature (Jeske and Shultz 2016; Gandini 2016; El-Ouirdi et al. 2015, 2016; Pais and Gandini 2015). However, these works still portray a quite fragmented picture, and it seems necessary to address the scale and implications of the transformation at stake to a greater extent.

This chapter aims to do so by looking at the way job seekers and recruiters use social media in their activity of, respectively, job procurement and screening of candidates—something that has been labelled, particularly, in the non-academic world, as 'social recruiting' (Jacobs 2009; Vicknair et al. 2010; Pais and Gandini 2015; Gandini 2016). Thanks to a set of survey data collected within the scope of a two-year international research project on social media and job hunting, we outline here how social media have come to represent a key interface in the matching between demand and supply of work across existing labour markets. Particularly, we will observe the extent to which these are now used as common tools in the recruiting process to the aim of monitoring a candidate's activity on social network sites, as we evidence how information retrieved on more or less public social media profiles is being used by recruiters for purposes of control and surveillance—and critically

assess the implications deriving from the widespread intermediation of social media in the meeting of supply and demand of work.

On the basis of such empirical evidence, we will come to argue that so-called 'social recruiting' practices offer unprecedented possibilities of pre-emptive control to be enacted by recruiters on prospective candidates. In analogy with Zwick and De Negri-Knott (2009), we will contend that social recruiting practices enable a 're-organization of the gaze of recruiters', who now have at disposal a wide-reaching array of databases containing information about applicants for jobs and positions of various sorts—a 'networked job seeker database' that can be accessed through the main social media and digital platforms. We will underline the far-reaching implications that emerge as a result of this documented, pervasive use of digital technologies in the hiring process, as social media are being increasingly used as spaces of control and surveillance on the recruiting side, in the relative ignorance of those being observed—and we will conclude by establishing potential trends for future research in this area, as the relevance of social media within the domain of work expands in scope and range.

Social Media and the Job Search

The extent to which one's social activity within a labour market intervenes as a factor of significant relevance in the hiring process has been made the object of attention of sociology for decades. This literature has principally been based on the work by Mark Granovetter who, in a series of works between 1973 and 1995, contributed decisively to the field by acknowledging the relevance of network dynamics, and especially the access to 'weak ties', to guarantee job seekers the necessary level of information in order to put them in an advantageous position to get a job (Granovetter 1973, 1985, 1995).

The pivotal idea behind Granovetter's legacy is that job seeking is an eminently social activity, and its outcomes are a direct function of this social nature. The idea that network relations are at the heart of professional success, particularly in the more digitised areas of labour (Gandini 2016; Grugulis and Stoyanova 2012), is still incredibly relevant

for present-day research, although there seems to be a need to better understand the forms of sociality involved in the hiring process within a scenario of pervasive, technologically—mediated social relations. The intermediary role of the Internet, and of Internet-based applications, within professional social relations is such that virtually no aspect of job seeking, recruiting ,human resource management, employee relations and the labour process itself can be said to be exempt from this dynamic.

This chapter focuses on two closely related and very specific aspects in this context—how job seekers use social media to find work online, and how recruiters use the very same resources for their own professional purposes. The recourse to the Internet and its features for purposes of recruiting, evaluating and filtering candidates is reported to be common practice since as early as the beginning of the 2000s. Cappelli (2001) accounted for around 90% of large US companies engaging in technologically enhanced forms of recruiting at the turn of the century, what the HRM literature had by then termed 'headhunting' (Macdonald 1986). In a survey conducted in an analogous time frame, Chapman and Webster (2003) noted that HR managers and recruiters had been looking with interest at IT innovations in recruiting for a decade, and had envisaged an increasing adoption of technologically-driven forms of candidate selection.

On the job seeking side, the study of how the Internet can help prospective applicants to be more successful in getting a job simultaneously arose to prominence. A dedicated strand of research, termed as a whole as Internet Job Search Studies, developed across the mid-2000s mainly looking at the rise of Internet job listings and online boards. Kuhn and Skuterud (2000) accounted for as much as 15% of unemployed job seekers using the Internet to search for employment in 1998, with Internet job search rates starting to exceed those of private employment agencies, registers of unions and other organizations. This rapid innovation adoption, however, was not exempt from challenges. Marchal et al. (2007), for instance, observed that early job boards and listings, often perceived as neutral intermediaries in the process of matching between demand and supply, were in fact largely unable to cater for the efficient matching job seekers were expecting (see also Gandini 2016; Pais and Gandini 2015).

Towards the end of the decade, the study of the Internet as an intermediary for job hunting and recruiting expanded in scope, coming to question the emerging role of social network sites (boyd and Ellison 2007) in this context. The term 'social recruiting' (Jacobs 2009; Vicknair et al. 2010; Pais and Gandini 2015) came to be commonly used by specialist commentators as well as academics to indicate the increasingly central role played by social media, such as Facebook, Twitter and LinkedIn to offer candidates new tools to search for jobs, as well as to provide recruiters with instruments to attract and screen candidates. Vicknair et al. (2010) were among the first to develop an academic contextualization of the term 'social recruiting', observing a vast diffusion of the use of social network sites for hiring purposes by recruiters, largely in parallel with the rise of LinkedIn as the leading social network site for professional purposes (Vicknair et al. 2010; Gandini 2016).

As a matter of fact, social network sites today are arguably essential resources for job search and recruiting practice (Pais and Gandini 2015; Gandini 2016). A variety of recent industry reports confirm such a significant trend, on both the demand and supply side. One amongst many, the Jobvite survey (Jobvite 2014), outlines how 76% of job seekers find employment opportunities via the Internet, with Facebook being their main search platform, whilst recruiters tend to concentrate their activity on LinkedIn when searching for candidates. The practice of using social media for job search and related activities seems to be a prerogative of mostly young (30–39 years old) and highly educated workers (Jobvite 2014). The encounter between demand and supply online has been made the object of attention by some recent academic literature, with the aim of understanding the broader implications of the adoption of digital media and social network sites in HRM practice. Jeske and Shultz (2016), for instance, note that, despite the growth in the uses of social network sites for professional purposes, legal frameworks and guidelines for the screening of candidates through social media are still at a very early stage. On a similar note, Wolf et al. (2014) bring forward the idea that HRM practice is a three-dimensional communicational process that heavily involves social media at the level of firm strategy, policy and practices of recruiting. However, they note, this still plays out in a dichotomy between top-down integrations of social media in the

recruitment process, and bottom-up uses that escape organizational control—something they believe is in its initial stages as a practice, and therefore needs further exploration. Ollington et al. (2013) explore the way social recruiting practices relate to the social networking practice usually at stake with job seeking. Thanks to evidence coming from interviews with 25 recruiters, their study finds that recruiting online is still very much a headhunting-oriented and specialist practice, which combines with widespread use of social media as a check for self-reporting bias by candidates. Building on social network theory, they contend that recruiters on social media remain a brokering social actor in a network ecology that favours 'weak ties' (Granovetter 1973), playing what they call a 'connector role' (2013: 255). El Ouirdi et al. (2015), using quantitative methodologies, show that recruiters are more inclined to engage in digital-based recruiting in accordance with the potential job-related gains, also evidencing differences in use and implication on the basis of the age of the recruiter.

Yet, despite this recent wave, most of the literature is still by and large descriptive and addresses the topic in a fragmented way. What is particularly noteworthy within existing works is the relative lack of engagement with bigger and broader questions concerning how labour markets are changing in light of the pervasiveness of social media technologies and their widespread use in day-to-day practice by a variety of actors involved in this scenario. Our work aims at responding to this necessity by starting a discussion on the broader implications of the integration of social media within job markets. Using large-scale data on social media adoption in job seeking and recruiting practices, we will critically assess what makes a 'digital labour market' and what implications the increasing use of social media brings for the study of the meeting of supply and demand of work.

Research Design

The data presented in this chapter derive from a two-year research project on the use of social media for job hunting and recruiting, undertaken between 2014 and 2015 at the Catholic University of Milan. The data

collection process in this project consisted of the administration of two large-scale questionnaires addressed at job seekers and recruiters in a variety of countries, distributed via the network of subscribers of a major agency work provider worldwide. This was done in two iterations—one in 2014, one in 2015—with a design that is not conceived as longitudinal, since the questionnaires are similar in nature and scope but differ in terms of the specific questions asked. The two samples are also broadly similar in terms of demographics and results. For the purposes of this chapter, we will mainly discuss data from the 2015 iteration of the survey, with few exceptions that we deem very relevant to the purposes of this work—which will be clearly labelled in the relevant findings section below.

The questionnaire collected responses from 26 countries and is composed of 31,793 job seekers—of which 73% provided a full set of responses—and 4168 recruiters—of which 44% filled out the entire questionnaire. In terms of countries, among job seekers the majority of responses come from France (51%), Argentina (15%) and Italy (10%); among recruiters, again France (30%) is the most represented country, followed by Japan (11%) and Thailand (9%). In some cases, for purposes of clarity we have aggregated findings on the basis of the following geographical areas, based on a criterion of geographical proximity and taking into account the number of responses received for each country:

a. Europe, that comprises of Belgium, Finland, France, Italy, the Netherlands, Norway, Portugal, Spain, Switzerland and UK, which in relative terms amounts to 66% of job seekers and 53% of recruiters;
b. the Asia-Pacific region, that comprises of Australia, China, India, Japan and Thailand, which amounts to 4% of job seekers and 29% of recruiters;
c. the American region, that comprises of Argentina, Mexico and USA, which amounts to 23% of job seekers and 8% of recruiters;
d. the Eastern European region, that comprises of Bulgaria, Czech Republic, Greece, Hungary, Poland, Romania, Russia, Slovenia and Turkey, which amounts to 7% of job seekers and 10% of recruiters.

It is worth noting that, when present, the comparative analysis of data across these geographical areas was adjusted using two auxiliary variables. This was done with the aim of increasing the representativeness of the samples compared to the real population of each of the macro-areas considered, and is principled on the assumption that individuals residing in different countries within the same macro-area all had the same opportunity to participate in the study. On the basis of this criterion, we created two distinct auxiliary variables with different weights for the groups of job seekers and recruiters (see Tables 1 and 2). The value of each weight derives from the real size of the population of macro-area X and the quota of interviewed subjects out of the total of the group that resides in the same macro-area (X). For example, the auxiliary variable for job seekers residing in Europe acquires a value equal to

$$\left(\frac{296,340,241}{3,929,978,161} * 100\right) \Big/ \left(\frac{17,670}{26,794} * 100\right) = \frac{7.54}{65.95} = 0.114$$

Nevertheless, we deem the nature of this study is a substantially exploratory one, that is not representative in statistical terms of the entire population of people who are engaged in online and/or social media job search. This is mainly due to how the survey was distributed—that is, via the network of subscribers of a major agency work provider worldwide, thus resulting in a sample that is not constructed in probabilistic terms. In addition, it must also be acknowledged that the entire distribution of the survey was online-based; this means that, for how this is coherent

Table 1 Geographical weights for the job seekers' sample

Country		N	%	Sampling weight
Europe	Sample	17,670	65.95	0.114
	Population	296,340,241	7.54	
Asia-Pacific	Sample	994	3.71	19.417
	Population	2,830,997,606	72.04	
Americas	Sample	6169	23.02	0.536
	Population	484,491,800	12.33	
Eastern Europe	Sample	1961	7.32	1.106
	Population	318,148,514	8.095	
Total	Sample	26,794	100	1
	Population	3,929,978,161	100	

Table 2 Geographical weights for the recruiters' sample

Country		N	%	Sampling weight
Europe	Sample	1130	52.71	0.165
	Population	205,279,102	8.72	
Asia-Pacific	Sample	615	28.69	2.141
	Population	1,446,734,016	61.42	
Americas	Sample	178	8.3	2.478
	Population	484,491,800	20.57	
Eastern Europe	Sample	221	10.3	0.902
	Population	218,860,783	9.29	
Total	Sample	26,794	100	1
	Population	3,929,978,161	100	

with the object of study, it also excludes those who do not have access to digital resources altogether. Finally, as a result of this modality of distribution, we must also acknowledge the potential existence of self-selection bias (see Lavrakas 2008).

Empirical Findings

Sample Overview

The sample of job seekers is composed of a slight majority of women (53%) over men (47%). In terms of age, the sample maps a relatively young age group. Data are in fact pretty much equally distributed across three age categories: the range 26–35 (workers born between 1980 and 1989), which corresponds to a third of respondents (33%) and the categories 18–25 and 36–45, each amounting to around 22% of the sample. In terms of education, we are confronted with a sample composed of highly-educated subjects, since almost half of the sample (47%) have a first-level degree (BA) or have attended university, and around 27% of respondents have a postgraduate degree. Approximately one-fourth of the sample (24%) has a high school diploma, whilst only a tiny minority (3%) of respondents do not possess a secondary education title. In terms of academic disciplines, workers in the sample mainly have a background in business and law (19%), engineering (12%) and communications or related degrees (7%).

For what concerns work experience, a large majority of respondents (61%) have worked for less than 10 years, divided as such: 14% have less than a year of work experience; 13% have 1–2 years experience; 17% have 3–5 years of experience, and an analogous percentage of respondents have worked for 6–10 years. The remaining 39% is constituted by older categories of workers who have between 11 and 20 years (46% of the subsample) and more than 20 years experience (54% of the subsample). In relation to the occupational status of respondents at the time of completion of the survey, 40% of them are unemployed, and 7% are looking for their first job. Those in full-time employment amount to 27% of the sample, whilst 9% have a part-time occupation and 4% are full-time students. The sample maps also a limited portion of self-declared freelancers (4% of the entire sample). A large majority of respondents are active job seekers who have searched for a job in the last year (73%) or for the past 2 years (10%). A noteworthy 71% of respondents is actively seeking for a job at the time of completion of the questionnaire, whilst 21% were not actively looking for employment at that moment, but may be doing so in the near future. Those who have never searched for a job amount to 5% of the sample, whilst only 6% of respondents declare they were not in search for a job at the time of completion. Despite their status as workers who are not actively searching for a job at the time this research has been conducted, we have decided to keep these respondents within our observed sample, as we deemed their status to be equally interesting to the aim of understanding the extent to which the logics here observed apply also to 'passive' candidates.

For what concerns recruiters, the sample is composed of a majority of men (63%) over women (37%). In terms of age, we are confronted with a sample that is relatively older than that of job seekers. The most represented age groups are 26–35 (born between 1980 and 1989, 39%) and 36–45 (born between 1970 and 1979, 34%). At the margins, 24% of respondents in the sample were born before 1969, whilst 9% were born after 1990. In terms of education title, the sample of recruiters is also a highly educated one: the majority of participants has either a bachelor's (41%) or a postgraduate degree (27%). A fourth of the sample has only attended a few years of university (25%), and only 7% of respondents

have a high school diploma. Less than 1% of participants have not attended secondary education. For what concerns the specific academic discipline, respondents declare to have a university education mainly inhuman resources (34%), business administration and law (18%).

Analogously, in terms of professional experience, we are confronted with a fairly experienced sample. More than a third (36%) of respondents have 3–5 years work experience, around a fourth (24%) have worked for 5–10 years and 8% have more than 20 years experience, for an overall 68% of relatively or well-experienced recruiters mapped by this study. Only 15% of respondents have 1–2 years work experience in recruiting, and 7% have less than a year experience. In terms of industries, 36% of respondents work in human resource management companies, whilst the rest of the sample is dispersed across a variety of sectors, such as technology (6%), industrial goods & services (5%), consultancy (5%), the automotive industry (4%), health care (3%), retail (3%), food and beverage (3%), construction and materials (3%), chemicals (2%). In terms of occupational positioning, slightly less than half of respondents (46%) hold a non-managerial role, whilst 34% have an intermediate managerial position and 19% hold a senior position. For what concerns the employer's size, 37% of the sample work in a corporate firm with more than 2000 employees, whilst 19% of respondents work in a company that employs 50–250 employees. The remaining 19% of respondents either work in a small to medium company (less than 50 employees, 11%) or a small agency (less than 10 employees, 8%).

Social Media Use

As we can see in Table 3, on average 73% of all job seeking activities take place online. On the recruiting side, responses show that 55% of the overall recruitment activity involves the Internet in some form. Among job seekers, online job search activity increases with the level of education; those with a BA degree or senior education title are more likely to search for jobs using digital media. From a geographic perspective, job seekers living in the Eastern European region seem to be more active in

Table 3 Assuming your total online activities are 100, what share does each tool represent? (Job seekers vs. Recruiters, percentage values)

	Job seekers	Recruiters
Careers section on company website	24.8	31.5
Job boards/online recruiting sites	60.6	48.9
Social media	14.8	19.8
Total	100	100

online job search if compared with those living in other regions (+9% against Asia-Pacific and the American region, and +8% against Central Europe). On the recruiting side, data show that in 2015, the American region is where recruiting is more digital-based (+19% against Central Europe and +16% against the Asia-Pacific region). The positions they filled most often through online recruitment are middle and senior management, which are most likely to be permanent positions rather than temporary roles. The sectors most active in online recruitment activities are IT, research and development, controlling, accounting and finance, corporate communication and PR. Roles in manufacturing and logistics are less likely to be filled through online activities. The most used digital tool remains the job board, that is paired in our data together with recruiting sites. These are preferred by a significant 61% of job seekers and 49% of recruiters. Social media do not stand out in terms of preferences; however, as we are about to see, these are largely utilized on both sides of the spectrum.

Data on specific social media (Table 4) show the existence of a clear divide in the sample for what concerns the preferred platform according to personal or professional use—with a similar pattern between the two groups. Facebook is clearly identified by our respondents as the main personal social media (circa 80% of job seekers and circa 75 of recruiters, aggregated figures). On the professional side, LinkedIn emerges as the most popular social media, both for recruiters (61% vs. 34% Facebook) and job seekers (34% vs. 24% Facebook). Despite such a divide, as we will see later, Facebook plays a quite relevant role also in the professional scenario, *precisely* because of its largely personal use.

Another interesting case is Twitter, which displays a sort of intermediate positioning. Among job seekers, around 25% of respondents

Table 4 Do you have an account on these social networks? If yes, is this for personal or professional use? (Job seekers vs. Recruiters, percentage values)

	Facebook—JS	Facebook—R	LinkedIn—JS	LinkedIn—R	Twitter—JS	Twitter—R
No	28.79	21.45	60.45	29.44	73.67	61.64
Yes, for personal use only	46.97	46.81	5.16	9.43	20.23	20.79
Yes, professional use only	1.09	3.63	20.12	32.5	0.94	6.66
Yes, both	23.15	28.11	14.27	28.63	5.17	10.91
Total	100	100	100	100	100	100

Table 5 Do you have an account for professional use? Yes *Geographic area (Job seekers vs. Recruiters, percentage values)

	Job seekers	Recruiters
Europe	44.37	29.2
Asia	38.33	39.02
Americas	22.79	9.66
Eastern Europe	26.52	9.59

declare using it; however, quite surprisingly, it is considered a personal rather than professional social media—contrary to, for instance, what happens among freelancers (Gandini 2016). Figures related to the use of Twitter among recruiters are comparable to those among job seekers in general terms, with only a higher percentage of use for professional purposes.

Some interesting data emerge, if we break down these figures in relation to geographic location (Table 5). Central European job seekers tend to be those more active on social media for professional purposes (44%), followed by Asia-Pacific job seekers (38%). Eastern European countries (27%) and the American region (23%) seem to display a lower professional use of social media among job seekers. Figures are somewhat reversed among recruiters, with Asia-Pacific ones the most active (39%), followed by Central European (29%) and American recruiters (slightly less than 10%). We can see here how social media adoption in the same geographic region by both groups is uneven, with differences in use that may be explained at a local level.

Table 6 Do you use these platforms for the following activities? (Job seekers, percentage values, multiple choice)

	LinkedIn	Facebook
Distribute CV/resume	29.05	11.29
Professional networking	25.97	16.3
Search for job ads	28.1	18.56
Submit applications	24.13	13.1
Research recruiters	23.25	17.09
Research employers' pages	25.06	23.06
Personal branding	17.6	21.57
Check what other say about prospective employer	20.32	21.72

If we look at the purposes job seekers use social media for, the main activity seems to be that of keeping in touch with colleagues (59%) or former colleagues (56%). A relevant number of respondents declare engaging in proactive networking activity via social networks sites to contact potential employers (35%) or look for recruiters or headhunters (24%). For what concerns the specifically professional activities of job seekers on social media (Table 6), we can see that there is a quite homogeneous distribution among categories. In relative terms, CV distribution and the search for job ads are the highest scoring activities on LinkedIn; interestingly, however, professional networking and the search for information about employers also scores quite high. Facebook sits in a secondary position, being more relevant only for what concerns personal branding activity and the search for other people's comments about prospective employers. To summarise, we can see that LinkedIn is more likely to be preferred for instrumental purposes (distributing one's CV, professional networking and searching for job advertisements), whilst Facebook seems to be preferred for what concerns the more 'social' side of the job seeking practice.

An element that seems to emerge from the data is the prominent role of reputation as evaluation criterion adopted by recruiters, as emerges from the figures enlisted in Table 7. The main purpose for the use of social media by recruiters is precisely that of a 'reputational check'; recruiters declare using social network sites to assess a candidate's social network and the information available online about prospective employees, as well to operate more general evaluations about their

Table 7 Do you use these platforms for the following activities? (Recruiters, percentage values, multiple choice)

	LinkedIn	Facebook
Advertising jobs	34.24	26.73
Check CV/resume	33.06	14.66
Sourcing passive candidates	35.94	16.07
Receive job applications	31.69	13.92
Check network	32.2	18.79
Check content posted by applicants	27.5	19.07
Employer branding	31.17	27.18
Understand personality	22.38	22.12
Create additional value for jobseekers	25.98	16.89
Check online reputation	26.49	22.96

personality. Overall, LinkedIn is confirmed as the preferred platform by recruiters essentially for any activity. Yet, it must be noted that this reputational evaluation takes place also on Facebook to a significant extent.

On this specific aspect, in the 2014 iteration of this survey[2] we developed an 'attractiveness index' (Table 8) to investigate which specific pieces of information that can be found online about applicants are more appealing to recruiters. Data show that information about the professional experience of a candidate (attractiveness index of 0.63) is considered by far to be the most interesting aspect. The presence of professional prizes or awards (0.38) is also of interest; however, it is worth noting that, although lower in relative terms, a significant element of interest for recruiters is the possibility of collecting information that leads to insights about the personality of a candidate (0.32). Contrary to expectations, recruiters seem to be largely uninterested in the number of contacts and rather search for 'tangible skills' that are more difficult to fabricate.

For what concerns personal information that can be found about an applicant or prospective candidate online, another aspect that the 2014 iteration brings to light is the fact that candidates seem to consider the publication of personal details or content online to be relevant to a limited group of friends, and are likely to pay minimal attention to the actual management of an online reputation from a strategic point of view. This applies particularly to Facebook as the most used social media

Table 8 Attractiveness index of the applicant's social media profile. Survey, 2014, recruiters. *Note* Index value from −1 (min attractiveness) to 1 (max attractiveness)

Rank	Elements on SM profile	Index
1°	Professional experience	0.63
2°	Professional prizes and awards	0.38
3°	Personality emerging from profile	0.32
4°	Content posted by the applicant	0.27
5°	References and comments posted by others	0.25
6°	Personal information (e.g. marital status, gender…)	0.17
7°	Pictures	0.13
8°	Hobbies and personal interests	0.09
9°	Number of contacts	−0.13

Table 9 Index of agreement with specific statements regarding a candidate's private and professional image on facebook. Total survey, 2014, job seekers. *Note* Index value from −1 (max disagreement) to 1 (max agreement), value 0 if neutral position

Rank	Statements about privacy	Index
1°	I assume my profile is only viewed by my friends	0.31
2°	My profile can only be accessed by my friends	0.27
3°	It is important to maintain a professional image online	0.20
4°	My online image is important to my future	0.10
5°	I work hard to maintain a professional image on my profile	0.01

for personal networking. Table 9 outlines an 'index of agreement' by job seekers on Facebook in relation to this specific aspect.

If we look again at the 2015 sample, one's digital presence seems to be highly regarded by job seekers as a whole. A significant 22% of respondents have a link to a personal digital profile on their CV. These are mostly LinkedIn profiles (63%), with much inferior rates for other social media (Facebook 31%, a blog 20%,Twitter 11%). This tends to be preferred, again by highly-educated workers; this is evidence of what seems to be a more general trend for which the higher the level of education, the more likely the job seeker is an active online user that makes use of online networks to search for a job. On the recruiting side, in terms of content production recruiters seem to very active (41% on average) either using a personal profile on LinkedIn (29%) or managing their company's blog or website (19%). Blogging seems to be quite

diffused among both groups—6% among recruiters and 18% among job seekers. There seems to be, however, a difference in how each group perceives the blog, that is considered as a more personal space by job seekers (12% of respondents declare having a personal blog) than a professional one (3%).

How It Works: Online Presence, Filtering and Reputation

In terms of aggregated figures, data show that 23% of job seekers have been contacted by a recruiter through social media at least once. This mainly takes place via LinkedIn (62%) or Facebook (36%). Among these, 16% have attended an interview after being contacted and 6% turned down an interview offer. Among those who attended an interview, 32% eventually got a job (6% of the whole sample), 33% refused the offer, and 34% were not offered a job. As Table 10 shows, passive candidates are contacted more often, but usually decline the invitation or offer.

Highly—skilled candidates with a university degree, mostly men between 30 and 40 of age, who work in areas where the presence of digital technology at work is more significant, such as the human resource industry, business administration and ICTs, are more likely to be contacted online. There seems to be little geographical differences on these figures among the various regional groups. What data seem to strongly evidence is the connection between a more proactive online job seeking practice and the outcomes this activity can bring. The likelihood

Table 10 Are you currently looking for a job? *Have you ever been contacted by a recruiter through social media? (Job seekers, percentage values)

	Yes, I am actively seeking	No, but I may be open to job offers	No
Yes, and I got an interview	15.54	19.72	15.26
Yes, but I refused the contract	4.5	10.63	11.79
No	79.96	69.66	72.95
Total	100	100	100

of being contacted by a recruiter on social media or a digital platform seems to increase with the number of social networks used (from 16% for those using one platform to 46% for those using a multiplicity of social network sites). Candidates who have been offered an interview have been involved in online job seeking activity an average 12% more than those who have never been contacted. Similarly, candidates who include a link to their online profiles on their CV are also more likely to be contacted by a recruiter via digital means; a significant 35% of respondents who indicate having referred to their LinkedIn profile on their CV were contacted, as opposed to a mere 9% of respondents who do not provide this information on their CV.

On the relevance of online reputation for recruiting purposes, and in terms of implications concerning monitoring and control-oriented practices, data show that 32% of recruiters (especially working in larger companies) ask candidates about their presence on social media. A relevant 28% of recruiters say they have rejected at least one candidate because of content available online about him/her. The rejection of candidates based on the content they post online should be interpreted as a filtering practice, perpetrated by the recruiters to reduce the (often large) number of candidates for a position. This occurs, as said, often on reputational grounds: the most frequent reason for rejecting a candidate on the basis of information found online is the presence of details that differ, or contradict, what is stated in the CV (54% of all rejections declared). Another frequent reason relates to the assessment of personality traits, which is also a significant cause of rejection (49%). Posting improper or inadequate images on one's profile or feed is also a kind of information that could lead to exclusion (46%). On the other hand, it is worth noting that the presence of political opinions expressed by candidates seems to be far less relevant for recruiters (11%) as well as the presence of discriminatory content, which appears to be only marginally relevant (27%). The intimate and intrusive nature of this screening practice is further confirmed by a piece of evidence that we asked about in the 2014 iteration of this study, when we found that between 6 and 12% of recruiters across different geographical contexts have asked candidates in a job interview to reveal the password of their own personalFacebook account for purposes of assessment. Among job seekers, figures revealed that 2% of candidates declared having been

asked to provide their Facebook password by a recruiter, and data show that one third of them fulfilled this request—in the implicit assumption that a refusal to comply would have led them to being excluded by the selection process. Data also show how this reputational evaluation is very much skewed on the side of recruiters, as the array of tools job seekers have to make similarly detailed assessments is much smaller. For how a significant 72% of job seekers declare having searched for information about a prospective company on Google or another search engine, only about 10% of them declare making use of specific platforms for reputational evaluation of companies such as Glassdoor or Kununu. Even smaller is the percentage of respondents who declare having written at least one review of a company through one of these platforms (1.7%).

Conclusion

In an article published in the *Journal of Consumer Culture,* marketing scholars Zwick and De Negri-Knott (2009) discuss how marketing as a discipline is being transformed as a result of the availability of 'networked customer databases' that can be constructed out of the activity of users on social media platforms. This availability of data about consumer practices that can be found in daily social media activity, they argue, leads to a 're-organization of the gaze of marketers' (2009: 221) as the diffusion of profiling technologies that systematize the behaviour of consumers allow an integration of such detailed information into the production process. Framed in a discussion that contrasts the Deleuzian notion of 'surveillance' (Elmer 2003) with the Foucauldian concept of 'dataveillance' (Poster 1990), Zwick and De Negri-Knott (2009) sustain that social media effectively represent 'surveillance technologies' that 'perform a complex set of cultural and economic functions characteristic of the post-Fordist mode of production, such as the spatial and temporal organization of markets, the provision of various forms of knowledge, and the flexible connection of consumption and production' (2009: 224).

The data presented in this chapter seem to suggest that, *mutatis mutandis*, an analogous dynamic characterises current digital job markets and particularly recruitment practice. We contend that the

intermediation of digital technologies within job markets has determined what may be termed, echoing Zwick and De Negri-Knott (2009), a 're-organization of the gaze of recruiters', who now have at their disposal vast sources of information regarding candidates who apply for jobs and positions—a set of 'networked job seeker databases' accessible through the main social media and digital platforms. More so, it may be argued that this unprecedented availability of data about job-seekers through social media effectively enables a dynamic of control and surveillance, exerted *ex ante* by recruiters and human resource managers on prospective employees. This occurs through both an evaluation of professional information as well as a personality assessment that, as seen, can influence considerably one's chances of being hired.

On the side of job seekers, results suggest the whole of one's online activity makes integral part of the information recruiters assess in the hiring process. The option of being potentially observed by a recruiter in one's daily social media use should be treated by job seekers as an implicit assumption as they submit an application for a position. Yet, for how job seekers spend at least part of their time online engaging in practices of personal branding, they largely operate in the assumption of not being observed in contexts that are not by definition professional ones, such as Facebook. The management of online presence by the job seekers mapped in this study still seems to be tangled in a distinction between private and public information that does not adequately reflect the way in which recruiters use social media in the recruitment and selection process. It may be argued this dynamic bears the potential to exert an unprecedented level of moral pressure upon job seekers, who 'need' to make sure not only that the content they post on social media is compliant with socially acceptable norms of conduct as well as moral standards, but also that others who they might engage in conversation with do not publish or post something that could be detrimental for their career chances.

Simultaneously, recruiters adopt valuation logics that tie the assessment of one's suitability for a position to the access of quality online information to a significant extent. This is a very valuable side of their work, as this stock of information is by and large commonly available and cannot be obtained with such a degree of depth via either a job interview

or through the usual networking, recommendation and referrals practices. Albeit unbalanced, we must also note that data seem to indicate how the most conscious and digitally savvy candidates are able to use digital media in an instrumental way to valorise content that may be relevant for potential recruiters. This might explain why more highly educated job-seekers seem to be achieving higher outcomes in the sample under consideration. This dynamic is, however, largely skewed in favour of recruiters. Whilst job seekers are offered very few tools to assess companies and find information about prospective employers, recruiters are offered much more powerful and intrusive tools to exert pre-emptive control as well as to develop an assessment of the risk involved in the hiring process.

The fact recruiters have the significant and unaccountable power of potentially being able to scrutinise social media use by job seekers in the relative ignorance of those being observed seems to be evidence of how labour markets are subject to a process of incorporation of the use of social media as profiling technologies and unregulated spaces of control and surveillance that is similar to what has been observed in other research across critical media studies and the sociology of work (Moore and Robinson 2015). On a broader level, it seems we are confronted by dynamics that unfold in the more or less diffused acknowledgement of reputation as a cultural conception of value (Gandini 2016), which is enabled by the role of social media platforms in their role of unaccountable 'middle layers' of information. This has been described by Shoshana Zuboff (2015) as a form of 'surveillance capitalism'—one that is built on the capacity to extract, commodify and control the widespread availability of (big) data—a shift, she argues, that implies a 'transformation' whereby such data become an intrinsic component of original and institutional life.

This chapter has expanded the current knowledge of hiring practices and provided new insights on how social media intervene within the domain of work, and particularly the meeting of supply and demand. However, a lot of questions still remain unanswered. The uneven

distribution of results among geographic regions, the significance of a potential 'education gap' that favours highly-educated digital job-seekers, a more in-depth look at issues of gender and especially the extent to which the visual culture that characterises social media has an impact on the 'first impressions' that recruiters develop about applicants or prospective candidates are all questions worth a dedicated inquiry. Also, a generational gap seems to lie beneath the surface, with younger job seekers and recruiters potentially addressing the issue of personal online information by adopting considerably different notions of privacy than the older categories of each group—a question that was not at the heart of this enquiry, but which seems to be very interesting to explore further.

Whilst we acknowledge the exploratory nature of our study, that prevents us to generalise trends emerging from our work, we also maintain that the empirical results here discussed unpack a number of relevant implications that are likely to apply to a broader and larger scale in the near future. We deem necessary for the scholarship on work and employment—as for other research domains—to set itself the goal of going beyond 'digitally dualistic' approaches (Jurgenson 2011) and observe the nature of work-related phenomena as they increasingly occur on a continuum that goes from the non-digital to the digital realm and back, and that cannot be confined to either of these single contexts. This chapter has offered a contribution along these lines, with the aim of igniting further debate around the issue of how the Internet comes to intermediate practices and processes that pre-date its existence.

Notes

1. See https://press.linkedin.com/about-linkedin for up-to-date information (last accessed 15 December 2016).
2. Data collected between March and June 2014 with analogous modalities, for a sample of 17,272 job-seekers and 1501 recruiters from 24 countries. See also Gandini (2016) and Pais and Gandini (2015).

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Close Watch of a Distant Manager: Multi-surveillance by Transnational Clients in Indian Call Centres

Winifred R. Poster

Introduction

Much of the emphasis in the surveillance literature is on the role of employers as the group that enacts surveillance in the workplace. Yet given the growing transnationalisation of work and expanding capacities of technology, other actors are gaining influence. This is well illustrated in the global service industry, which performs tasks for businesses (often through, or for, information and communication technologies) rather than producing tangible products. In this chapter, I focus on the Indian call centres to show how *clients*—the ones who contract the services of outsourcers, from their position in the US—take on roles as virtual managers.

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_7

Clients are the firms that 'purchase' services from Indian call centres. In India, the clients are US and other global north organizations in a variety of industries. Most often, these are financial and banking firms like Citibank, JP Morgan Chase, GE Capital/Genpact, Standard Chartered Bank, and HSBC Bank (Poster 2013b). Second most common are telecommunications and computer firms, like Sprint, T-Mobile, Dell, etc. Call centres in my study, however, also take contracts from a number of other organizations such as utilities companies and governmental offices.

We might expect clients to stand back from the surveillance process inside the call centres. They are physically far away from the call centre in India. Moreover, they have chosen outsourcing as a way to relieve themselves of this burden. They have relinquished responsibility for daily tasks by removing customer service functions from their own offices.

Yet, clients often use technology to *enhance* (rather than reduce) their presence in the outsourced call centre. This analysis centres around several technologies which help clients to become active participants in the daily operations of call centres: autodialers, speakerphones, metal detectors, and shopfloor webcams. These technologies enable them to have control over: (1) the core process of connecting US consumers to Indian workers; (2) the training and monitoring of Indian workers; (3) the supervision of Indian managers; and (4) the analysis of habits by US consumers who buy their services or products.

I argue for a situated view of technological agency with workplace surveillance. Much attention is turning to the role of big data (e.g., the massive collection of information about workers and consumers) as the new strategy of surveillance in organizations. However, I will show how clients in my study don't always gravitate towards the most sophisticated and/or data-driven technologies. They often deploy mundane technologies for their surveillance, and those that are hard-wired to the workspace rather than immaterial. These technologies also vary in location. Some are physically in or regulated from the US, like the autodialer, while others, like computer units and speakerphones, are placed in the offshore location. Straddling political borders and geographic zones, these technologies are more complicated than those located in a typical single-sited workplace.

Moreover, I will complicate our understanding of surveillance itself by arguing for a framework of *multi-surveillance* in the global service economy. Clients, like many participants in Indian call centres, observe many groups at once and in turn experience the gaze of all those groups. Consequently, surveillance in Indian call centres does not play out as neatly as one might expect. Rather than a uniform and unidirectional process, surveillance by clients is fractured, multiplied, and interconnected with that of other groups.

A Multi-surveillance View of Indian Call Centres

Clients represent one spoke in an array of surveillance practices within the global service industry. Call centres perform back office functions for organizations by managing interactions with the public over the phone. Starting around the year 2000, US (and other global north) firms began to move these functions overseas to third-party firms. India became a prime destination for its highly educated, English-speaking, and inexpensive labour force. Now, there are at least two million workers in the wider 'business processing management' sector of India.

There are many participants in the industry, and groups who engage in surveillance. The major actors—US client firms, technology vendors, and customers, and Indian managers and workers—all observe each other on a regular basis. In what I call *multisurveillance* (Poster 2011), these groups use sophisticated software programs along with routine ICT devices, to do the everyday work of monitoring and disruption.

In Indian call centres, surveillance occurs transnationally and coalesces along group lines. These groups conduct surveillance from positions within a 'global service grid' which is organized along two types of hierarchies—one of service relations, and another of transnational relations. Laid out conceptually as a four-box grid, its vertical axis represents labour process categories (manager and worker), and its horizontal axis represents postcolonial categories (global north and global south). *US clients and vendors*, accordingly, sit in the upper left hand corner, privileged by socio-geography and corporate power. *US consumers* sit below them,

still in the global north but subservient in service authority. On the right-hand side, *Indian managers* sit at the top, as organizational leaders who are nonetheless beholden to US authority for funding and contracts. Finally, *Indian workers* are below them, facing the downward pressure of labour as well as geographical marginalization.

Within this frame, then, surveillance is a social movement tactic. Participants *mobilise collectively* to assert their interests. They do it not simply for domination and resistance, but as multiple (and shifting) hegemonies and counter-hegemonies. Surveillance, ultimately, is a form of electronic activism that is practiced by many groups transnationally, both separate and together. Clients represent a *hegemonic* form of surveillance, in the sense of seeking technological control over mass publics for the aim of maximizing profit. Yet they are not alone. The power of observing and over technology, does not reside in a single group but is spread wider. It belongs to other elites—such as US vendors who create the surveillance systems and techniques, and to Indian managers who do the direct supervising over workers. Similarly, workers are not the only ones to resist to these practices through *counter-hegemonic* surveillance. Rather, the challenge to elite surveillance is launched on two fronts from both consumers and workers, and from two geographies, the US and India. Significantly, this dual, cross-cutting system of the global service grid generates multiple affiliations and orientations for action. Groups change their orientations and shift their allegiances. My larger project examines all five groups and their complex relations; here I focus on the agencies of clients in their multi-surveillance.

The implication of the global service grid for clients, therefore, is that they are pulled in two directions. On one hand, they are influenced by the corporate pressures of lean production, flexibilisation, cost-cutting, etc. These dynamics encourage clients to spread their business processes transnationally—keeping administrative functions at home while outsourcing customer service functions abroad. On the other hand, they are pulled in another direction by consumers and workers who demand accountability and limitations on their surveillance practices. In response, clients negotiate this dual tension by becoming virtual managers. Their strategy is to supervise from afar. Their multi-surveillance reflects an interest in keeping tabs on all the staff (both managers and workers) abroad, as well as the consumers at home.

Research Methods and Sources

The analysis is based on ethnographic fieldwork in Indian call centres from late 2002 to early 2004. Fieldwork was done in the northern region of India near New Delhi, in the neighbouring cities of Noida (state of Uttar Pradesh) and Gurgaon (state of Haryana). Three call centres were the focus of the analysis, representing variations within the industry in terms of size, ownership, and global positioning: BigCo, as a multinational firm, with about 3000 employees; MediumCo, as a joint venture firm with a US company, and about 200 employees; and SmallCo as an Indian-owned firm, with 40 employees.

Among the various types of data, I conducted 50 semi-structured interviews with phone-calling employees, and 20 interviews with human resource managers, quality control personnel, recruiters, trainers, nurses, etc. Another 15 interviews were conducted outside the firms with experts and professionals from the community, such as representatives of industry associations, government officials, and employee associations. I observed the 'production floor', attended training seminars, joined agents for dinner in the cafeteria, etc. Names of the firms and the employees have been changed for anonymity.

Between 2009 and 2015, I did further research to explore actors in the US who participate in this story—the vendors, clients, consumers, etc. This involved analyzing websites of call centre and technology companies, and viewing 'webinars' or online videos about their products and programs. I also conducted interviews with experts in the call centre industry and consumer advocates. I then triangulated or layered this data with material from my Indian-based interviews, gaining a richer perspective on customers, clients, and vendors from the people who interact with them on a daily basis.

Remote Clients and Their Surveillance Technologies

Focusing on several representative devices, the following outlines techniques of multi-surveillance for clients to become virtual managers in Indian call centres.

Autodialers

The autodialer or 'router' automatically feeds phone numbers to workers' computers and initiates the call. It enables clients to have control over the most basic element of production process—the timing and routing of the calls themselves (Aneesh 2009). Clients also apply this vendor technology for another purpose—to extend their agency in surveillance on the Indian work site.

Clients like the autodialer, first, because it performs many tasks of the *worker*. It decides whom to call and when to call. It listens to the response by the customer. It catalogues how the call is answered. In this process, the autodialer can tell if a human versus machine answers the phone. It can identify a real person by his/her 'rate of speech, the amplitude of syllables and wait time' (Original Sources: Computer Audio Engineering). With a special 'hello chip', it analyzes the greeting by word and repetition. If the autodialer hears, 'hello, hello, hello?' when it calls, it knows that a live person has picked up the phone. The autodialer can also tell if a machine answers. If it hears speech that is continuous and lasts too long without stopping, 10–20 seconds, it will mark the response as an outgoing message of an answering machine. If it hears three special information tones (SITs) preceding a 'no longer in service' message, the autodialer will mark the line as a disconnected number. After this, it will sort and store the customer phone numbers that it collects, by re-entering them into the system, discarding them, etc.

All of these tasks previously done by the worker—the surveillance of customers, the logging of consumer information into the database, the subsequent sorting of phone numbers, etc.—are done by the system. What makes this possible is the speech recognition software.

Clients also like the autodialer for its ability to take over functions of the *manager*. It surveilles the pace of work—how fast the employees are working, if they are being too idle, if they are entering wrong numbers, etc. It can also slow or speed the rate of calls. One technology in particular, 'predictive' dialer (a successor to the autodialer), reduces unused time within the call routing process. It estimates (or 'predicts') the likelihood that, on one hand, the customer will be available to receive the

call, and on the other hand, the worker will be able to attend to it. It selects customers who fit desired profiles. It assesses employees who are ready to receive the call by patching calls to workers who are free, based on their department or skill level.

The effect of this technology on increasing the pace of calling is palpable for workers: 'Most of the call centres had automatic diallers [sic], meaning that you can not influence when a call is made. Sometimes you have to make 400–500 calls per shift' (Original Source: GWN 2007). Indeed, call centres in India have higher call volumes than those in other countries, perhaps in part due to the extensive use of predictive dialers. One study reports that Indian workers serve an average of 180 customers a day, whereas workers in the US serve 75 customers (Batt et al. 2005).

Clients assert their agency over autodialers in other ways. Some clients manage the autodialer by housing it on or regulating it from their own premises in the US. At MiddleCo, the autodialer was located in Florida. Clients also set rules on how autodialers run. In many cases, clients decide the call duration, and number of calls per employee, as well as how many employees should be hired (Original Source: Centre for Education and Communication). In these ways, autodialers allow clients to be managing when they are not physically there.

However, clients don't always use autodialers to replace humans. Sometimes, they use this technology for the opposite purpose—to insert *themselves* directly in the management process. Some clients are actively involved in the monitoring of calls and checking firsthand how well or poorly the workers are doing in the interaction (D'Cruz and Noronha 2006). Preeti, working at Hero Spectramind, explained to me how clients enter their own numbers into the dialer in order to pose as customers. This way, from their home offices then, they can secretly check on employee conversations.

If clients are suspicious of a particular employee for improper behaviour (like unusually high sales, etc.), they may ask the quality department onsite to patch them through to listen in on live calls. Clients monitor data streams from the 'customer relationship management' (CRM) software and surveillance technology. They keep track of individual workers and immediately communicate with Indian supervisors about their performance. A female worker at GE Capital in Gurgaon

reported that, 'If someone missed a call, a manager would call from Australia and complain about this particular worker' (Original Sources: GWN, No. 1, 2007). In these ways, clients use the autodialer and other vendor technologies to bring themselves into the core process of call centres, as if they were on the shopfloor.

Workers have their own point of view about autodialers, of course. Some see the downsides. Pradeep at MiddleCo, who goes by the American alias George Lawson, observes how the router may call the same customer over and over:

> Because of telemarketing calls, people are very much frustrated. Just take an example: [Let's say I'm a customer, and] my name is George Lawson. If a person calls me at my place – but *my mom* picks up the phone, and she talks to that person, and she says "No, no sir. I am not interested." Still, [the agent] puts it [in the computer] as "call back" – rather than as "not interested" – because only *my name* [George Lawson] was there in his computer. So what is happening is that person, or that household, gets that call near about … seven to eight times. This is the basic case. So it gets very, very frustrating. That's why you people [Americans] are again and again calling us [to complain]. [Emphasis added]

The dialer reads the input from the software, and then automatically sends repeated calls to the same customer without regard to context or appropriateness. Vendors and clients are aware of this. In fact, there is a name for it in industry lingo—it's called 'recycling' (Original Sources: Computer Audio Engineering). Recycling is efficient from the client point of view, because it increases the likelihood of contacting the customer.

Yet while vendors and clients may be indifferent to the effect of the dialer on customers, many workers are not. Pradeep feels frustrated about his powerlessness over the technology. He empathizes and identifies with the customer because of it. It's quite telling that in his story, Pradeep places *himself* in the role of the customer—the one who is targeted by the recycling. He relates to their experiences more than those of his own colleagues in India or clients in the US. Ironically, an unwitting

consequence of deploying this technology by clients is creating bonds between customers and workers. This is an example of how the global service grid results in alliances among groups transnationally.

Consumers in the US get fed up with the autodialers. They have waged a number of legal battles against clients through the government. Significantly, this battle does not take place in India—where the call centre is, where the workers are (who make the calls), and where the managers are (who oversee the calling process). Rather, legislative opposition is mounted in the US, as the dialer falls under the accountability of the client.

The most notable policy win for consumers was in 1991 with the Telephone Consumer Protection Act (Original Sources: US Govt, FCC). TCPA curbs the use of autodialers by businesses in several ways. First, it limits *whom* they can call, by excluding emergency phone lines, hospital rooms, and paging services (which would lead to charges for the person receiving it). A 2003 supplemental ruling also prohibits autodialer calls to cell phones. Second, it limits *the duration* of the calls. The TCPA requires that autodialers must end their connection within 5 seconds after the consumer hangs up (since some of the systems some linger on the call and tie up phone lines indefinitely). Likewise, it requires predictive dialers to transfer the call to a live agent within 2 seconds of the recipient's greeting. Third, it sets limits on the error rates of autodialer technology—no greater than 3% of the calls that they dial may fail.

A note on the TCPA is how it links various call centre technologies. Just as it places restrictions on *autodialers*, it simultaneously limits use of *virtual representatives* (or 'V-reps'). V-reps are automated call centre workers, based on artificial intelligence and other computer programs, who act as stand-ins for live employees (Poster 2016). The TCPA says that businesses may not use artificial and prerecorded voices while dialing any home phone number (with some exceptions like prior consent from the recipient, etc.). Calls must also state the name of the business, as well as the phone number, at the beginning the greeting. These two central devices of the customer service industry are *packaged together* in consumer protection policies, revealing how the state recognizes underlying connections in these systems in their effects on consumers. In sum, the dialer

is a way for clients to maximize their control of the outsourced call centre, while minimizing the role of Indian managers and workers.

Communications and Infrastructures

As another strategy for bridging the distance gap, clients use communication technologies (both large and small). These routine devices enable clients to make their presence known through sound and sight, and to insert themselves in the daily activities of the outsourced call centre. Notably, while the autodialers above enable clients to control the *timing and path* of calls, speakerphones, and videoconferencing systems enable them to control the *content*. In this way, clients remotely manage the substance of employee conversations with customers and many other informal aspects of the labour process.

Speakerphones. Some technologies are small and unobtrusive. We see this in the example of employee training. Clients go to great lengths to be involved in the day-to-day running of these sessions. One might think this would be the first thing that US firms would release to Indian managers. These classes can be mundane and repetitive, for instance, in breaking down the minutia of American English grammar, speech, and accent to workers. In fact, even Indian managers subcontract the process to local professionals, teachers, and drama coaches, who come in from outside and take over. (Ironically, this act constitutes an 'outsourcing' of tasks by the outsourced call center).

Yet, US clients in my study often wanted to be involved in these mundane matters. Employees told me that *training* is the context in which they most commonly encounter the clients. *All* the call centres in my study were set up to handle direct electronic participation by clients in the training process. At SmallCo, clients used a simple speakerphone and desktop computer. Employees would gather round the table in the conference room to hear sessions through this box, by trainers in the global north. The President describes: 'There is one new process from the UK for some wireless campaign, and the trainer will be on the speaker phone, training from UK. There will be more training through

the web—through the video conferencing.' Even in such a small firm, with so few employees, clients make their presence known.

Clients become teachers in these long-distance classes. They join in on a significant component of the training process—role-playing. They listen to workers play their parts and then comment on the performance, as an instructor would. Or, they play a part themselves. That's what happened when I walked in on a live client session at MiddleCo one day. A client from a Massachusetts gas company was on the speakerphone, posing a customer, and doing a mock call with an employee. Twelve other workers, as well as an onsite trainer, were in the room listening.

The client's first call was straightforward. She posed as 'Bailey Bainbridge'. She said there was a smell of gas coming from her propane tank. The employee gave safety instructions and confirmed the order details. The onsite trainer praised him for 'giving good information'. His emotional labour was lacking though. He 'took too much time with pauses, used too much informality ("I'm gonna"), and lacked confidence by giving imprecise phrases ("*around* $250")'. With the next call, the client took on a different persona. Now she was 'Kathryn', a much more belligerent customer. From the top of the conversation, she started with questions about outsourcing for 'Mike', the worker:

Kathryn: Where are you?!
Mike: You've reached an emergency call centre.
Kathryn: What's the name of your city?!
Mike: I'm not able to disclose this. What's the problem I can help you with?
Kathryn: I'm out of gas for my forklift and Zambini.
Mike: Sorry, what is the problem?
Kathryn: I need gas for my Zambini! Do you even *know* what a Zambini is?!
[Exchange repeated three times].
Mike: Yes, we can deliver gas containers to you.
Kathryn: Will there be charge for delivery?
Mike: Yes, you have to pay the outstanding balance to the deliverer.

She was trying to refer to a *Zamboni*, the machine that smooths ice at skating rinks, but apparently she didn't know her constituents, nor their everyday technologies, very well. Notable here is how clients pose as customers through the technology, just like they did above with the autodialers. In this case, they do so not in secret, but outright.

Role-playing in the mock calls is a key tactic by clients for inserting themselves in the training process. Substantively, they are assessing performances of emotional labour and national identity management. While emotional labour in the call centre involves affective displays of cheerfulness, deference, service, etc., (Poster 2013b; van Jaarsveld and Poster 2012), national identity management involves the covering of Indian-ness and replacement of American-ness through accent and conversational style (Poster 2007). Thus, the gas company official was looking for things like: How will the worker handle the test of his American-ness? How well would he wear the American mask and hide the Indian location? From the trainer's point of view, Mike did a satisfactory job—he was 'polite, courteous, and he continued the conversation after the initial questioning of location.'

In this particular situation, the purpose of client role-playing was not just to give advice. It was a critical test of employee skill to start a new campaign. For employees, there was a lot at stake in this training session. They had been practicing for several weeks and this was their final examination. For the firm, there was an added pressure. This would be their first *inbound* campaign, or in other words, the first time they would be receiving calls *from* customers, rather than making calls *to* them. I learned later that they did not pass this test; several more weeks of training were ahead. Clients like this gas company are arbiters of when and how campaigns move forward, based on the direct contact with the outsourced call centre staff.

Video Conferencing and Auditoriums. BigCo has an elabourate infrastructure that enables clients to participate in trainings virtually. The Vice President for Human Resources explains:

> We have a capacity to train about three hundred people at any one time. We have rooms where you do soft skills training: voice training, accent training, culture training, leadership-development training. Then we have

> training rooms in each of the centres. Sometimes when there is a huge ramp up we do training on the floor as well, during off-shift hours. We have partitions – we move the partitions in, segment the floor out, and conduct training on the floor itself.

Large call centres like BigCo are set up for many kinds of trainings, as the VP explains, of varying sizes and for varying purposes.

Rooms with the most advanced technologies are reserved for clients. One is a 'trial call room' (as it was called on my building tour) or 'training centre' (as the VP refers to it). This is an auditorium set up for larger demonstrations. Here, workers engage in individualized tutoring and mock calls with clients, while also watching their local instructor in the front of the room. Other rooms facilitate technology training by the clients. The 'fitted room', for instance, has about 20 computers mounted inside the desks with glass. In this setting, employees not only *talk* to the clients, they *work* on client technology directly. They use client network servers and computer software—systems that are based *in* the US—to familiarize themselves with CRM programs before they get on the job.

To direct the work process itself, clients turn to other kinds of technology. At MiddleCo, they use the internet to deliver and supply materials for managers. The CEO explains: 'When we are selling a cell phone plan, for example, there are some standard questions that have been prepared by the client over a period of time, because of their experience with stuff like that, which is downloaded to our people'. For instance, they send the script for carrying out national identity management, so that workers can practice and use it on the phone. They send lists of movies to show in training sessions to teach American culture.

Clients even provide lists of aliases via the web for workers use in their American identity posing. 'Arnold' at BigCo, for instance, received his name from a major US computer company. These clients have pressing reasons to be involved with this process firsthand. At MiddleCo, the Vice President of Human Resources told me that the US government requires its corporations (through their outsourcing managers) to keep all employee aliases for a minimum of 5 years as part of fraud prevention measures:

> We have to guard all the accounts, all the information that we have, and keep records of alias names … to insure that we comply with [the] law. If someone [an employee] uses an alias name, we have to insure that we keep it for some period of time. We try to show that them that we keep it for at least 5 to 7 years. … We never destroy it.
>
> *This is an Indian law? A federal law?*
>
> A US federal law. … We have to keep all sorts of data … as part of the Telemarketing and Consumer Fraud and Abuse Prevention Act. … We don't have to show it to anyone, but one should keep it … just in case you have to track a person down. I've heard of places where – not in India but in US – where they've had a problem with fraud, and they've had to track it down through the person.

Practices of national identity management—in the form of employee American names—are under the purview of the US government. Clients, accordingly, set rules for Indian call centres about the record-keeping of this information.

For workers, being on the receiving side of client regulations can be confusing. This is because the clients of global call centres change, sometimes frequently. Indian call centres take contracts from multiple clients—consecutively at the small ones, and simultaneously at the large ones. Each of these clients, in turn, may have their own national identity management rules. This means that managers must 'change … names and identities of workers to suit clients' needs' (Original Source: Centre for Education and Communication, p. 82). Siddhant at MiddleCo describes how his alias changes with each new client:

> When I was working in U.S. mortgage, it was Richard Lee. But then when I came to U.K. mortgage, the clients insisted that your alias-name has to start with the same letter as your original-name. That was for the entire team, so the entire team's alias was changed. So since my first name is Sachin, it was Scott Lee then.

Clients, therefore, have authority over a significant part of the labour process. The alias may seem like a small detail but it is very meaningful for employees. It is a major component of their 'identity' on the job

(Poster 2007). When clients change then, so does the employee's identity.

Architectures and Separate Entrances. Clients exert their will not only through small devices like speakerphones, and mid-size infrastructures like video auditoriums, but also through the space and geography. They take over the physical layout of the call centre. This happened at the Convergys call centre with its client Citibank:

> I used to work for Convergys, in the Citibank process. In total about 600 people work there, it is a 24×7 process. … Citibank had a[n] individual floor and entrance in the building. People working for Citibank were also obliged to wear a tie, the others not. So you could see who works for Citibank and who is not. … Convergys made sure that they got the people with the best accent for the Citibank process. ...The other people at Convergys would not get these incentives. The basic wage would start from 8,500 rupees for beginners, they could go up to 17,000. Some people made 26,000 total wage including incentives. [Original Source: GWN, No. 1, 2007, emphasis added, reordered for clarity]

Sectioning off a floor of the building enables Citibank to maximize the efficiency of its control. It can set its own pay, bonuses, and benefits. It can upscale the status of its service. The client can mark its service brand on employee bodies (e.g., in the uniforms they wear and requirements for ties), and on their verbal exchanges (e.g., by requiring higher standards for English accents and thereby raising their linguistic cachet). Not surprisingly, these kinds of client-specific rules create tensions *among* workers in the same larger call centre, as they see their colleagues experiencing different labour processes—on different floors of the building and with different clients.

In all these ways, clients are diffusing their influence throughout the call centre. Employees are hearing clients live on the phone, using client technologies via networked servers and computer, and working by client rules as transmitted via the web. Clients direct the intimate and substantive aspects of *what* workers do on the calls, aside from the quantitative aspects of *how* they do it culled from CRM software.

Disk Drives and Metal Detectors

A third strategy for client intervention in outsourced call centres is through disk drives and metal detectors. These devices represent a physical surveillance. They are material items, but their purpose is immaterial. By monitoring workers' movements and their use of physical objects, clients identify and manage the flow of information—that is, by checking for data that workers may carry in their hands and on their bodies. While managers are the ones to install this equipment, it is the *clients* who often give the original directive.

Many of the call centres in my study were fortified digitally like military installations. The first sign is a lockdown of the computer terminals. Along with the phone, the computer is a main tool for call centre work. Yet in MiddleCo, all computers are stripped down to prevent access to what's inside. They look like blank boxes, completely closed off. There are no USB ports, no disk drives, and in some cases, no keyboards. There are no places to enter things in or take things out, nor any buttons to press. Special software devices prevent copying or downloading. Search engines on browsers are configured with programs to monitor and restrict web surfing.

Similar procedures are reported in other studies of call centres within the global south. In South Africa, for instance, team leaders use paper shredders to destroy any notes workers made during the call, and then they scour workstations for any bits of remaining paper (Ball 2010). They also restrict printers to specific campaigns, so that employees working on other campaigns do not have access to them. Workers understand that these policies are linked to the US client, and not their immediate managers. Umesh at MiddleCo continues:

> Everything is under the Nondisclosure Act—anything and everything within this company. Clients are very particular about those things because the database is very expensive—from the client that sells the database, for the lead that you call. If I take it outside, I can sell it to anyone.

In this way, the computer becomes a conduit for client control.

What's remarkable is how this practice extends almost all the way up the corporate ladder. Even the managers running the call centre experience this electronic lockdown. Umesh describes the impact of this policy on his daily activities, like transferring work between home and office:

> We work at home, but I plan what I need to do. I plan as to [what] I need to make the script for this campaign. I can *get* something from home, but I would not *take* anything from this place, outside. That's the reason why we are scheduled with 8 hour shifts but get extended to 12 hours, 13 hours, 15 hours sometimes. [Emphasis added]

Client regulations on everyday tools—the internet, laptops, digital storage drives, etc.,—create a break in the virtual flow of tasks between spheres. In this technologically intensive industry, ironically, managers are left with pre-technological methods to do their work. They use paper, pen, and the human brain to bring work back and forth. They do it 'in their minds' or 'on paper'. The higher ups are subject to the same rules as the shopfloor workers—even at the expense of their executive, administrative and supervisory responsibilities that they need to do for the firm.

Traditional labor theory would predict that the brunt of these policies is aimed at *workers*, especially those who make and receive calls on the shopfloor, i.e., those who have the least amount of authority. With a multi-surveillance view however, we find that *all the staff* of the outbound call centre, from top to bottom, are under suspicion for data theft. Indeed, clients in global call centres treat managers just like workers—as potential criminals. The result is that even the highest-level staff are under surveillance by clients.

Metal detectors are another example of the client control apparatus. The campus of BigCo has metal detectors in its many security checkpoints. To get to the shopfloor, I had to pass through two walk-thru metal detectors: one outside the building at the entry gate and another inside the building. All my electronic equipment was confiscated. In order to bring my tape recorder inside for interviews, I had to get a signature from the CEO himself. Once inside, all the rooms and halls inside are pass-coded and ID card-restricted. Especially surprising was

that employees go through security checkpoints on their way *out* of the building as well as on their way in. This is a critical component of the surveillance process. Managers need to watch employees in order to intercept information that is potentially being taken away from the site.

In this context then, the human body is surveilled as a vehicle for carrying and passing information. Data is protected above all else by these call centres. This was evident in the legal documents I had to sign to do my fieldwork. They make clear the value (financial and otherwise) of the data that is circulating in the call centre. When I signed this letter, managers at BigCo wanted me to know who I was doing it for and why. The Vice President of Human Resources said: 'We'll get you to sign a NDA [non-disclosure agreement]. *It's not for us. Our clients are very sensitive*, for the right reasons, for the information security' (emphasis added). US clients are tagged as the source of measures to protect information. Still, Indian managers defend their legitimacy. It's 'for the right reasons', he told me. In this way, both managers and clients justify the bodily surveillance of workers.

An interesting corollary is that, during all this fuss over data security, the *safety of humans* is of little interest. Protecting bodies is not the main goal of these strategies. Guards were not checking whether entering visitors were bringing in harmful objects. (This is includes people visiting the CEO—there were *no* metal detectors or security checks in his building at BigCo). Indeed, weapons checking—among the high or low staff of the firm—is not the point of this surveillance.

This is not surprising, given the orientation towards public safety by the Indian state. Officials have done little to secure metropolitan spaces, despite the many bombings that occurred during the prior decade to this study. In fact, it wasn't until the late 2000s that many buildings were fitted with bomb detection equipment on their entrances. (At that, the technology was old school. Incoming cars were inspected underneath with mirrors on a stick and a human eye scanning the trunk.) Rather, the primary concern here is about the mobility and tracking of data. With call centres, we see how the 'electronic panopticon' (Zuboff 1988) is being realized more vigorously in information technology sites than in other spheres of Indian society—even prisons. My follow-up research project is revealing an absence of technological surveillance in some

prisons in India—no metal detector walk-thrus, no surveillance cameras, no electronic locks on the doors, etc., (Poster 2013a).

Aside from guards with guns, the monitoring infrastructure is minimal and markedly pre-technological. Given that the prison was the site of Foucault's original analysis of the panopticon (1979), this is quite telling. The information age and its diffusion of data throughout social life has recasted the manner in which bodies are surveilled in a given space. Bodies are surveilled aggressively not just for discipline, but when they are linked to sources or movements of information. In outsourced call centres, we see how clients play a role in making this happen, by pushing this strategy from the global north.

In sum, disk drives and metal detectors illustrate how clients use electronic *hardware*—not just the software—to bridge the distance gap. With these devices, clients are able to control over the physical actions of workers and managers transnationally. Unlike the case of the autodialers above, these technologies are not in the US. They are in the Indian call centres themselves: on the shopfloors, in the hands of the workers themselves, and in the computer terminals they work on. These devices are farther away from clients. Yet, they are primary tools for clients to assert their agency. They show how clients use remote technologies to keep tabs on outsourced labour processes.

IP Addresses and Webcams

So far, this chapter has considered how clients use technology to manage from afar—now I turn to the ways they use technology to manage *at home*. In this section, we see how clients actively surveille the last group: consumers. Clients use the same techniques on consumers as they do on workers. Furthermore, they use surveillance of workers (both locally and globally) as strategies for monitoring and managing consumers at home. Client surveillance of customers is informational through things like IP addresses and visual through things like webcams.

Informational Surveillance. The first way clients observe consumers is through information and databases. Gathering and storing data about consumers are major undertakings, and not surprisingly, an entire

industry has developed around them. Indeed, 'one of the fastest-growing businesses on the internet is the business of spying on consumers' (Angwin 2012). Firms either invest their resources in collecting the data themselves, or buying it from specialized consumer research agencies like Claritas, Dun & Bradstreet and InfoUSA (Thelen et al. 2004). Purchasing this information is one of their costliest activities—up to two-thirds of a project budget.

Clients collect many types of information about consumers—their phone numbers, addresses, credit histories, spending habits and preferences. This data has many uses in a call centre for the routine tasks that employees do. An example is how clients collect extensive amounts and types of data on consumer ethnicity. Whether or not consumers are aware of it, firms are profiling and examining their ethnic, racial, and national backgrounds. They do this through communications technology, by determining which populations live in which calling areas. Nass and Brave (2005) recommend that firms use Caller ID and email internet protocol addresses to assess languages and accents for the areas where consumers live. One firm in Japan uses consumer telephone area codes, mapping the phone regions according to ethnic concentrations and geographies.

The purpose of this data is not to monitor consumers themselves, however. It is meant for the employees who serve them. Clients use data on consumer ethnicity to construct an ethnically compatible workforce. With this information, clients instruct call centres how to groom their staff, so that employees match the accents and cultures of the major ethnic groups in consumer neighbourhoods. This practice is supported, and in fact recommended, by research from Nass and Brave. They find that 'people like interfaces with personalities similar to their own' and 'prefer voice personalities that complement their own' (2005, p. 5). In accordance, managers select workers, train them through intensive national identity management, or buy V-reps, to reflect the ethnic leanings of their consumers. Consumer data, therefore, is a starting point for selecting and managing the identities of workers.

Market research firms survey consumers about their feelings towards foreign workers and their preferences for nationality in service. Studies in the UK report that 60% of buyers would change suppliers if companies

shifted their calls to India. For financial and retail services, consumer opposition was higher, at 95% (Read 2001). This data is used to gauge backlash and subsequently train workers in national identity management. Finally, clients collect data on broad populations of the global south to determine their potential as an outsourcing workforce for the future. An offshoot of the market research industry—in offshoring projections and forecasting—has arisen just for this purpose. Data gurus analyze and advise on the best destinations. They survey a host of populations from all over the world, especially in the global south, and then rank them to produce an overall 'index of opportunity'.

Good prospects are identified by many traditional indicators: economics (GDP, wage rates), technology (infrastructure), human capital (skills), legal systems (intellectual property laws), and government (corruption, political relations). Clients of call centres have similar offshoring concerns as those in other transnational industries (e.g., manufacturing, etc.). However, as seen in the 'Global Outsourcing Report' (Original Source: Minevitch and Richter 2005), clients of interactive customer service are looking for additional criteria in their outsourcing destinations: language capabilities, cultural affinities, and adaptability. In fact, 'language, accent and cultural issues' ranked on average *ahead* of 'the potential to strike' and 'the existence of government incentives' in the level of importance to these firms, according to a report by Business Insights (Original Source: Eastwood).

Global south countries are then rated on their potential and 'risk' for each of these dimensions. In 2005, India was at the top of the list. In fact, its cultural rating of '1' (on a four point scale) was a main reason why it beat out its second place rival, China, which was rated a '4'. These kinds of intangible factors, i.e., concerning people's social habits, are primary indicators for how clients rate consumers abroad. In this way, international information gathering is a tool for seeking out new outsourcing locations by clients. The general population of a nation—its citizenry, consumers, etc.—is assessed for its potential to become a workforce for call centres.

Visual Surveillance. The second way clients observe consumers industry is visually. Clients are teaming up with vendors to develop new technologies for watching the bodies and movements of customers.

Clients observe consumers directly through webcams. Most major stores like Walmart have installed video cameras. The purpose is to keep track of, analyze, and then modify consumer behaviour—to change their flows through the store, to reduce their proclivity to steal, etc. Firms are beginning to place these cameras in other locations. Vending machines that sell small items in public places (and thus perform the function of retail employee) have been around for more than a half a century. However, now they are being equipped more human abilities. Facial recognition systems scan the bodily features of the customer, analyzing, and assessing things like skin and wrinkles (Rosenbloom 2010a, b). Before the machine accepts money or dispenses goods, for instance, it determines if the customer is old enough to buy tobacco products. Robotic vendors, therefore, are imbued with *policing* functions over consumers.

Facial recognition software is somewhat reminiscent of emotion detection, which I have described in my broader project (Poster 2011). Clients are using intrusive equipment to surveille consumers, just as they do with employees. In this way, firms are watching consumer bodies in order to regulate the consumption and marketing processes.

Clients use webcams on consumers for another reason, though – to acquire data about *other* groups like workers. Vendors like Cisco Systems offer technologies that can track the patterns of consumer movements around the store, and how long it takes employees to serve them. By monitoring consumers, firms can check how well workers are doing their jobs.

Turning the tables on this dynamic, moreover, clients are observing *workers* so that they can control *consumers*. Take the case of Asda. This is the second largest supermarket chain in the UK, and a subsidiary of US-based global retail giant Walmart. In 2010, the company installed webcams in its subcontracted garment factory in Bangladesh (Bachelor 2010).[1] The factory produces clothes for the brand 'George', which Asda sells in its stores.

Curiously, the firm wasn't interested in viewing employees for itself. They broadcasted the feed on their corporate website, so that the live video of workers in Bangladesh would be visible to the public. They could see, firsthand, factory employees putting finishing touches on jeans and casual trousers, testing quality in the textile laboratory, etc. The ultimate end user of the Asda webcam, therefore, would be consumers in

the UK. The shopfloor webcam, pointed at Bangladeshi workers, was designed to pacify Asda's own angry consumers. It came in response to charges by consumer and media groups that Asda had substandard labour practices in its outsourced factories. These cameras would reassure consumers that items produced overseas were done so under fair conditions. The goal therefore is dealing with consumers back at home.

This case illustrates the way clients exert their agency in the global grid. Asda sends work abroad while simultaneously seeking to regain control of it at home (in this case, to manage political fallout). It also shows how the global grid distributes power and propagates multi-surveillance. Consumers have authority over clients by using the media and threats of boycotts to hold them accountable for their labour practices. Consumers even express solidarity with workers in the global south. In turn, clients attempt to subdue their protest through surveillance systems (i.e., webcams and websites).

Though this case is outside the call centre industry, it foretells a possible future for visual surveillance. Given the growing concern about data theft by consumers, webcams may become more appealing to clients and managers of offshore locations. Despite the fact that the medium for worker–customer interaction is verbal, clients may feel that observing employee behaviour *physically* during the call may serve as an extra measure of security. Such practices are already being used in home-based call centre work. Domestic outsourcing firms that operate through 'crowd-sourcing', i.e., routing calls to employees' homes, are using visual surveillance to keep tabs on these unsupervised workers. Firms like Odesk (now called Upwork) use software that takes six random screenshots per hour of employee computer terminals, and makes them available to clients (Shellenbarger 2008). One can see the trend moving to offshore call centres quickly as well.

Discussion

Clients are increasingly making their presence known in call centres. Kinnie and colleagues have noted this process domestically. They observe how, within the UK, clients are having 'direct' and 'indirect influences'

on their own national call centres (Kinnie and Parsons 2004; Kinnie et al. 2008). Indirectly, they imprint the values of the brand, set targets for customer service and finance, organize the shopfloor into teams, and monitor call centre data instruments. Directly, they may oversee day to day operations of the call centre–from the recruitment of telephone workers, to the hiring and promotion of line managers, to the onsite training and induction for new campaigns, and to the dispensation of wages, bonuses, and prizes for competitions between employee teams.

With transnational outsourcing, we might expect that such close attention by the clients is hard to put into practice, and perhaps even undesirable. Gaining distance is the main reason why they outsource to begin with, as I opened the chapter. Even so, clients of Indian call centres maintain their hold over the day-to-day operations across borders, and they use technology to facilitate this. For some tasks, like regulating the pace and quantity of calls, etc., this is easier to do (Original Source: Centre for Education and Communication). They simply install auto-dialers and various CRM software packages, and let them run. However, this chapter also reveals more extensive and on-the-spot interventions in the labour process by clients. They participate in training sessions. They send detailed materials like scripts for phone conversations and aliases for the employees. They assess workers individually. They control where workers walk in the building. They direct what workers do with their computers. They monitor both workers and as well as managers. And so on and on so forth.

Their surveillance reflects a tension of the global service grid–contradictory imperatives of relinquishing authority for the shopfloor to managers who are in India, and simultaneously using technology to gain it back. Pressures at the centre of the global service grid pull them in (moreso than for vendors). We saw this, for example, with the storage-keeping of employee aliases. Consumers and the state make clients legally accountable for some of the goings-on in outsourced call centres, through legislation like the Telemarketing and Consumer Fraud and Abuse Prevention Act (Original Source: US Govt.). So, as much as clients would like to withdraw, they are compelled otherwise.

Clients negotiate this role carefully. They extend their presence wide enough to have agency in the call centre, but limited enough to avoid

everyday problems. Clients operate behind the scenes and are rarely seen in full view. They use these technologies as a way to extend their reach into the call centre. Some clients do make periodic visits to Indian offices, especially when starting a new campaign. They also bring employees to the US for training. This is usually reserved for higher level workers, the 'team leaders'. However, none of this was going on at any of my firms during my fieldwork. I did not see a single American or British client while on a tour of a dozen or so call centres with a local official. Rather, the most common means for client travel is virtual. Employees like Pradeep at Middle-Co are acutely aware of this:

> What is happening is that clients never interact with us. They'll always be in contact with one of the directors of this company, or with the assistant managers, or maybe with the TL's [team leaders]. *There are very, very few situations when a client comes to you and talks to you.* That's what I'm saying, because a client never comes to us. They always convey their message to the directors that "This is our requirement, we have to achieve this number of sales or…or this thing or that." According to that, we have to work. So ultimately, they rule us. This is the basic thing. *Maybe they are not ruling us directly, but indirectly they are on our head.* [Emphasis added]

Being elusive is part of the virtual persona clients seek to project–one that does not have overly identifiable features. Not having a face obscures accountability to workers.

What this chapter shows, then, is how clients are *selectively hidden.* They use technology to reveal themselves (e.g., in training sessions, on speakerphones), but also to mask themselves (e.g., in the monitoring process, feeding their numbers into the autodialer and posing secretly as customers). Through this process, clients can direct from abroad without being seen.

Conclusion

This chapter has outlined how many devices help call center clients maintain their authority digitally, if not physically, from afar. Overseas clients use: *autodialers* to control the core process of connecting US consumers to Indian workers; *speakerphones* to participate in the training

of Indian workers and monitoring Indian managers; *metal detectors and disk drives* to restrict the flow of information and movements of workers in the Indian building, and *IP addresses and webcams* to monitor consumers who buy their services or products. I have argued that, in a system of multi-surveillance, they are able to carry this out on a range of different actors in the transnational call centre industry all at once: Indian managers, Indian workers, and US consumers.

These agencies call for a reworking of how surveillance is traditionally conceptualized. One reason is transnational dispersion. Outsourcing doesn't remove the job of supervising and administrating from the global north. Instead, it adds another layer management transnationally, thereby installing administrators in two regions of the global economy. One is remote and virtual, the other is onsite and live. Clients are often directors of the technology in global call centres; managers, in contrast, are the enforcers. Thus, because of the dispersion of the global service grid itself, power is more decentralized. It is distributed among different types of elites, including clients and vendors.

A multi-surveillance view also shows us that surveillance in the global service economy is not monolithic. Client practices sometimes vary from–and clash with–that of other elites in the global service grid—particularly vendors. While vendors would like clients to adopt computerized stand-ins, clients don't necessarily use technology to replace themselves (or workers). Their surveillance is not always algocratic (Aneesh 2009), in the sense that their interest is not uniformly in autonomous systems that will run without them. Instead, clients choose technologies that enable them to be the distant managers of the global call centre, so that they can control directly from afar. This represents an important challenge to the narrative of vendors—even if just a small one. Clients reject the notion of *fully* automating call centre processes, expressing instead a commitment to human workers and customer service jobs. Critically, this reveals fractures of authority in the global service grid. Supervision over call centre operations is at times divided between vendors, clients, and managers, and across global north and south.

Finally, there is a shifting of surveillance gazes. Neither the directions nor the targets are stable. Rather, actors pivot in their positions in the grid based on their situational interests. For instance, Indian workers at

times bond with the US client, crossing lines of both service and geo-political authority in the grid. The brand name of the client is very meaningful for employees, both in symbolic and material terms. It helps them build a prestigious resume and accrue higher wages. In fact, many times employees choose jobs based on the reputation of the client rather than just the call centre. At other times, those workers bond with their Indian managers *against* the US client, when those managers help them resist surveillance imperatives from the global north. Thus, as I show in my larger project, the same people who monitor each other can also become partners in the surveillance of others, as they find common adversaries in the global service grid.

Notes

1. I'm grateful to Jamie Cross for bringing this to my attention.

Acknowledgement Research was conducted with support from the National Science Foundation (#SES-0240575), the Vice Chancellor for Research at the University of Illinois at Urbana–Champaign, and the William and Flora Hewlett Foundation. I am grateful to the participants of the study for their generous offerings of time and energy, and to an anonymous reviewer for insightful suggestions. Much thanks goes to the editors of this book, Phoebe Moore, Martin Upchurch, and Xanthe Whittaker. The opinions expressed herein are those of the author alone.

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Hawthorne's Renewal: Quantified Total Self

Rebecca Lemov

Even as industrial mills that once evoked the 'dark satanic Mills' of William Blake's poetry have fallen into ruin—only to be reconstituted as gently Skinnerian experiential environments—the workplace itself is being rebuilt along similar lines: Quantrepreneurs, tech evangelists who make responsive technologies in order to monitor and mould the workplace environment as well as the worker's experience within the environment, debut myriad devices and software systems that function in the workplace. How will self-tracking practices—which many scholars have themselves been tracking (e.g. Berson 2015; Moore and Robinson 2016; Schüll 2016; Till 2014)—alter the cadences and character of work? For example, BetterWorks, a Palo Alto-based company is 'bringing the Quantified-Self to Work' via five pillars of Goal Science.™ Their method is meant to 'engag[e]', 'empower[]' and 'cross-functionally align []' workers. Ultimately, the 'deeply held' goal is to 'help[] people feel like they are winning at work', ushering them through a series of stages to

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_8

reach their articulated goals through optimising achievement. Through easy-to-use dashboards on the BetterWorks platform, managers can graphically view moment-by-moment who is a 'team player' and who may be slacking off, a.k.a., 'not in the goals process': 'They can easily see who is active and who is not in the goals process, as well as who is overachieving and who is underachieving' (BetterWorks n.d.). Likewise employees can use 'frictionless check-ins' to self-monitor their progress in tasks. The process targets and engages the striving self as shaped and elicited in neoliberal push to define and reconfigure quotidian practices in the creation of 'human capital' (Dilts 2011; for a critical overview of human capital theory see Tan 2014). All activity becomes redefined as forms of personal investment. Defining the self as that entity engaged in redefining its activities as forms of personal investment is a nearly pure definition of the agentic self under neoliberalism; as Gershon defines it, 'This [neoliberal] concept of agency requires a reflexive stance in which people are subjects for themselves—a collection of processes to be managed' (2011: 539). In the popular Anglophone press, the arrival of the Quantified Self in the workplace sometimes receives expression in alarmist Orwellian terms, as in the ominous headline in the *Atlantic* in 2013: 'They're Watching You At Work' (Peck 2013). Oddly, this article is about 'the application of predictive analytics to people's careers' rather than workplace surveillance—the ominous title works as a sort of clickbait. Peck warns that:

> An emerging field sometimes called 'people analytics'—is enormously challenging, not to mention ethically fraught. It can't help but feel a little creepy. It requires the creation of a vastly larger box score of human performance than one would ever encounter in the sports pages, or that has ever been dreamed up before. To some degree, the endeavour touches on the deepest of human mysteries: how we grow, whether we flourish, what we become. Most companies are just beginning to explore the possibilities. But make no mistake: during the next five to 10 years, new models will be created, and new experiments run, on a very large scale.

Yet it is also a process whereby '*you're* watching you at work', something Moore (et al.) call 'self and other-tracking' in their chapter in this

volume, and the different routes by which self-regulation and external monitoring encouragingly interact with each other. As I will argue, such systems operate on two levels: with regard to factory-like, 'non-creative' jobs such as UPS package delivery or Amazon warehouse fulfilment, they modify the worker to meet the unceasing demands of production quotas or algorithmically adjusted delivery schedules; in the case of higher end jobs in non-traditional sites, they work by engineering emotional states in tune with a corporatist, cooperative ethos, updating empowerment and work/life integration techniques to encompass 'all-of-life' ventures (Moore et al. 2017). In each case, the subjective 'self' is engaged through environmental feedback mechanisms and, in the process, potentially transformed. Under the 'Quantified Self at Work' new banner, reports of increased levels of productivity accompanied by the affective sense that one is 'winning at work' accordingly accrue. This is particularly the case in the more intensively engineered work environments.

If the post-industrial workplace—symbolised by London's Millennial Mills, a derelict flour mill situated on the Docklands now being refurbished for immersive 'experiential shopping'—is now finally slated for renovation, what then can be said of the post-industrial worksite? How is it being transformed? What can the past—not, perhaps, the ruins, but the archives—tell us about the reshaping of working environments? The epochal sensibility, the 'last of its kind' as a structure of feeling applied to buildings and outposts of another moment of capitalist production, is a potentially odd source of nostalgia. Even odder is that it tends to obscure changes in production that are ever—intensifying. In the post-World War II period, consumption did not replace production, obviously, but the imperative for creative capitalism moved to consumerism (Cohen 2003). Now, one can argue, the data-driven, environmental 'surround-sound' immersive practices that drive consumerism are also beginning to drive production, causing the two to bleed into each other.

The quest is to gather ever-more-personal data in order to personalise and optimise the workplace. The domain of subjectivity, however, has been driver of scientific inquiry for some time, its origins found in work inaugurated almost a century ago. In this light, my chapter examines a key set of experiments that bear on the little scrutinised transition, which commentators often present as inevitable, that occurs variously after

'crossing the analog-digital divide' or moving finally into the information age, or transitioning to neoliberal forms of capitalist accumulation, accompanied by the arrival of post-humanist sensibilities. Instead of assuming a broad transition in general terms, relying on assumptions in which the 'last of its kind' is always just disappearing (a locution that has something in common with salvage tropes among anthropologists), I analyse historical experiments targeted directly at what the Harvard Business School lead researcher on the Hawthorne experiment, Fritz Roethlisberger, called 'the elusive phenomena' that make up attitudes at work (1977). In decades of twentieth-century experiments, an epochal change in workplace subjectivation came about. Examining this set of experiments and results allows us to see which elements in today's configurations are new, which elements are rooted in decades'-old practices, and therefore how these techniques (of the subjective moulding of workers) continue to evolve.

Hawthorne Effects

Hawthorne Works was a manufacturing powerhouse for the ATT-Bell telephone system's Western Electric Company, which built constituent communications parts for telephones at its sprawling campus in Cicero, Illinois, not far outside of Chicago. The Hawthorne experiments were conducted by Firtz Roethlisberger and Elton Mayo between 1924 and 1933 at this plant. The study constitutes widely recognised landmarks in the emergence of key sciences of subjectivity in the twentieth century—leading to a technoscience of subjectivity in the twenty-first, one might argue. Researchers gathered up qualitative and quantitative data about workers' subjective states and utilised them in understanding effects on productivity. By examining these experiments at an archetypal industrial factory, my aim is not only to question easy assumptions about what neoliberal forms of capitalism along with developments in self-tracking, monitoring systems, and internet, social media and digitisation growth mean to work, workplaces and workers' psyches. It is also to shed some light on the metamorphosis of 'self' underway in sites of many kinds. Technologies of selfhood have been addressed in a range of literature,

via e.g., what Gill identifies as 'new and emerging forms of discipline, which operate as technologies of selfhood that bring into being the endlessly self-monitoring, planning, prioritising 'responsibilised' subject required by the contemporary' (Gill 2009: 231). Here, I wish to historicise a particular element of such technologies, their targeting and transformation of employees' subjective states, focussing particularly on the apparently mundane and inconsequential thoughts, daydreams and incidental musings with which workers occupied themselves.

At the heart of the most famous segment of the experiments was a specially selected set of workers, isolated in a designated room, whose task was to construct a particular 'relay'—the Relay R-1498. In the first two years of study, the team of six 'girl' operators (working nine hours a day, five and a half days a week, under constant if unusual supervision) produced 34% more relays than their previous average rate; by the fifth year of the study, production had steadily risen by 46%, even as their shifts had decreased in length. The question of why, exactly, this spectacular rise occurred became a besetting question for workplace researchers, who had introduced many variables, experimental conditions and methodological interventions to the 'T-Room' where the controversial experiments took place.

Before discussing their experimental arrangement and outcome, in which the operators' dynamics in the relay assembly room played a major part, it is useful to note the symbolic significance of the 'relay' gadget itself: relays are electromagnetic switches that, after being activated by a weak signal, then send out a new, stronger signal. The Bell System, which introduced automatic exchange switching in 1918, and which was committed to increasing capacity for long-distance calls, thus needed an ever-expanding amount of relays. In the 1920s, for example, a typical direct call required as many as 150 relays, versus only about 20 for an operator-assisted call (Gillespie 1991: 50–51). By the late 1920s, when the key experiments took place, Hawthorne was manufacturing over 7 million relays each year. Most of the 35-plus constituent parts—including pins, bushings, springs, terminals, insulators, plates and armatures—could be machine-punched in massive quantities, but they then required assembly, adjustment and inspection by human eyes and hands,

the speedier the better. Bearing in mind that the relay functioned to connect calls and also to remove the human operator[1] from that role, the part was both automating and facilitating. Ultimately, the labour its assemblers undertook under experimental conditions would reveal systematic emotional connections among the human parts of the system as well. The events of the Relay 'T Room' were to reveal the circuitry of subjectivity itself.

The Hawthorne Works plant hosted what has been called the 'first major social science experiment' (Baritz 1960), which as mentioned was really a series of experiments, culminating in the relay assemblies. In the course of the relay tests, two of the initial group of workers were removed and replaced (potentially for union agitation or pace-setting on the production line), and the final six continued to work together until the end of the formal study and in fact for many decades beyond. At first the girls were observed secretly. Second, they were moved to an observation room. Third, the experimenters altered temperature, humidity and other working conditions in some way. In each case and with each alteration, the girls' productivity rose. This was a mysterious surprise and in an interview with a popular magazine, Elton Mayo, one of the study's lead researchers at the Harvard Business School, retrospectively called their realm of research 'the twilight zone where things are never quite what they seem' (Whitman 1948: [59]). (This was years after the experiments, once they had become of the stuff of legend, and had made Mayo's and other major Harvard Business School experts' reputations.) He concluded that the workers had through the process of the experiment itself somehow become a 'conscious group' and it was this—'merely placing the six girls in the same room'—that had raised productivity (and presumably their inner motivation to produce the gadgets). Mayo consequently made it his life's goal try to understand the 'we feeling' in the modern factory. In a series of 20,000 interviews of workers, he found that it was not the substance of the interviews *per se* but the very fact of being interviewed (i.e. being paid attention, scrutinised, surveyed, watched, listened to) that defused griping and made employees more docile and better adjusted. 'The airing of grievances was often therapeutic in itself', as one social theorist has summarised these experiments (Rose 1990: 71).

In what follows, I turn to examine closely one of these therapeutic threads by following the cadences of conversation as it unfolded between Operator No. 2, a young woman named Jennie Sirchio (20 years old in 1924, at the start of the study, 27 years old by the time of the initial interview), and one of the Hawthorne researchers, a woman named J. Rousseau. This set of interviews marks a methodological turning point significant in the history of the sociological interview, a history in which Hawthorne plays a significant role: researchers were dropping the highly choreographed interview protocols previously used and replacing them with a nondirective interview mandate, an innovation that put them in the *avant garde* of the field of interview techniques (Lee 2011).[2] It was not after all until the 1950s that Benney and Hughes would announce, 'Sociology has become the science of the interview' (quoted in Lee 2011: 123). Note too that the Hawthorne non-directive interview was an independent invention, parallel to that of Carl Rogers (1945), who developed his technique in the 1930s at the Rochester Society for the Prevention of Cruelty to Children while working with severely disturbed children, eventually coining the phrase 'nondirective interview', and sometime later renaming it the 'client-centered approach'. Nonetheless, Hawthorne's social researchers surveyed their own, unique lineage of question-free interviewing style, as we will see below, in the same decade.

The first interview with Jennie, recorded on 28 May 1931, opens on a dramatic conflict: the initial description, which reads a bit like stage notes, reads: 'Employee speaks very crisply at first as though she either is not interested in talking to the interviewer or has made up her mind that she was going to say nothing'. One can bear in mind that the Hawthorne experiments by this time had been going on for years, so Jennie was no neophyte. Interviewer Rousseau begins by asking, 'Have you ever been interviewed before, Jennie?' to which she responds, her crispness coming through, 'Yes, I was interviewed last year'. She also notes she's heard the other girls talk about their own interviews. Next, the interviewer offers to tell her more about how the interview programme has been changed since it began in 1928, to which accounting she responds, 'Well, now what am I supposed to talk about?' Told it can be anything, and 'it doesn't make any difference', the worker refuses to talk freely and asks the interviewer to ask her questions. The interviewer asks why, and

Jennie insists she does not know what to say. She could talk about her 'home conditions', for example, but isn't sure she wants to hear about it. Her tone has now evolved into testiness.

At this point, the interviewer observes that the research team has abandoned asking questions by means of a long list, which was how they originally approached it, laying aside the direct interview method in 1930. 'Like if I had 10 questions here to ask you, maybe you wouldn't be interested in talking about any one of the them, but there might be a lot of other things you would like to talk about, see?'[3] When this does not stimulate a flow of words on the part of Jennie, the interviewer continues by empathising that she wouldn't know what to say either, if someone told her 'to just talk'… 'I'd have so many things in my head I wouldn't know what to say first'. Having been interviewed so often (by Pennock, Hibarger and Chipman, all of whom notably were male researchers), Jennie observes that they must already know everything: 'you could find out all about what we are like' from the existing records, and this awareness seems to have a dampening effect on her desire to talk. 'I don't think there is anything we could tell you that they don't already know about us'. The interviewer points out she is going to introduce another innovation: instead of talking just to 'you girls' she will also talk to the experimenters, managers, layout operators, and inspector. Once a week is their plan. Jennie seems nonplussed. Each time she is told that she has useful knowledge, she insists she knows nothing more than she has already told: 'in insistent tones' (as the record notes) she repeats, 'they have everything up there' (p. 3). Finally, however, she agrees to the plan, and agrees to help, and tell her 'anything you want to know'.

She recalls the time she started work, which was around when her mother and her little sister died within a few weeks of each other. She goes on to describe how 'working in a great big bunch' of her friends is a nice feeling, each constructing relays, no one stalling. This is the best way to work. The rest periods, although initially suspect, Jennie admits to enjoying greatly. Having a snack and some tea improves her mood, and the fact she missed her break that morning was upsetting. The record interjects, 'employee [made] quite a scene over not getting her tea' that morning, having forgotten. All in all, the relay room is exactly to her satisfaction, especially with the addition of regular tea breaks, and fans in

summer. 'There is everything that I like… I can't tell you anything I don't like because there is nothing there I don't like…'. When conversation halts, as Jennie periodically interjects she really hasn't much to say, the interviewer encourages her to take five minutes in silence, and think about what she might talk about. She finally resolves to talk about her home and family, and the 'stage notes' offer, 'This information is given abruptly and with air of finality as if employee is saying, "I suppose I'll have to tell her a little bit to satisfy her and get it over with."' This, and the structure of the interview as a whole, strongly suggests there was a challenge in gaining admittance to the sanctum of truly personal information—this was doled out with a certain reluctance, play, banter and strategy on the part of the E (employee), and in response the I (interviewer) (p. 5) goes about deliberately establishing rapport by talking about a case of sensational blackmailing that was then in the news. Rapport is evidently well established some time later (four more pages into the transcript), when Jennie asks the interviewer to spell her name, and they each spell out each other's names, whereupon Jennie declares they know each other a little better now. Nonetheless, she insists—a constant refrain she has never abandoned—that she has nothing else to tell the interviewer. The interviewer proceeds as follows: '(Appearing casual and not interested in personal affairs to avoid Employee's feeling 'pressed')', she goes on to suggest the morning interview is finished. Jennie offers that since she has no steady boyfriend, she really has little to say. The interviewer perks up. Jennie reveals the dearth of a boyfriend, though she used to have one. They couldn't come to an agreement. Jennie further reveals she's never been in love. 'Haven't you?' asks the interviewer. Jennie provides some information about her sisters' marriage difficulties and then trails off. 'Well, I guess I've told you everything', and with this the first interview comes to an end.

In their second interview, the interviewer, Rousseau, struggled to recognise Jennie (only a little over a month after their first interview):

I	'Is that you, Jennie?'
Operator	(Smiling) 'Yes, it's me.'

I I hardly recognized you. Aren't you wearing your hair different or something?

E It's my sunburn—that's what makes you not recognize me. Well, I guess I'm wearing my hair different, too. I guess I had it behind my ears the last time I came down here, didn't I?

I I guess you did.

E You just ought to come up to the test room and see the way we are dressing lately. We wear our hair behind our ears, and we wear our stockings rolled. First thing I do when I come to work is to go to the locker room and roll down my stockings and take off my girdle'.

I Well, you didn't have to roll them up to come down here to see me.

E Oh, I'm wearing them up this way today because last night I went home and looked and I found a Christmas gift that was given to me. A pair of silk garters, so I am wearing them this way today. But to get the silk up above your knees is so hot. Whey the visitors just take one look and run away. (laughing)

I (laughing) I'll have to come up and see you.

E You ought to do that. We look like old ladies. My, it is hot up there.[4]

It is clear that relations were playful between the experimenter(s) and the 'girls'. (There was sometimes flirtation, mild insubordination and playfulness, especially between the male observers and interviewers.) This has been a source of dispute: critics in the 1930s–1950s identified coercion and managerial panopticism as the cause of increased production. 'We cannot accept the view that rationality and initiative are vouchsafed only to the elite and that to the common man is left only the virtues of faith and obedience' (Kerr 1953: 110–111).[5] They also argued that the economic conditions of the depression had something to do with it. Sociologist C. Wright Mills deplored the reduction of the unions to 'status use', ignoring their class and power functions (Mills 1948).

Gillespie describes the relationship as 'paternal', a dynamic also observable in the records. The interviews have been most commonly criticised as means of burrowing into workers' subjective space and enforcing discipline while neglecting any encompassing analytical frameworks that incorporated social struggle or power relations.

While they almost certainly were targeted to achieve the former (burrowing into workers' subjective states), it does not seem that the latter (enforcing brute discipline) is a full description of what emerged. Late in life, several of the erstwhile Relay Room girls—Wanda Beilfuss, Mary Volango and Teresa Zajac—spoke of the appeal of working at Hawthorne: it was a job everyone wanted (at least in their immigrant, Chicago-based Irish, Czech and Italian circles), and the only negative, while working on the factory floor initially, was the mean and sometimes cruel behaviour of the floor managers. 'We had bosses that were real nasty… We had one [Mr. X] that was real mean. He used to come up to me and say, who can I bawl out today, and I'd be shaking myself… His supervisor, Mr. Y. always had a habit of watching my work. I'd have my head down, but he'd keep watching. He was always kind of working against us…. Mr. Z was a mean thing too. I don't know why these guys were all so mean. They were the bosses and wanted to have people working. I guess they just wanted to do their job' (worker interviews from 1979 quoted in Sonnenfeld 1985: 123). If the Hawthorne experiments revealed a new approach to workplace control, it was control of a more intimate, 'friendly' variety.

The events at Hawthorne seemed to show that the experimental conditions themselves, under which each worker felt himself to be the focus of interviewers, to be under observation, to 'count' in both senses of the word, brought about the desired results of group cohesion and greater adjustment —in sum, a sort of group mind. Group Mind, incidentally or not, was the name a coterie of influential Harvard professors led by L. J. Henderson in the 1930s gave themselves for weekly meetings to speculate on social control. Conditions could and did condition both outer behaviour and inner belief. What was on display at Hawthorne was not overtly coercive or punishing forms of panoptical control but, perhaps, a more emotionally driven type of collaborative coercion. Reinforcing this point about the different climate fostered deliberately by the Hawthorne interviewing

technique, Lee comments that the point of foreswearing questions was to 'creat[e] a nonjudgmental climate within which the client felt able fully and freely to express feelings, and in which those feelings were rendered back to the client accurately and sympathetically by the therapist'. When translated into research, this allowed the interviewee, rather than the interviewer, to 'assign significance to the topics covered in the interview'. This encouraged the interviewee 'toward greater self-reflection' (Lee 2011: 126). Examining the interviews sheds light on how inner beliefs became one more factor to be circulated within a system of production.

It is fitting that the research Hawthorne spawned, particularly the discovery of the Hawthorne Effect, was itself unusually generative. For decades, Harvard Business School colleagues treated it as though it had revolutionised the study of workplace management, moving the paradigm from scientific efficiency and Taylorism to a newly cutting-edge Human Relations approach that (to put it simply) no longer factored out emotional states and the subjective dimension of work experiences but instead factored them *in*to analysis. As Daniel Bell argued, Frederick Winslow Taylor's 1911 *Principles of Scientific Management* insured that 'a compulsive character [was] stamped on working life' (Bell 1956). Time-motion studies imposed abstract motion divorced from the human mover onto repetitive tasks, and the assembly line rationalised techniques, giving birth to mass production (first in a slaughter house, later at Ford's Highland Park factory). The Human Relations school marked a turn whereby the 'human factor' figured into workplace design and business plans. With the debut of the field of personnel management, 'personnel managers sought not just obedience, but cooperation' from the workforce (Gillespie 1991: 49). Early in the Hawthorne experiments, in-house researcher George Pennock, who was superintendent of the works' technical branch, posed a list of questions he hoped the nascent experiments would answer: 1. Why does output drop in the afternoon? 2. Do operators actually get tired out? 3. Desirability of establishing rest periods. 4. Changes in equipment. 5. What is the attitude of the operators? 6. Effects of a shorter working day on output (Qtd Gillespie 1991: 49). The fifth question on this list suggests the way in which 'attitude' became a new target of research and its aims for exactitude. How did attitude relate to productivity?

Elton Mayo, an Australian emigre with a wide-beamed, one may say scattershot training (he pursued subjects from law to philosophy to anthropology while a young scholar), approached the subject of workplace studies in 1922 with some radical ideas about strike control. Indeed, strike control was Mayo's explicit aim when he devised the format of the Hawthorne interviews originally. Mayo conceived of the worker as an irrational near-primitive for whom the interview would serve as an outlet, dispersing and releasing anti-authoritarian feelings and personal hangups. Before his involvement at Hawthorne, Mayo garnered some attention for a 1923 article, 'The Irrational Factor in Society', which focussed on the example of a medical colleague of Mayo's who was once consulted by a young artisan who desired relief from 'certain hysterical symptoms, Mayo recalled, continuing: 'We speedily discovered that he was what he proudly called a "rebel"' (1923). In other words, the artisan objected to all authority, and to such an extent that if a boss or foreman gave him a direct order, it was his habit to walk off the job. This, as Mayo elaborated,

> …'response to situation' we found, was determined by the facts of his early childhood. His father, a drunkard, had brutally mishandled his mother and himself. His reaction to authority, individual or social, was his reaction to his father; he had never discriminated between paternal and other commands. His recovery from hysteria was accompanied by a complete change of attitude to authority. He took a job and kept it, and recognized the necessity for legitimate authority as part of social and industrial organization. (Mayo 1923)

By 1926, Mayo was framing workers as anthropological primitives, drawing from Lucien Levy-Bruhl's concept of prelogical and obsessive thinking. Fatigue, in particular, caused workers to lapse into irrationality. The massive interviewing project at Hawthorne was Mayo's way of investigating 'human nature and social motives' so that strikes and sabotage could be undermined.

The Hawthorne Works closed its doors in 1983, five years before the now-reborn Millenium Mills in London. In the mid-1980s entrepreneur Donald L. Shoemaker purchased Hawthorne and replaced it with a shopping centre, leaving one of its remaining towers standing at the

corner of 22nd Street and Cicero Ave., overlooking an unremarkable parking lot. More recently, the Hawthorne Experiments' central place in management theory has received further confirmation, and they have been hailed for constituting the basis for modern management itself. As a recent Harvard Business School assessment put it, the Hawthorne Experiments and the publications that resulted were 'a manifesto that offered a new vision for reconstructing a shattered world of meanings for both management scholarship and organizational life' (Anteby and Khurana n.d.). They marked a turning point in the management of the workplace and also the theorisation of such management. In turn, the final question to be addressed here is: how do these epochal experiments reflect on the changing post-industrial workplace of the 'new economy' and the increasingly Quantified Selves that populate it?

Varieties of Surveillance and Subjectivity

Discussions of the arrival of data-gathering technologies in daily domains focus on its inescapability, as the writer Tom McCarthy recently pointed out: 'Every website that you visit, each keystroke and click-through are archived: even if you've hit delete or empty trash it's still there, lodged within some data fold or enclave, some occluded-yet-retrievable avenue of circuitry' (McCarthy 2015). McCarthy emphasises the folded-in quality of this ever-more-ubiquitous tracking capability. Its pervasiveness and subtle but total penetration will soon reach the point at which the 'right to be forgotten' and the claim to be anonymous become the most valued states. These marker-less identities are paralleled by the rise of 'normal core' fashion that flouts its utter in-distinguishability as fashion. All are elements in the ongoing and evidently accelerating process of making 'virtuality part of everyday life', and they receive no shortage of commentary about how they are transforming self-to-other relationships and self-to-self relationships (Dean 1998: 8). How such transformations are played out in the workplace is becoming a newly urgent question. Likewise, the new forms of subjectivity that arise in sharing economies–for example, peer-to-peer

production arrangements, seen as politically subversive–are also relevant (Moore 2011).

A flashpoint for discussions about the entrance of tracking technology, counting devices, and calculation strategies into the domain of self-understanding is the Quantified Self movement. Founded officially in 2008 through the efforts of Kevin Kelly, then of *Wired* magazine, and Gary Wolfe, a Bay Area writer, brought together self-trackers ranging from the ardent to the merely curious. Under the banner of 'Self-knowledge through numbers', or those numbers gathered through biometrics, sociometrics, and psychometrics, members combine platforms and tools to find new ways of gathering data and identifying correlations. 'Once you know the facts, you can live by them', is the second dictum. QS-ers continue to form groups across the US and in 30 countries around the world, meeting weekly to share results (their meetups likely launching a thousand dissertations). On the week of March 15, 2015, groups were meeting in St. Louis; London; Denton, Texas; Thessaloniki, Greece; and Washington DC, where they reported on tracking anything from the seemingly mundane (cups of coffee drunk per day, pulse rate, sleep hours) to the more esoteric (personality-test scores, 'narcisissm index', 'spiritual well-being', or 'all the ideas I've had since 1984') via devices that populate wrists (fitbit), lower backs (UpRight), forks (HapiFork), chests (Spire), and pockets (of course, phones).

Another arena where a clearer focus on the abandoned body emerges is in research on the seemingly most menial work: collective labour markets harnessing human computing abilities. 'Clickwork' is the mass labour of many hands on many keyboards, their collective output aggregated through Amazon Mechanical Turk (AMT), amounting to a new form of harnessing human computing at scale (also discussed in the chapter by Moore et al. in this volume). Amazon and others cannot afford to regulate this labour through traditional means; instead, administrators filter it through 'light' automated management rather than top-down heavy-handed control. Microwork ethnographer Lilly Irani describes how, for example, management of a 10,000–60,000-member workforce for a particular project can never affordably be handled by means of an old-style Foucauldian 'disciplinary' technics, in which individual workers

are shaped and exactingly moulded on the physical and psychic level for their tasks. Rather, management must operate automatically, with a light touch, and 'Instead [of surveillance and control of the panoptic], requesters sort desirable workers through faint signals of mouse clicks, text typed and other digital traces read closely as potential indicators' (Irani 2012). Most often workers work alone in rooms with their computers.

Keeping this in mind, a new perspective on the 'wearables' movement of quantified self emerges. Wearable devices that can track behaviour, gather data, offer feedback and potentially 'steer' future behaviour, are cybernetic devices brought to wrist, thumb and clavicle. As Schüll states, these devices are:

> …digital compasses whose continuous tracking capacities and big-data analytics can help consumers navigate the field of everyday choice making and better control how their bites, sips, steps and minutes of sleep add up to affect their health. (2016: 317)

It is curious, however, that the embedding of such devices ignores the body itself, constantly moving focus back to the cleverness of the interface, the dashboard or the technological innovation, rather than the place of contact, and the moment-, post-contact, when a period of suspended animation can be seen to occur.

As mentioned, the process of quantifying the workplace self occurs in different registers. For 'non-skilled', non-creative-class jobs, it may take the form of sophisticated and intrusive top-down tracking, as described in a recent popular-press account. An average shift for a UPS driver (re-named) Rose entails making 110 stops and the delivery of 400 packages in a day. After leaving his house at seven in the morning, he faces a day so busy that he must run upstairs and into gardens to meet algorithmically moderated quotas. This breakneck pace often does indeed break bodies: 'If you go to one of these UPS facilities at shift-change time, you'd think you were at a football game, the way people are limping, bent over, with shoulder injuries, neck injuries, knee injuries', said David Levin, an organiser with Teamsters for a Democratic Union, a reform caucus within the Teamsters. 'It's 15 years of rushing, rushing, rushing, working when

you're exhausted, working those long days, running up and down stairs with boxes'. The driver, Rose, suffers from chronic back pain, but has not undergone surgery as a physician he consulted told him he had too many injuries to undergo a successful spine operation. 'People get intimidated and they work faster', he said in an interview. 'It's like when they whip animals. But this is a mental whip' (Kaplan 2015).

David Cozzens is the CEO of Telogis, a company that provides telematics to commercial trucking fleets, including those of AT&T and Coca-Cola. Telogis offers 'Connected Intelligence. Smarter fleet management'. Through the system of visualising one's business in real time, the system's software can 'minimiz[e] idle time and total mileage while getting the same quantity of work done' [Telogis website] A feature is 'InSight AlertsTM' and driver scorecards. Alerts arrive when a violation of desire norms or standards occurs. A photo of the 'Alert' includes tweet-size report: 'Driver: Tony Williams' with a second line: 'Harsh braking at 2:30 pm'. A picture of Mr Williams sits above. Insight and InSight converge in such viewing systems. Meanwhile, the motivations at upscale workplaces take a different and more participatory shape, in which the worker contributes to the goal-setting process and complains only privately while publicly cheering on his own and others' efforts through workplace social media and other responsive technologies.

Underlying the phenomenon of the quantified self at work and the increasing harnessing of subjectivity within responsive systems is the question of dehumanisation. Bearing in mind William Gibson's observation that dehumanisation is caused by economic systems, not technological ones, it seems that with increasing automation and the increasing share of robots doing human work, alongside the algorithmic apportioning of work flow, workers' subjectivity is in the position of becoming a distributed, circulable entity, one that moves across and within machine–human interactions (Vint 2015). Even as Sherry Turkle (2012) has characterised the much-remarked-on spectacle of teenagers sitting together each engaged with her own gadget as a communal affect of intimate isolation, we see workplaces fostering engagement with intimate gadgets that reflect new economic relations.

In Conclusion

The onetime 'elusive phenomenon' that drove the Hawthorne researchers to experiment in its capture is now at the heart of economic changes and workplace relations. Meanwhile, in recent scholarship in the history and sociology of science, we see that the putatively elusive realm of subjectivity is ripe for reevaluation. If objectivity has a history (Daston and Galison 1992, 2006), so too does subjectivity. As Steven Shapin argued recently in an essay called 'The Sciences of Subjectivity', it is about time for scholars who study science to see subjectivity not just as a wayward element that acts to disrupt objective processes. According to which view, subjectivity is the part of scientific inquiry that is 'inchoate, arbitrary, unstable, and endlessly varying', the part that is constantly 'contaminating' the workings of objectivity, and in the end 'what we're sadly stuck with if we don't watch out'. Instead, one can focus on subjectivity as a domain of active knowledge making and an 'explicitly framed topic of inquiry' (Shapin 2011: 172). In that spirit, I have examined the extent to which Harvard Business School researchers did exactly this—explicitly framed subjectivity as their topic of scientific inquiry. The elusive phenomenon was extracted in this way, although the result of its circulation under new arrangements is not yet known.

Even as subjectivity is increasingly harnessed within work environments, there are signs that this targeting is neither inevitable nor the whole story. For example, Moore argues that there are inklings of post-capitalist subjectivities emerging in post-industrial coding circles: 'These groups are made up of geeks, artists, hackers, designers, carpenters and programmers, all of whom are committed to a radical ecology based on the tenets that defy the proprietary and competitive relations that dominate the majority of productive relationships in the current, seemingly post-industrial, digital age. P2P production communities are composed of […] three dimensions: social relations, human subjectivity and the environment' (Moore 2011). Somewhat along these lines, anthropologist Schüll, investigating intensive digital self-tracking regimes, finds a post-ontological subjectivity emerging through self-tracking minutely focussed on physiological routines, while others

identify a formation of 'self as archive' that is characterised by radical flattening and potential searchability (Schüll 2016; cf. Lemov 2017). The self is being transformed. When 'one becomes a bundle of ill-defined but highly flexible skills, one becomes a fragmented self of usable traits', argues Gershon (2011: 539). Following on this fragmentation and bundling of self, the critic Jackson Lears recently observed its outcome, 'in an atmosphere dominated by postmodern irony, pop-neuroscience, and the technocratic ethos of neoliberalism, the self is little more than a series of manipulable appearances, fashioned and re-fashioned to meet the marketing needs of the moment. We have bid adieu to existential inwardness' (Lears 2015). The disruption of subjectivity's domain, at work and at play, is clearly an ongoing process, one which occasionally raises possibilities of bringing about more freedom, even as it more typically consigns subjects to ever-more-responsive and ever-less-free regimes.

Notes

1. The term 'operator', as Gillespie points out (1991: 51), was used normally at Hawthorne to describe the unskilled female laborers who assembled the relays; it is not clear whether they wished to evoke the function of these workers as mere operators carrying out operations, or whether it was meant to suggest telephone operators, or perhaps to differentiate skilled from unskilled workers.
2. Roethlisberger and Dickson (1939) cited Piaget as an influence on the interview methods they developed for their widely-read Hawthorne study.
3. Interview No. 1, May 28, 1931, p. 2. Harvard Business School, Baker Library Manuscripts: Western Electric Hawthorne Papers, Box 3C, f. 22 Relay Assembly Test Room: Interviews, 1931–1933.
4. July 1, 1931 Record of Interview (seq. 16), Harvard Business School, Baker Library Manuscripts: Western Electric Hawthorne Papers, Box 3C, f. 22 Relay Assembly Test Room: Interviews, 1931–1933
5. Early criticisms of Hawthorne also included Bell (1947) and Dunlop (1950). Later critiques included that of two Marxist psychologists who protested the 'pro-management bias' of the studies: Bramel and Friend (1981).

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"Putting It Together, That's What Counts": Data Foam, a Snowball and Researcher Evaluation

Penny C.S. Andrews

Open data, institutional data, personal data and social data can be gathered by a data broker, deemed to be adding value by creating unprecedented combinations. Some or all of the original data may not belong to the broker, but their control of data flows and ability to combine different sources takes the existing data points into something new that can be sold and resold. This new object may be seen as beneficial, where the data donor and/or society receives something in return, or what I call 'data foam', where the new product or service has little or no benefit to anyone other than the seller. This chapter explains the concept of data foam, using the specific example of the increasing use of metrics in researcher evaluation.

The concept of the surveillant assemblage (Haggerty and Ericson 2000) or data double (Poster 1990) is a familiar one. People are aware that their data are profitable to corporations, for marketing and insurance purposes, crime prevention and control and myriad other uses. The privacy intrusion is seen as acceptable, if they receive something in return (Gordon 2014). This is a part of the price we pay for cheaper and more personalised products and services, and has come into its own with the rise of 'freemium' apps for mobile devices and the seemingly almost

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_9

compulsory engagement with platforms from Google and Facebook in order to engage with modern life. Our shadows are always with us.

There are so many data-related metaphors now: data flows, data journeys, data friction, data doubles, data ghosts. Why throw another into the fray? Why 'data foam'? Well, the various components of the 'assemblage' can be agitated again and again to produce a new and shallow layer of dubious value on top of the seemingly reasonable use of data in public statistics or as payment for products and services. This agitated ephemeral layer, this 'foam', is another product or service to be sold—not to solve a problem but to create a market or influence decision-making.

Is charging for value-added services really an unproblematic aspect of open data and 'leaky' data (social media, institutional/work data, phone data, CCTV, ANPR, data others put out there on our behalf) (Bates 2012)? Who benefits? Whose labour is not compensated or valued? Are platforms really the problem? Is the financialisation of open data, that should be publicly owned and not necessarily exploited for profit (Bates and Goodale 2017), and personal data, that should not be weaponised against a user (Lyon 2003; G.J.D. Smith 2016), the price we have to pay to live and work in the twenty-first century?

Once, my wallet was stolen in a large store in an out-of-town shopping centre. There were no witnesses and, according to the duty manager, the area of the store where I had been standing when it happened was not covered by CCTV—it was an open area with no shelves and therefore no chance of employees or shoplifters damaging or stealing stock or fittings. The security camera in 'public' areas does not exist to protect citizens, but to monitor employees and protect property. Workplace monitoring and productivity metrics are again not for the benefit of the surveilled. So combinations of these data sources, frothed up into something new, are used for decision-making that rarely benefits the data creator. It is exacerbating existing problems.

The new objects created from combining sources, this data 'foam' on top of the existing flows, can be used for monitoring, marketing, assessment and control. Cambridge Analytica's algorithms worked with their unique combinations of Facebook data to influence the outcomes of the UK EU referendum vote ('Brexit') and the 2016 US Presidential

election. Elsevier's 'basket of metrics' is used for researcher assessment, comparison and employment decisions. The call centre or warehouse performance dashboard and the Bradford Factor for measuring employee absenteeism are so old fashioned now that you can combine video tracking, social media and physical social interactions of employees and persuade them to do corporate wellness wearables such as Corporate Wellness 360, which offers corporate wellness packages where staff are provided with devices that generate 'smart data' and advanced analytics for employers.

Quantification in higher education made its biggest early strides on the student-facing side of the university, providing 'richer information' (Williamson 2016) to support 'learning and teaching' via learning analytics, recruitment and retention management and course and tutor evaluation (Hall 2016). It crept slowly into the work of the researcher, as the regular research evaluation exercises started to take hold in many countries, with academic tenure, promotion and recruitment committees also enjoying the 'evidence' provided by cold hard numbers (Besley and Peters 2009). The quality of research could suddenly be measured by the Impact Factor of the venue in which the outputs were published, the number of times they were cited, a star rating in the research excellence framework (REF), and the ability of the researcher to bring in grant funding against targets. The backlash against such crude measures (Gruber 2014; Anonymous Academic 2015) has only encouraged the spawning of yet more metrics, bringing in quantification of impact via social media data and other sources (Martín-Martín et al. 2016) and touting the value of Lambert's (2003) 'basket of metrics' for researcher assessment (Clements et al. 2016b).

Metrics are not merely 'neutral' statistics as all chapters in the current edited collection maintain. When multiple actors use a measurement, it becomes a visible artefact that can be compared with other artefacts—a material object that did not exist before (Pine and Liboiron 2015; Moore and Robinson 2016). The production and analysis of these artefacts is a profitable service, be it traditional bibliometrics, which serve disciplines such as the humanities very poorly (Thelwall and Delgado 2015; Stelmach and Von Wolff 2011), or the alternative article level metrics commercialised as Altmetrics (owned by Digital Science) and Plum

Analytics (Roemer and Borchardt 2015), which was acquired by Elsevier in February 2017.

The vast number of publications produced by researchers every year led to a call by some for the human evaluation panels of the REF to be replaced in part or in whole by metrics, and an extensive multi-stakeholder review led by James Wilsdon (Wilsdon et al. 2015) recommended that metrics be used responsibly and only to support qualitative decision-making, not replace it. This recommendation has been upheld by the recommendations of the recent Stern Review (Stern 2016), despite Elsevier lobbying the government for the tender to run the new metricised REF (Eve 2016), although it seems that the new teaching excellence framework (TEF) will rely heavily on metrics (Department for Business Innovation & Skills 2015, 2016).

CRIS (current research information systems) such as Pure and Symplectic are explicitly designed to be reporting tools as well as bibliographic management systems, including the generation and exposure of metrics and comparisons,. Institutional repositories (IRs) have also been used alongside or instead of CRIS in REF reporting and exporting data to funders for Researchfish (Clements et al. 2016b; Hinrichs et al. 2015). Researchers often feel uncomfortable with audit culture (Apple 2005; Sparkes 2007; Cahill and Irving 2015; Back 2016; Anonymous Academic 2015), and policymakers and managers are doing little to address this concern (Cruickshank 2016), while librarians continue to embed Altmetrics, bibliometrics and Snowball metrics into the research sharing infrastructures they control (Sonkkila 2015; Ward et al. 2015; Clements et al. 2016b). Academic SNS are also engaged with metrics, ResearchGate even devising its own version of the h-index, following interest in its proprietary ResearchGate Score (ResearchGate 2016; Kraker and Lex 2015).

Studies of academic identity often refer to the 'game' of academia, with the strive for 'excellence' and need to achieve highly on publishing and teaching metrics, as one where they do not understand the written rules, or they feel ill-prepared to play (Pereira 2015; Sparkes 2007; J. Smith 2010; Krause 2009; Levin and Montero Hernandez 2014; S. Ball 2000; Winn 2014),—even as they recognise their role in this game at various stages in their careers (S. Smith 2015; Watermeyer 2015;

White 2012; Barry et al. 2001; Zembylas 2007; S. Moore et al. 2016). This performative aspect to working life (J. Butler 1988) and academic identity (S. Ball 2000; Gendron 2008; Morrissey 2015; Musselin 2013), based on Goffman's ideas of social performance (Goffman 1956), adds additional pressure to the academic's experience of work and time that is not experienced by other higher education workers.

It could be argued that the constant drive for improvement in 'excellence' also moves away from learning about learning for the benefit of society and towards metrics, compliance and evidence for the benefit of third parties, where reporting is a proxy for actual improvement and consistency of approach is actively discouraged (Collini 2012). Collini is talking about teaching here, but the same could be said of research, in a move away from increasing the sum of human knowledge and understanding towards again metrics, compliance and reporting (S. Moore et al. 2017). Beer (2016a, b) argues that measurement 'produces uncertainty and competition'; it individualises people and stimulates intense affective responses. It is important not just to consider how the academic rat-race and the metrics associated with it affect the careers and working lives of researchers but also how they affect researchers' affect. In other words, measures are affective even when they are not effective, and how they make researchers feel is as an important a consideration as the behaviours they target.

If Zuboff (2015) is correct and the current logic of capital accumulation is 'surveillance capitalism', the biggest commercial players in academic publishing and research sharing are already involved in researcher monitoring or surveillance via the data journey (Bates et al. 2016) through the profiles, linkages, data intersections and metadata (Beer and Burrows 2013) managed and controlled via their products and services. The publishing giants provide a full range of these to researchers and libraries and institutions, including citation analysis products (Harzing and Alakangas 2016; D. Butler 2016), CRIS (Clements and McCutcheon 2014), researcher identification systems and analytics (Yu et al. 2016; Elsevier 2014; Ware and Mabe 2015), PDF and reference management services (Manoff 2015), research data management (European Union 2016) and other researcher tools such as profile services and research notebook software (Martín–Martín et al. 2016; Hoey

2015; Banks 2016; Boersma 2016; Nicholas et al. 2016; Cutler 2012; M.E. Smith 2016; Parker-Gibson 2015). The real threat may not be publisher control of research outputs, but of workflows and data flows, which are far more difficult for either researchers or librarians to ethically disrupt.

> What's wrong with a big for-profit company producing such metrics? What does it mean if Elsevier owns this data?…The data is not available to the people or institutions or disciplines it purports to measure. It cannot be contested, it cannot be re-analyzed, it cannot be investigated, it cannot be downloaded. It just has to be trusted. (Kelty 2016)

Elsevier are also part of the Snowball Metrics initiative (Green 2014; Wilsdon et al. 2015), used by some institutions in benchmarking university outcomes (Jump 2014), monitoring researcher productivity and informing academic recruitment decisions (Dresbeck 2015). In some cases, Snowball Metrics are linked directly to the CRIS (Clements et al. 2016b), and Elsevier have lobbied the UK government in the hope of becoming the preferred supplier of metrics for future research assessment exercises (Wilsdon et al. 2015; Eve 2016). The Elsevier product Scopus is already used for the Times Higher Education world university rankings, despite its poor reporting of research outputs other than journal articles and conference papers and thus marginalisation of arts, humanities and social science work (THE reporters 2016). Elsevier, and their competitors know that ownership of data flows (K. Ball et al. 2016; Baker and Millerand 2007; J. van Dijck 2015; Helmond 2015) is valuable. In August 2016 another large publisher, Wiley, acquired the publishing software company Atypon (Wiley 2016), who provide the hosting platforms and analytics services used by their rivals SAGE (SAGE 2016) and Taylor & Francis (Atypon 2016). Academic publishing is no longer primarily a 'content' business (Lovink and Rossiter 2005; Schonfeld 2017).

Elsevier market Snowball Metrics as 'crucially, bottom-up' (Snowball Metrics 2017b), with project partners at research-intensive universities in the UK and working group members in the US, Australia and New Zealand. This framing implies that researchers themselves are driving the

metrics initiative (Jump 2014; Green 2014). However, the endorsements plastered across the Snowball Metrics website are from research management staff, not academics. John T. Green, the originator of the concept, is keen to sell himself as a Life Fellow of Queen's College, Cambridge (Green 2013), but had ceased being an active researcher many years ago. He was working in research administration before he entered the academic publishing industry and then education consultancy. The language of these website endorsements is alien, resembling the technocratic and managerialist approach that is mocked and resisted by increasing numbers of researchers (Brandist 2016; Wood 2010; D. West 2016; Morrish 2014). For example:

> Snowball Metrics is about working on and sharing a common language so that institutions are confident that they can use all of their data to compare their performance with each other in an apples-to-apples way. (Jennifer Johnson in Snowball Metrics 2017c)

> We have begun to source data, taking that which is readily available and trying to ensure it conforms to standards, yet cognisant that something is better than nothing in what is a sector that has struggled to grasp and accept performance management. (Rutherford, in Snowball Metrics 2017a)

Snowball Metrics 'agreed and tested methodologies' are provided in the friendly-sounding 'Recipe Book' (Colledge 2014; Snowball Metrics 2017c). These metrics enable institutions to benchmark their performance against their competitors and inform decision-making about individuals and departments. For example, the metric Applications Volume 'calculates the number and price of research grant applications that are submitted to external funding bodies'. Researchers and departments can be evaluated using the various metrics against the expected amount of citations, grant income per full-time equivalent member of staff and number of co-authored outputs for their field.

Academic librarians and scholarly communications professionals serve two masters—their institution and their users (academics and/or students). Sometimes they see benefit in serving a third—commerce. The

publishers and vendors of research-related services who sell their products to these professionals are not the enemies of research, clearly, but there is a conflict of interest when said professionals can be found shilling for metrics providers at conferences, on vendor websites and in journal articles. Librarians profess to hold values relating to intellectual freedom and serving the user (Berg and Jacobs 2016; Weissinger 2003; Foster and McMenemy 2012), which are aligned with researcher values and ideals such as academic freedom and furthering the sum of human knowledge (Winter and O'Donohue 2012; Morrish and Sauntson 2013; Ylijoki 2003). These values become compromised when this third master is served, when librarians involve themselves with promoting Elsevier's competitive measures of productivity (Reznik-Zellen 2016) and provide data and justification for strategies that quantify 'Publications in Top Journal Percentiles' and 'Academic-Corporate Collaboration Impact' (Clements et al. 2016a) . Information is shared between Snowball Metrics users via a 'free' data brokerage system, but how aware are those at the sharp end of being measured that this is even happening? What value does this kind of quantification bring to an institution unless it is thinking of itself predominantly as a business?

Elsevier and the academic support professionals who promote them make quantification seem reasonable by referencing the need to employ more than one metric and supplement numerical data with qualitative data from peer review (Reznik-Zellen 2016; Darroch and Colledge 2016), as if it were the crudity of single numbers that was the problem and not the process of assessment itself and its links with funding income and employability, precarity and stress (Martín–Martín et al. 2016; Trullen and Rodríguez 2011; Raaper 2015). Metricisation only serves to intensify this process.

Elsevier produced metrics-based models (Jump 2015), marketing fluff (Wise et al. 2016) and responded to consultation (Elsevier 2014), trying to legitimise a use for their data foam products such as SciVal and Snowball in potential reforms to the REF that would replace or 'enhance' peer review with metrics in research evaluation (Wilsdon et al. 2015; Green 2014) . This idea has thankfully since been rejected (Stern 2016). Via the Freedom Of Information (FOI) process, despite attempts by the relevant department to block his requests, Martin Eve was also

able to discover the content of a meeting between Elsevier representatives and the UK Minister for Higher Education (Eve 2016), which discussed metrics further.

Researchers engaging with openly sharing their research outputs have to relinquish control over how and by whom data related to their identity (Jefferies 2016) and their research workflow is circulated (Beer 2013) at some point, be it to the institution, academic SNS, their funder, the State, etc. However, when one supplier controls or has access to most of the data flows, individual pieces of information can be combined in ways that are harmful to the individual, their community or both (Bossewitch and Sinnreich 2012; José van Dijck 2014; José van Dijck et al. 2016; Leszczynski 2015). Is it fair or reasonable that the same highly-profitable companies (Larivière et al. 2015) who publish your work, paying nothing for your labour in writing and reviewing, also profit selling from data about you and services based on their ability to quantify your worth?

The individual researcher is encouraged to think about their own research, their own metric scores, their own career. Considering the impact on their community is not part of the marketing of research evaluation metrics, nor how competition and quantification can work against the values held by researchers. Metrics are sold as accountability and transparency, of personal benefit to the ambitious researcher, the very least deserved by the mythical 'taxpayer' funding the research.

Possessive individualism, where every individual is a self-interested and competitive 'proprietor' of their skills, owing nothing to society, is the prevailing attitude of people in a 'marketised' society—according to Macpherson (Macpherson 2011), who defined the term, and others writing about the modern era confirm his view (Gilbert 2013; Hayles 2005; Garrod 2016; Sevignani 2012). The 'digital possessive' (Gordon 2014)—where digital networks are material objects and those objects are ordered within personal interfaces—can be seen in online profiles, which are an externalisation of a person's subjectivity, experiences and networks (Boyd and Ellison 2011; Baym and Boyd 2012). Academic SNS and some of the features of institutional and commercial research software can be seen to support this new 'possessive' profile and network norm, in a marketised higher education environment (Hall 2015). The digital possessive and possessive individualism come together not only in

research sharing infrastructures, such as the rebadging of the University of Sheffield's implementation of the Symplectic system as 'MyPublications', but in attitudes to academic entrepreneurship (Ozga 1998; Peters 2001; Winn 2013; Giroux 2013), knowledge production (Olssen 2016) and the power of having access to and being able to disseminate knowledge online (Cottey 2010, 2014).

Academic researchers differ from many other workers engaged in research and development activity, in that while their work may officially be 'work for hire', academic convention has it that the university waives its copyright claim and returns it to the researcher (Wesolek and Royster 2015; Kelty 2014). Unless the Stern Review (Stern 2016) recommendations on the non-portability of research outputs is implemented, it is also currently the case in the UK that the institution where the researcher works at the time of the REF can claim their output, rather than at the time of acceptance or publication, which gives researchers with publications in hand a 'bargaining chip' when looking to be hired or promoted by an institution. Research outputs belong to the individual researcher—not the institution or the public. They are 'theirs' to share. The metrics associated with those outputs may be the only academic capital that the contract researcher, holding neither grant money nor job security, is able to accrue.

While established academics may rightly feel aggrieved at the increased level of surveillance and quantification in academia (Burrows 2012; Shore and Wright 2015; Morrish and Sauntson 2013), it could be argued that the real victims of data foam and the metrics gold rush are Ph.D. students and early career researchers. Universities are handing over large amounts of money for the right to use proprietary products, such as Altmetric, Plum Analytics, Scopus, Web of Science et al. (Schonfeld 2017) while entrusting much of their teaching and research to low-paid precarious workers and research students (UCU 2016). Meanwhile, senior researchers have name recognition and social and financial capital (Walsh 2016; Fuller 2015), and can afford to make bold proclamations on the evils of sharing work via Academia.edu and ResearchGate (Bond 2017) and ridicule the use of social media by vulnerable scholars (Stewart 2016; Lupton 2014). The level of autonomy wished for by junior researchers, captured by Beyoncé in Brown et al. 2016 - 'I dream it, I work hard/I grind 'til I own it' - is stymied by the realities of the modern academic job market.

The prestige economy (Blackmore and Kandiko 2011) favours male academics (Coate and Howson 2014), and the numbers do too (J.D. West et al. 2013; van den Brink and Benschop 2012; Bröckling 2005). Google Scholar's algorithms and the use of citation indices to filter the vast quantity of publications in the literature searches (Gruber 2014) prioritise the already-cited over the new and exciting. Meanwhile, women, people of colour and disabled researchers are overrepresented in 0 h and casual contracts (UCU 2016; Lopes and Dewan 2013)—if they manage to remain within academia at all. Precarious researchers and those without current institutional affiliation cannot rely on the visibility of university website profiles, that for them tend to disappear at the end of their contract if they are entitled to one in the first place, and a track record built over years of 'academic freedom'. New academics have to prove their worth, be discoverable to potential employers and collaborators and stand out in recruitment exercises that prioritise high scores for h-index and grant income figures over the reading and understanding of their work, their skills and their potential (Havergal 2016).

Success in the 'basket of metrics' and the ranking systems such as university league tables employing this data assume the norms of scientific disciplines and English-speaking countries (Fiormonte and Priego 2016). Books and book chapters have not been well accounted for (THE reporters 2016), which disadvantages humanities and social science scholars, as well as disciplines that produce outputs aimed at practitioners outside academia as well as researchers. Additionally, practice-based outputs in the arts are badly captured by systems for capturing information and metrics about research, as well as the artworks themselves (Nadim and Randall 2013; Research Councils UK 2015; White, Wendy and Hemmings 2010; Gramstadt 2012). Productivity and quality are based on the quantity and venue of publication, and speedy citation, rather than a longer term or qualitative view. Spending 2 years writing a book that only counts as two outputs in a research assessment exercise and takes 10 years to show its influence, while bringing in a few thousand in related grant income, looks shabby in quantitative terms next to a life scientist who co-authors 30 highly cited articles a year and is able to command a multimillion-pound lab.

There has been a move in the UK REF from the submission of a variety of outputs suitable to their field (books, performance, media, etc.) towards publication patterns that favour academic journal articles across the disciplines (HEFCE 2016). While humanities researchers, in particular, have explained the problems around using metrics to assess their work, including differences in citation patterns and the half-life of research outputs (Thelwall and Delgado 2015; Hicks and Wouters 2015; Benneworth 2014; Stelmach and Von Wolff 2011), the response from the data foam industry has been to conjure up yet more metrics for predicting and measuring success (Brynjolfsson and Silberholz 2016; Taylor 2016; Van Noorden 2016).

Clegg (2013) suggests that the move towards affective economies—where 'emotions do things, and they align individuals with communities' (Ahmed 2004)—in higher education, which has been criticised for gendering division of academic labour (Hey 2011), may lead to a 'more hopeful account of the academy'. In this account, people are more likely to act meta-reflexively (Archer 2007, 2010), reflecting on their own reflections, and fight for their values rather than adhere to self-interest and societal norms. Some signs of this hope can be seen in the recently published *Academic Diary* (Back 2016) and the fostering of collaborative online communities that are values-driven (Costa 2015; Hall 2013; Gornall and Salisbury 2012; McAlpine 2016).

More negatively, along with the increase in corporate agency also foreseen by Clegg, evident in individualised 'wellness' approaches to managing the 'risk' of ill-health in the academy (Saltmarsh and Randell-Moon 2015), there are less sanguine examples of acting on principle such as the resignation of Sara Ahmed in protest at institutional failure to address the problem of sexual harassment (Ahmed 2016). Principles of one department may not be aligned with another. As Hanke (2016) states: 'a new dependency arises in the fluidity of the network university when data on institutional-level research performance is processed and used by upper-level administrators to manage lower-level faculty-administrators'. Services have an interest in collecting data to prove their value to senior management (Curtis + Cartwright Consulting 2011; D. Maxwell 2015), and are often required to report to external agencies and initiatives—such as UK anti-terrorism programme Prevent

(Heath-Kelly 2013) —which do not necessarily benefit, or can even harm, users of those services. Buying into data foam products like metrics and algorithmic software of dubious value in order to fulfil these requirements may come to characterise this era of management. As Bowie (2002) asks, 'Why stay in a sad place where they don't care how you are?' - researchers could legitimately ask how valued they are by the institution and question the values held by those who promote data foam. Whether the research office or the academic library handles the invoices for the data foam explosion, it is the quantified researcher who pays.

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Technologies of Control, Communication, and Calculation: Taxi Drivers' Labour in the Platform Economy

Julie Yujie Chen

Introduction

When the law that legalized ride-hailing apps like Uber and DiDi in China took effect on 1 November 2016, Li was a taxi driver in Hangzhou, the capital of Zhejiang province in China and the headquarters of Kuaidi. Kuaidi was DiDi Chuxing's major rival in the online ride-hailing marketplace before their merger in February 2015. DiDi, after purchasing Uber China in August 2016, has become the monopolistic ride-hailing app in China. Through DiDi, passengers have a variety of options for their transportation needs, from hailing a cab to car-pooling, booking a limousine, or hiring a designated driver.

The interior of Li's taxi was hypermediated by an assemblage of digital devices and communication systems (see Fig. 1). In addition to the six devices shown in the image, Li also had a dashboard camera, another

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
Dynamics of Virtual Work, https://doi.org/10.1007/978-3-319-58232-0_10

Fig. 1 Multiple devices and multiple accounts used by taxi drivers (photo taken by the author in October 2016)

smartphone, and a feature phone in the glove compartment. Besides these devices, which were owned and installed by Li, his taxi was equipped with a digital taximeter, the vehicle audio system, and a central surveillance system mandated by the municipal transportation department. This system was composed of GPS, an emergency call system, and four cameras—with one in the trunk—to monitor and record the locations of the vehicle. Li's use of seven smart devices in the taxi may be an extreme case in reining the rise of ride-hailing platforms in China. Taxi driving in China was among the earliest industries to be equipped with central communication systems for on-call service, pricing, personal safety, and surveillance (Xiao and Yan 2005) and Li's taxi is a prime example of the technological conditions in which drivers carry out their transportation services today. Taxis are hypermediated, networked, mobile workspaces.

Taxis were mobile workplace under 'electronic panopticon' (Bain and Taylor 2000) long before ride-hailing apps threw real-time algorithmic monitoring into relief. Due to the global popularity of the gig and sharing economy, as championed by Uber and Airbnb, there has been a surge in the study of algorithmic labour and algorithm-based surveillance (Rosenblat and Stark 2016), and in general, researchers have begun to look at the facilitation of new ways of labouring and service provision via online, for-profit platforms and their accompanying algorithms and data analytics for service matching (Glöss et al. 2016; Malin and Chandler 2016; Mikolajewska-Zajac 2016; Raval and Dourish 2016; Rosenblat and Stark 2016). Raval and Dourish (2016), for instance, have shown that these platform's 'prosocial' design (Harvey et al. 2014) demand more communicative, emotional (Hoschild 1983), and temporal labour from drivers. Ethical questions have been raised about the algorithmic distribution of work linked to installations of GPS (Herbert and Tuminaro 2008), and the fairness and transparency in ride fares determined by surge-pricing mechanisms (Chen et al. 2015; Hwang et al. 2015; Rosenblat and Stark 2016), in the context of racial and geographical discriminations (Thebault-Spieker et al. 2015) and the underestimated social cost of taxi-hailing apps (Rogers 2015). The robust scholarly interest in the impact of (new) algorithmic technologies in workplace surveillance and work process control, valuable as related research is, overshadows the fact that workplace surveillance on taxi driving via cameras and other mechanisms has long existed (O'Mara 2009). Apps on smartphones are, in fact, late comers to the assemblage of surveillance technologies.

Taxi drivers are treated as a separate group of drivers from private car owners in the studies about ride-hailing economy. Chinese taxi drivers' experiences with DiDi Chuxing, the most widely used taxi-hailing platform in China prior to Uber, provide a nuanced perspective for examining labour on and via ride-hailing apps. Taxi drivers in China were the first group of driver-labourers for apps like DiDi before it began to expand its business to private hires, chauffeurs, ride-sharing, premium car services, and now driver-partnership programmes. DiDi's incipient development—and for that matter its transformation and digitization of the taxi trade into an app-based, on-demand economy—relies heavily on

traditional taxi drivers, who continue to be a crucial component of staple drivers for DiDi. DiDi's appropriation of taxi drivers' labour sets itself apart from Uber. Taxi drivers are exempted from paying percentage commissions to DiDi, which is different from private drivers on DiDi and Uber.

Chinese taxi drivers like Li thus work at the intersection of the emerging on-demand economy (facilitated by online platforms like DiDi) and the incumbent taxi industry. The question of how taxi drivers like Li perform their services in a work environment is permeated by various digital technologies, which each may embody different and, at times, conflicting power relations, deserves closer scrutiny. In their forceful critique against the overgeneralized use of the metaphor of electronic panopticon to describe call centres, Bain and Taylor (2000) urge scholars to pay attention to the imperfectness of the panopticon and 'the complexities of managerial practice and the contested nature of the employment relationship' (2000, 16). Along these lines, taxis not only epitomize the pervasiveness of technology but are also contested sites for interplay between controlling and surveillance *and* drivers' defiance and counterwork. A crucial question is how taxi drivers make use of technology to fight against the imperfect panopticon and *construct* their own mobile workspace and determine their own conditions.

The present chapter is inspired by an interior view from the front seat in Li's taxi. In it, I examine the labour performed by taxi drivers amidst the rise of DiDi Chuxing and the taxi-hailing platform economy in China, I explain how the nature and the process of driving as labouring have been changed by taxi drivers adopting, resisting, and manipulating the technologies intended to put them under constant control and surveillance. To do so, in the sections that follow, after explaining the difference in the development of ride-hailing apps in China as represented by DiDi, I highlight the distinctive ways in which DiDi appropriates taxi drivers' labour to make sending ride requests through handheld smartphones an everyday habit in China, the process that I term as the platformization of taxi service. Focussing on the virtual payment introduced by DiDi through WeChat (the most popular social network app in China), I discuss how taxi drivers are subject to technologies of control on ride-hailing platforms. Before concluding,

I examine how taxi drivers take advantage of communication technology for personal, social, and political activities at varying levels.

As precarity (Standing 2014; Moore 2017 fc; Huws 2014) is the norm for taxi drivers, the chapter concludes with a critique of the binaries of the new economy and traditional industry and of stable and unstable employment that often leads to an outcry over the informalization of the labour force in the developed regions and 'crowd-fleecing' (Scholz 2016) by platform capitalism. The chapter offers a nuanced account of how taxi drivers adapt to, fight against, and manipulate the tidal wave of commodification and datafication of ride service. It enriches and extends current critiques of labour practice in the sharing and gig economy (e.g., Glöss et al. 2016; Huws 2015; Cherry 2011; Holts 2013; Gray et al. 2016; Akhtar and Moore 2017; Gregg 2015; Irani 2015; Rosenblat and Stark 2016).

Platformization of Taxi Services: DiDi and the Digital Labour of Taxi Drivers

The explosive development DiDi Chuxing, the 4-year-old ride-hailing platform company, is unprecedented in the Chinese or even global history of the digital economy. DiDi started its business by recruiting traditional taxi drivers. After the merger with its major domestic rival, Kuaidi Dache, DiDi was reported to have completed 1.43 billion trips 2015 alone (Eadicicco 2016), surpassing what Uber has accomplished in its entire global history (Hawkins 2015). After acquiring Uber China's operations, DiDi has become the monopolistic ride-hailing platform in mainland China and facilitates more than 90% of the taxi-hailing service and above 80% of the private car-hailing service (Wang 2016).

There are two popular misunderstandings about DiDi that deserve clarification before proceeding to examine the relations between taxi drivers and the ride-hailing platform.

1. DiDi is the Chinese replica of Uber in its algorithmic matching of passengers to drivers and in its appropriation of private vehicles and car owners' labour.
2. Ridesharing and private hires for ride services dominate DiDi's business.

Some media coverage of DiDi's purchase of Uber China went so far as to describe Uber as the latest failed attempt by the Silicon Valley to conquer the Chinese market. Admittedly, DiDi and Uber were in fierce competition, but considering DiDi as a Chinese version of Uber obscures the former's appropriation of incumbent taxi drivers. Chinese taxi drivers were the first batch of drivers recruited by DiDi before the latter began to recruit private car owners and expand its business from taxi hailing to chauffeurs, car-pooling, express car service, and now driver-partnership and DiDi bus. The comparison also falls short of capturing the profound changes in driving as work in the platform economy.

While the story of Uber began with cold calling to limousine and chauffeur companies in the Bay Area (Efti 2014), DiDi and its contemporary rivals failed at building collaborations with taxi companies. Instead, it took off from in-person demonstrations of how the technology works for taxi drivers. In its early days, DiDi hired thousands of people for its ground promotion team to set up booths in places where taxi drivers tend to concentrate, like airports, gas stations, nightclubs, and railway stations. What the ground promotion team did was introduce the ride-hailing application to taxi drivers and, more importantly, help interested drivers install the app and set up driver accounts, demonstrate how the app works, and later on solve technical problems for drivers after installation. Recruiting taxi drivers was DiDi's focus from its foundation in 2012 until August 2014, when the limousine book service was launched. By then, the total number of downloads of DiDi on Google Play reached 100 million.

Taxi services in China as offered by traditional taxi drivers, however, are not on the wane, in spite of the emergence of ride-hailing apps and the monopoly of DiDi. Even so, according to China Internet Network Information Centre (CNNIC), use of ride-hailing apps to hire traditional taxis was consistently higher than for hiring private cars for ride or

ridesharing service from 2015 to the end of 2016. There were 97 million users who hailed taxis via online platforms and 22 million users who used apps for private hires in the first half of 2015. The respective numbers climbed to 159 million and 122 million by June 2016 and 225 million and 168 million by December 2016 (CNNIC 2016a, b, 2017). The focus on private rides as opposed to taxi services is a deliberate discursive strategy to marginalize taxi drivers in the ride-hailing platform economy and to further downplay their labour or even render them invisible. Nonetheless, the taxi-hailing service grew faster than private car hiring in 2016, with a growth rate of 42 and 38%.

When DiDi cheered its facilitation of 10 million private car rides (as opposed to traditional taxi rides) on a daily basis for the first time in February 2016 (DiDi Press Center 2016), it forgot to mention that DiDi and Kuaidi have facilitated a combined total of 11 million taxi services daily since as early as March 2014 (Anonymous 2014). In the online DiDi Press Centre,[1] few milestones in the development of the company related to the role played by taxis or taxi drivers. The DiDi 2016 business report highlighted the company's accomplishment of creating 17 million flexible jobs in 2016. Taxi drivers do not belong to this category.

It is noteworthy that no ride-hailing apps in China including DiDi charges taxi drivers for commission fees. No monetary exchange between taxi drivers and the platform, differing from drivers on Uber, may deflect one from contending their labour be appropriated by ride-hailing apps. I would argue that the persistent invisibility of taxi drivers' labour in the on-demand ride-hailing economy is symptomatic of the transformation of taxi driving into digital work. Criticism of the exploitation of free labour on the Internet and in the digital economy has circulated for more than a decade, since Terranova's (2000) observation that the rise of free labour and a continuous extraction of embodied labour is the oil for the engine of the digital economy. Fuchs (2010, 2013) characterized all Internet and social media users as the creators of spaces of common experience on the Internet. Since information capitalism is engaged in a 'total commodification of human creativity' Fuchs argued that users are content producers on social media, so they all are vulnerable to exploitation (2010, 192).

The analytical meaning of the metaphor of free labour, if being used too indiscriminately, may fall short of capturing the complexity of taxi driving within ride-hailing platforms and, for that matter, the 'platform capitalism' (Olma 2014). Furthermore, the concept of the sharing economy is a capitalist ideology that conceals the continuation of the exploitation from the transition to the post-industrial society in the Global North in the twentieth century (Srnicek 2016; Fuchs 2017) and signals a downward spiral towards underpaid and contingent work and the end of employment as we know it (Scholz 2016).

The unpaid work taxi drivers carry out is analogous to the free labour practice of Internet users in that they contribute to the development of ride-hailing apps, that is, the platformization of ride service, without compensation. To unpack the nuances of the free labour provided by taxi drivers in platformizing ride service, I identify three intertwined yet different labour activities taxi drivers engage in: connectivity labour, infrastructural labour, and datafication labour. The distinction among the three is analytical. In practice, they are interwoven together and concealed by the overt work activity of driving.

Connectivity Labour

I use *connectivity labour* to describe the ways in which taxi drivers and their social networks are being appropriated by DiDi as the means to reach and retain passengers on the platform. They perform connectivity labour by interfacing between the ride-hailing apps and passengers and cultivating passengers to habituate them to hailing taxis on handheld devices. This aspect of connectivity labour inserts predictability and control into what Davis (1959) once characterized as a random relationship between cabdrivers and their fares.[2] Connectivity labour also involves the coercive power that ride-hailing apps have over taxi drivers by making them app-dependent. When the platformization of taxi service is complete, taxi drivers will have few alternatives but to remain connected to the platform.

Without the service provided by traditional taxi drivers, and without the connections they established for the platform to retain passengers,

DiDi would never have succeeded. As mentioned in the previous section, DiDi hired a ground promotion team to teach taxi drivers how to use the ride-hailing apps. The strategy of providing face-to-face demonstrations and technical support to recruit taxi drivers is not an accident but proves to be grounded in the technological conditions specific to taxi drivers. Qiu's (2009) study showed that a great majority (80%) of Chinese Internet users were working class with educational attainment below the college level, rather than urbanite white collar, who formed 'a working class network society' in China. The smartphone penetration rate has grown rapidly in China in the past decade, where 58% of Chinese adults were smartphone owners in 2015 (Poushter 2016). The working-class network society has evolved into a working-class mobile network society. The smartphone has become an indispensable digital device in the work environment for taxi drivers, as a great majority (90%) of them use their smartphones for work. They use it for communication (e.g., making phone calls or instant messaging with friends), navigation, and getting ride requests (Chen et al. 2016).

Taxi drivers share with other working-class groups their choice and use of information and communication technologies (ICT). One point nine million migrant workers from rural regions to cities form a majority of Chinese working-class. Qiu (2009, 10) argued that workers' informational demands and their use of ICT are determined by the existential challenges facing them in the urban areas, such as the lack of job security, child education, and health care. Communication technologies, including mobile phones, walkie-talkies, and pagers, play a crucial role in enabling Chinese taxi drivers to stay connected with their fellow drivers who may also be their distant cousins. In contrast, urban elites' choices and uses of ICT are more likely to be based on their desire and consumption needs. The existential needs driven demand for ICT among workers is indicative of their precarious status, and it also explains the flourishing supply of affordable, domestic-brand mobile phones as well as low-end SMS service in China.

Allowing passengers to add tips to fares (by 5–20 RMB) was one of the earliest functions developed on DiDi, prior to offering subsidies to both drivers and passengers.[3] Consequently, an application that might increase their income further is more appealing and more suitable for their

day-to-day habits of using mobile phones than consumption-oriented apps. Furthermore, being a cab driver is considered by immigrants of racial and ethnic minorities in the U.S. as a favourable occupation to settle down in a foreign city (Hodges 2012). Chinese migrant workers-turned taxi drivers tend to cluster based on the extended family ties and birthplaces. Their occupational identities overlap with the social identities and networks they brought with them while migrating to the city (Ding 2014). In some cities in China, there are taxi driver villages (Zhou 2016), where migrant-turned taxi drivers from the same hometown concentrate in the city (Ding 2014).

Taxi drivers also perform *coercive* connectivity labour. In the race to seize the market share among DiDi and two dozen other ride-hailing apps, taxi drivers are treated as a bridge to reach passengers. The more hailing a car via the platform becomes the norm, as opposed to street hails, the more driving as service becomes more generic and disposable. Traditional taxi drivers are capitalized on by realizing the platformization of ride hailing, but after it succeeds, taxi drivers are cornered and lose bargaining power against DiDi. More often than not, they have to rely on ride-hailing apps to make ends meet. They perform the connectivity labour coercively. It marks a profound departure from unpaid consumption and affective labour social media users have put in building their online subjectivity and social networks (Jarrett 2015) and from cultural workers like musicians, who build and maintain connections to their audience to foster their careers (Baym 2015). The motivation for workers in cultural and creative industries to interweave social and economic relationships is the aspiration for a better professional future (Duffy 2016). It is a survival issue, however, facing taxi drivers in the ride-hailing economy. Taxi drivers are trapped into using the ride-hailing platforms because without sufficient income, they cannot survive as drivers. Differing from 'forward-looking, carefully orchestrated, and entrepreneurial' aspirational labourers (Duffy 2016, 446), taxi drivers try to prevent their jobs from going backwards. They do not deliberately craft their skills or manage their online reputation in an entrepreneurial manner; instead, their responses appear to be improvised and ambivalent.

In other words, taxi drivers embody connectivity that bridges passengers to the platformized virtual territory of ride hailing. Taxi drivers'

reliance upon the connection to and through the ride-hailing apps for existential need leads to their complex and ambivalent attitude towards ride-hailing apps. On the one hand, traditional taxi drivers protest against DiDi's opening to private cars and the government's legalization of ride-hailing apps, feeling being betrayed and leeched by DiDi after the platformization of ride hailing is achieved. As one taxi driver told me, 'is there any essential difference between private cars hailed on the platform and unlicensed illegal taxis?'. Unlicensed taxis, or in Chinese *heiche* (black cars), post a persistent threat to the taxi industry long before the emergence of ride-hailing platforms. From a taxi driver's point of view, DiDi allowing private cars to enter the market is no more than whitewashing prior black cars. On the other hand, taxi drivers acknowledged that the auto-matching algorithm helps reduce taxi cruise time (when they have no paying passengers). The driver is not alone when he said, '[We need] ride-hailing apps designed for taxi drivers. Illegal taxis and private cars facilitated by ride-sharing platforms must be rectified!'.

Datafication and Infrastructural Labour

Connectivity labour from taxi drivers overlaps with other two forms of labour, but the latter two emphasise the registers of labour that help build and sustain the platform infrastructure and datafy information that feeds the data centres and algorithms. I choose to use datafication labour instead of data work/data labour (c.f. Scholz 2016) because I want to highlight that data are not objective artefacts, nor are they immune to political and cultural forces. Datafication labour speaks to the fact that data are manufactured and data being created are not neutral or natural, but are always framed and contextual (Gitelman 2013). On social media, for instance, users' identities and activities are categorized by algorithms (Cheney-Lippold 2011) through which social media companies collect and manipulate users data to deliver advertisement. José van Dijck (2013) argued that the ICT industry is engaged in a huge social engineering project that codes people's social connections and desires as peculiar types of data manageable and manipulatable by computers. Therefore, when Internet users produce data categorised as related to identity, social

connections or desire, they fulfil datafication jobs that are pre-determined by the algorithms. Indeed, criticism against datafication labour that 'is turning us into extras of platform capitalism, taking hold of our vitality, desire, eroticism, and time' (Scholz 2016, 65) suggests that datafication labour is pervasive and the experience and qualities of datafication labour are diverse. In the following, I will focus on the adoption of virtual payment by taxi drivers as an example to illustrate the specific aspect of datafication and infrastructural labour by taxi driving.

Taxi drivers perform datafication labour for ride-hailing apps to not only turn information about vehicle's location and mobility into data for DiDi to train its auto-matching algorithms but are subject to more control as compared to passengers. Take the adoption of virtual payment as an example. As mentioned earlier, taxi drivers use of ICT is likely to be driven by their existential needs whereas urban residents by consumption needs and desires. The asymmetry in the use of ICT between these two groups manifested in their varying degree of using or not using virtual payment function on their smartphone. In January 2014, when DiDi introduced virtual payment via WeChat Wallet on platform,[4] it was not yet a popular technological practice among taxi drivers. Soon after it was introduced, negative reviews left in the apps store for Didi concentrated on drivers' inability to accept virtual payment. A one-star reviewer complained that '[DiDi] failed to control [the] taxi driver's behaviour. The driver refused to accept payment through WeChat and requested cash. I had to pay [an] extra 10 RMB' (see Fig. 2).

What happened to the above reviewer was that s/he received a WeChat voucher worthy of 10 RMB (about 1.4 U.S. dollars) from DiDi, but the virtual money was not cash, in the eyes of the taxi driver when they have not registered on WeChat Wallet for money transfer. The passenger was dissatisfied because the driver resisted cash payment, and

Fig. 2 A one-star review on the failed virtual payment transaction (Sanjieke 2016)

the passenger blamed DiDi for the failure of virtual payment transaction. DiDi reacted to the negative reviews of this kind quickly and started to offer subsidies through WeChat Wallet to taxi drivers later in the month. DiDi raised subsidies to random amounts between 12 and 20 RMB because its then rival Kuaidi quickly followed suit, by introducing virtual payment on Alipay, a major virtual app backed by Alibaba that competed against WeChat Wallet. A price war between the two taxi-hailing apps began which cost 1.5 billion RMB (224 million USD) in three-month period from January to March (AllChinaTech 2016).[5]

Rewarding systems as technologies of control are not new and subsidies as additional income to taxi drivers were deployed as means to attract taxi drivers to adopt virtual payment methods and make their business transaction data more trackable and manipulatable. Taxi drivers must *learn* to work via apps, during which the control is enacted through platform algorithm. Learning how to integrate virtual payment into their daily driving jobs is one of the tasks in the learning process. Further to this, ride-hailing platforms not only facilitate taxi service provision but also shape how taxi services ought to be carried out. Jose Van Dijck (2016), argued that platforms like Google, Facebook and recently Uber and TaskRabbit dominate everyday life from transport to news to neighbourhood service. They are no longer the gateway but become infrastructures that underlie communications, social interactions, and business transactions. A platform society has come into being when 'social, economic, interpersonal traffic is largely channelled by an (overwhelmingly corporate) global online platform ecosystem that is driven by algorithms and fuelled by data' (Jose van Dijck 2016). In Rossiter's (2016) theorizing of logistical media, he pointed out that logistic software has materialized the means of tracking and controlling mobilities, and transportation and communication system are indispensable infrastructure for current labour control.

Training taxi drivers into using virtual payment is one of the most important steps for ride-hailing platforms to employ taxi drivers to build the platform soft infrastructure. For that matter, taxi drivers carry out infrastructural labour to sustain the platform expansion by adapting to changes in work environment. Besides offering subsidies to drivers, DiDi allowed users (including drivers) to share WeChat vouchers on their

social networks in May 2014. Consequently, drivers' social networks were used to attract potential drivers and spread the use of ride-hailing apps. This also related to the coercive connectivity labour they are put to perform. Studies showed that nearly seven in ten taxi drivers learned about the ride-hailing apps through recommendations by friends and co-workers (Tsinghua Media Survey Lab 2015). When the subsidy war ended, there were more than 1 million registered taxi drivers on Kuaidi alone, which covered 40% of drivers across the country.

There are two important clarifications to make regarding the categorization and analysis of the three categories of taxi drivers' labour. First, the analysis by no means exhausts the way in which taxi drivers perform these labour. Highlighting three categories of labour in my study, I do not intend to downplay the amount of emotional labour and temporal labour taxi driving requires to perform in the ride-hailing economy, as shown by studies by Sharma (2014) and Raval and Dourish (2016). Second, taxi drivers are not alone in performing these labour for the ride-hailing apps. Passengers' unpaid labour, for instance, also contributes to datafying mobility and training the platform algorithms. As Scholz (2016) stresses, the nature of corporate platforms in the so-called sharing economy is extractive in that they appropriate labour from all users.

Indeed, all three categories of labour forms—connectivity labour, datafication labour, and infrastructural labour—do not refer to the static work content for taxi drivers to perform. As Lev Manovich characterizes the nature of the Web as constantly under-construction, '[the] open nature of the Web as medium (Web pages are computer files which can always be edited) means that the Web sites never have to be complete; and they rarely are. The sites always grow' (Manovich 2001, 196). The 'permanently beta' status (Neff and Stark 2003) is also applicable to describe how taxi driving on the ride-hailing apps is subject to constant changes.

Conclusion

In becoming an app-based on-demand driver, taxi drivers by no means accept the ride-hailing apps without resistance. Indeed, according to statistics collected by China Labour Bulletin, a non-profit organization based in Hong Kong that keeps track of worker's collective activism in China, there has been a sharp increase in protest waged by Chinese taxi drivers since the popularity of ride-hailing platforms (China Labour Bulletin 2016). A survey study in June 2016 showed that more half of the taxi drivers reported to have participated in strikes (Chen et al. 2016). In addition, it is not uncommon for taxi drivers to register on multiple ride-hailing platforms or use multiple devices like what Li's taxi interior demonstrated (Fig. 1). About ten percent of taxi drivers on ride-hailing apps reported to have registered on more than two platforms (Chen 2017). The combination of the discussion of the rise of an alternative taxi hailing platform to rival the likes of Uber; methods of algorithmic worker control of the drivers involved; and simultaneous forms of resistance which I have presented here, illustrate that ride-hailing platforms are not broad-brush forces disrupting the global taxi industry indiscriminately. The rise of the ride-hailing economy as spearheaded and dominated by DiDi exacerbates the already precarious status of taxi drivers in China. Being informal and insecure workers, taxi drivers fall prey to taxi-hailing platforms, which appropriate not only the driving labour from taxi drivers but also connectivity labour, infrastructural, and datafication labour. The development of DiDi and its ways of exploiting traditional taxi driving furthermore, signals a budding of platform capitalism that differs from the comparable model born to the Silicon Valley, the centre of technological innovation and global digital capitalism. The platform capitalism embodied by DiDi takes advantage of the pre-existing technological and material conditions in China and reconfigurates their technological work ambient to the process of making ride-hailing an app-dependent daily habit. Taxi drivers, although not as unionized as their western counterparts, are not powerless. They utilize their informal status and appropriate technologies of communication and algorithm to engage in different levels of tactic calculations and political resistances.

For this conclusion, I would like to offer a critique against the tendency of treating precarity as newly emerged labour conditions that associate with the decline of Fordism and the rise of digital capitalism in the advanced post-industrial society. Papadopoulos and Tsianos (2006), for example, writes that 'precarity constitutes this new arrangement of exploitation of living labor in advanced post-Fordism…Precarity means exploiting the continuum of everyday life, not simply the workforce.'. Neff (2012) has also argued that political rhetoric and cultural discourses around the new economy of the Internet industry have profoundly changed what risk means for workers. Not just tech start-up founders but ordinary workers are being forced to adopt entrepreneurial behaviours and buy into the ideology that validates risks, uncertainties, and changes associated with contemporary work as 'forces to be embraced rather than feared' (Neff 2012, 52). As Neff may agree, 'venture labour' would not have come into being if not for the pervasiveness of venture capital in the post-industrial US and particularly in the digital economy. Taking risks, accepting precarious states of working, and learning how to manage and steer risks are becoming the *new* norm.

It is time to stop treating temporary and contingent jobs as a new phenomenon and challenge the norms and assumptions of supposedly stable employment. Precarity has been the norm facing taxi drivers in China for years. The informal economy and informal sectors constitute half to three-quarters of all non-agricultural employment in developing countries, according to International Labour Organization. For taxi drivers like Li, building and maintaining social networks to establish an enlarged supportive occupational circle and learning how to handle unpredictable situations related to their driving jobs are not new. These are tactics and skills they need in order to make a living. A long-term struggle against and re-appropriation of precarity, and technologies of control and surveillance, have the potential to contribute to the repertoire of transnational collective activism. For instance, the practice of "multi-homing" (Waldman 2015) by taxi drivers that predates the coinage of the term implies the necessity to communicate and exchange counterstrategies across national border. Transnational alliance against platform capitalism is possible, even more so if the common underlying

labour all platform users exert, collective, infrastructural labour, and datafication labour, is recognized as such.

Notes

1. DiDi press Centre: http://www.xiaojukeji.com/news/newsdetailen?newsKey=db464323-f5fe-48f7-8c64-df0f8ec5d02f
2. Booking taxis via telephone in China is not as popular as in, for example, the United States or Europe. Street hails remain the most popular until the rise of ride-hailing apps.
3. There is no tradition of tipping service workers in China.
4. WeChat Wallet is an extension service provided by WeChat that allow users to link credit/debit card to the WeChat Wallet. Money transfer between users is free.
5. The total amount includes subsidies for both taxi drivers and passengers.

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P.V. Moore et al. (eds.), *Humans and Machines at Work*,
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