

CHAPTER I

Introduction

Christian Fuchs and David Chandler

1. Introduction

In May 2017, *The Economist's* front cover headlined a feature on Big Data titled 'The World's Most Valuable Resource'. The feature argued that data is the world's new oil. Data would drive development in the twenty-first century in the same way as oil transformed the world's economy and society in the early twentieth century. Such popular discourses claim that Big Data enables new ways of generating knowledge that will lead to innovative and creative possibilities.

In the same month as *The Economist* ran this feature on Big Data, we organised the interdisciplinary symposium 'Digital Objects, Digital Subjects: Activism, Research & Critique in the Age of Big Data Capitalism' at the University of Westminster (May 20-21, 2017)¹. The symposium was hosted by the Westminster Institute for Advanced Studies and the Department of Politics and International Relations. It featured ten presentations by leading international experts on the study of the digital in politics, the economy and society. This edited collection is a product of the conference, and provides further reflections on the presentations given.

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book and his editorial help. We are also grateful to our colleagues from the Communication and Media Research Institute and the Centre for the Study of Democracy who have acted as chairs and respondents, as well as to the speakers, contributors, volunteers, interpreters, technicians and administrators whose work helped to make the conference a big success.

Many claims have been made about the emergence of a 'digital turn' that is said to have radically transformed the possibilities for politics by undermining traditional modernist binaries of subject/object, state/society, politics/economics, public/private, consumption/production, time/space, mind/body, labour/leisure, culture/nature, human/posthuman. This turn has run through several phases, including cybernetics, automation technologies, mainframe computers, databases, artificial intelligence, personal computers, the World Wide Web, smart phones, geographical information systems, social media, targeted digital advertising, self-quantification, Big Data analytics, Cloud computing and the Internet of Things.

This collected volume presents interdisciplinary assessments of the digital's impact on society. The contributions interrogate the claims of both digital optimism and digital pessimism. Digital optimists assert that digital technologies have radically transformed the world, promising new forms of community, alternative ways of knowing and sensing, creative innovation, participatory culture, networked activism and distributed democracy. Digital pessimists argue that digital technologies have not brought about positive change, but have rather deepened and extended domination through new forms of control. The pessimists speak of networked authoritarianism, digital dehumanisation, alienation 2.0, networked exploitation and the rise of the surveillance society.

The chapters engage with questions of the digital in respect to activism, research and critique. They engage with the possibilities, potentials, pitfalls, limits and ideologies of digital activism. They reflect on whether computational social science, the digital humanities and ubiquitous datafication enable new research approaches or result in a digital positivism that threatens the independence of critical research and is likely to bring about about the death of the social sciences and humanities. The volume explores the futures, places and possibilities of critique in the age of digital subjects and digital objects.

The main question this book asks is: what are the key implications of the digital for subjects, objects and society? This question is examined through three lenses: digital capitalism/Big Data capitalism, digital labour, and digital politics. These three perspectives form three sections in the book. Each section consists of six chapters: three presentations each followed by a comment or response. The first section focuses on society in its totality as digital capitalism. Digital capitalism exists wherever capitalist society is shaped by computer technologies. In recent years, Big Data has become an important aspect of digital capitalism, leading to the emergence of a new dimension of Big Data capitalism. The three contributions by David Chandler, Christian Fuchs and Paul Rekret, as well as the three comments (Christian Fuchs' comments on David Chandler, Chandler's on Fuchs, Robert Cowley's on Paul Rekret) focus on digital capitalism in general, as

well as aspects of Big Data. Chandler discusses how Big Data capitalism brings about a new form of digital governmentality focused on correlation. Fuchs argues that Karl Marx helps us to critically understand digital capitalism and Big Data capitalism. Paul Rekret criticises the posthumanist approaches of Donna Haraway and Bruno Latour in the context of digital capitalism.

When analysing capitalism critically, we are dealing – as the subtitle of Marx’s opus magnum *Capital* indicates – with the critique of political economy. Political economy has an economic side and a political dimension, and these interact. Sections II and III approach digital political economy. Section II focuses on digital labour and Section III gives attention to digital politics.

The three chapters in Section II – by Kylie Jarrett, Phoebe Moore and Jack L. Qiu – focus on a range of issues concerning labour and class in the digital age: the digital houseworker (Jarrett), the digital worker’s quantified self (Moore), and slavery in the digital age (Qiu). Joanna Boehnert comments on Kylie Jarrett, Elisabetta Brighi on Phoebe Moore, and Peter Goodwin on Jack L. Qiu.

The three chapters in Section III – by Jodi Dean, Paolo Gerbaudo and Toni Negri – discuss aspects of digital politics, namely social movements in the context of communicative capitalism (Dean), political parties in the digital age (Gerbaudo), and the question of how social struggles can advance digital alternatives (Negri). Paulina Tambakaki comments on Jodi Dean, Anastasia Kavada on Paolo Gerbaudo, and Christian Fuchs on Toni Negri.

Taken together, the three sections, with their nine presentations and accompanying comments show that we face a contradiction of subjects and objects in contemporary digital capitalism, and that structures of domination and exploitation threaten social cohesion and democracy. Digital domination and the exploitation of digital labour are the hegemonic structural forces shaping digital capitalism. But the situation is not hopeless, because there are potentials for struggles that can establish alternatives. For example, potentials for establishing a society of the digital commons are emerging within digital capitalism. Toni Negri, in his contribution, therefore asks how we can politically appropriate digital machines. The interest in advancing the digital commons and establishing a society of the commons is a political perspective that holds together many of the contributions to this book.

In the remainder of this introduction to the collected volume, we will discuss the relationship of digital subjects and digital objects (Section 2) and the notion of Big Data capitalism (Section 3), which form the background and context of the nine presentations and responses in this book.

2. Digital Subjects/Digital Objects

This volume engages with the changes that objects and subjects are undergoing in digital society. It asks what are the key implications of Big Data and the digital for subjects, objects and society.

Computing and digitality are not exclusively phenomena of the twentieth and twenty-first centuries. Digital logic has a much longer history. Already in 1703, Gottfried Wilhelm Leibniz suggested basing mathematics, not on the decimal system, but on binary logic: ‘But instead of the progression of tens, I have for many years used the simplest progression of all, which proceeds by twos, having found that it is useful for the perfection of the science of numbers. Thus I use no other characters in it but 0 and 1, and when reaching two, I start again’ (Leibniz 1703, np). In the history of computing, pioneering work was done by Charles Babbage and Ada Lovelace in the nineteenth century. Babbage and Lovelace were ahead of their time because the technological standards of the nineteenth century were focused on what Marx (1867/1976) termed large-scale industry, rather than building a computer. Computing devices as we know them today go back to Alan Turing’s concept of the Turing Machine that he invented in 1936. The digital logic of zeros and ones is a key feature of the way a Turing Machine operates. During the Second World War, Turing built computers for the British military in order to decipher the Nazis’ encoded messages. In this light, the Second World War was not merely a war of military might, but also the first computational and digital war.

The example of the Turing Machine indicates that computing and the digital always stand in a broader social, political, economic and ideological context. Today, digital computing is ubiquitous and shapes all aspects of contemporary life, including capitalism, governance, everyday life, culture, education, welfare and science.

Technologies have always impacted human capacities. We cannot, therefore, easily separate technological objects from human subjects. The computer, the digital machine, has from its beginning changed the way subjects act and interact in the world. In the history of warfare, we have gone from hand-to-hand combat to killing at a distance through computerised technologies that enable smart bombs, killer robots, drone assassinations and pre-emptive warfare. These technologies do not only make warfare more distanced in space and time, but they also distance it morally. The example of digital warfare shows us that digital machines change the way subjects and objects relate to each other and are constituted.

This edited collection focuses on the latest stage of digital life and the digital transformation of society. We call this latest stage ‘Big Data capitalism’. Algorithms that generate Big Data have today become central to political and ethical concerns, but there is no clear consensus on the distinctiveness of algorithmic knowledge.

The United Nations argues that Big Data analytics are central to solving the world’s most pressing problems, from food shortages to conflicts and environmental crises. For example, the UN Global Pulse project developed a model of real-time food price changes by collecting and analysing more than 40,000 tweets about food prices in Jakarta, Indonesia. Less altruistically, Big Data is also crucial for Facebook and its users who share over 5 billion posts and

upload more than 300 million images per day. More than 500,000 comments are posted per minute. Facebook's 2016 advertising profits of US\$ 10.2 billion were generated by targeting users based on the analysis of Big Data generated through users' activities and content.

'Smart cities' like London and Barcelona deploy Big Data analytics to more efficiently administer these urban complexes. Transport for London (TfL) captures and analyses 20 million Oyster travel card taps per day in order to manage traffic flows and innovate transportation. In Barcelona, more than 20,000 smart meters are installed on bins, streetlights and other pieces of infrastructure, collecting socio-environmental Big Data. At Walmart, the world's largest company with a turnover of almost half a trillion US dollars per year, an analytics team analyses hundreds of data streams in real time, including customer data, sales data, meteorological data, social media data and event and location data, all with a view to responding rapidly to emerging trends and thereby increasing sales and catering to its customers' perceived needs.

These examples, in the areas of disaster risk (UN Global Pulse), media and communication (Facebook), smart cities (Transport for London) and business (Walmart), demonstrate the vast amount, variety and speed of data collection and analysis. Big Data has transformed our ways of knowing in different fields, and algorithmic knowledge is impacting on everyday practices and processes. This book aims to clarify what is at stake when knowledge, subjects, objects and society become digital and algorithmic. Algorithmic detection of correlations across time and space enables Big Data approaches to operate in 'real-time' scenarios, as in the examples of food prices in Jakarta, TfL's data management of traffic, Facebook's advertising practices, and Walmart's retailing strategies.

Although there is no agreed definition of what Big Data means, it tends to be understood as being related to volume, variety and velocity (Kitchin 2014, 68). Big Data's *volume* refers to datasets so large that they cannot be processed and analysed by humans but only by machine-driven algorithms. There is a wide *variety* of sources and types of Big Data. Big Data has a high *velocity*: it is produced, circulated and acted upon in real time, and at very high speeds.

Connected digital devices such as CCTV, drone cameras, Internet of Things sensors, Twitter, Google, Facebook, smartphones, UN Global Pulse technologies, smart city technologies, news feeds, weather report stations, demographic and population data collectors, price and economic data tools, or Walmart's data collection methods, create constant streams of data. Algorithmic knowledge enables Big Data analytics that are produced by correlating these data streams to identify and analyse patterns of occurrences that enable new understandings and ways of seeing the world.

In philosophy, the rationalist tradition saw knowledge as existing in fixed causal relations and in fixed properties or essences of entities that were independent of and prior to experience, while empiricism argued that knowledge was experiential, contextual and obtained through the human sense organs. It was Immanuel Kant who advanced an epistemology that stressed the importance

of the distinction between rational knowledge and sensual knowledge. ‘To the extent to which knowledge is subject to the laws of sensuousness it is sensuous; to the extent to which it is subject to the laws of intelligence it is *intellectual* or rational’ (Kant 1770, 50). Algorithmic knowledge undermines this distinction.

The algorithm is a notion found in mathematics and computing that has long been associated with the pursuit of rational forms of knowledge. ‘An algorithm is a reliable, definable procedure for solving a problem. The idea of the algorithm goes back to the beginnings of mathematics’ (Henderson 2009, 7). Today, algorithms not only calculate existing data but also develop new forms of ‘sensual’ or ‘empirical’ knowledge by finding correlations. Algorithmic knowledge seeks to find patterns and relationships, enabling new ways of seeing, sensing, responding and adapting to life in its complex emergence.

In this process, the Kantian distinction between rational knowledge obtained through the brain’s reflective capacity, and experiential knowledge obtained through the sense organs, breaks down. Digital machines generate Big Data through sensors, and thereby simulate and automate human experience. At the same time, ethical rationality is increasingly perceived as residing in machines, which results in automated decision-making. Knowing and sensing seem to become a unified algorithmic procedure that resides across the human/machinic divide. This volume takes a deeper look at digital transformations and asks what their consequences are for our understanding of what subjects and objects are, and how they operate in society.

Big Data studies is a rapidly expanding research field (see Mayer-Schönberger and Cukier 2013, Kitchin 2014, Mosco 2014) that deals with how Big Data and algorithmic knowledge transform the economy, politics, culture and the environment. This growing volume of research is matched by publications about Big Data. In the summer of 2017, Web of Science listed approximately 5,800 articles published in the years 2014, 2015, 2016 that have ‘Big Data’ in their titles. Important fields where Big Data research has had an impact include disaster research, media/communication studies, smart cities, and management and organisation studies.

In disaster research, Big Data is increasingly deployed to predict and prevent disasters and minimise their impacts on humans and nature. Big Data is also used in disaster response, where Unmanned Aerial Vehicles (also called drones) gather data about disaster sites, while machine-learning algorithms identify patterns in disaster-related data. Digital humanitarianism is increasingly deployed before and after disasters. Digital humanitarianism ‘examines how new uses of technology and vast quantities of digital data are transforming the way societies prepare for, respond to, cope with, and ultimately understand humanitarian disasters’ (Meier 2015, xi). In disaster and political research, Big Data analytics and new information technologies are increasingly perceived as essential when it comes to dealing with a wide range of international issues, such as development (Coyle and Meier 2009), conflict (Karlsrud 2014, USIP 2013, Himelfarb 2014) and natural disasters (Meier 2015). Big Data analytics

are key to the implementation of the UN's 2030 Agenda for Sustainable Development Goals: 'More diverse, integrated, timely and trustworthy information can lead to better decision-making and real-time citizen feedback. This in turn enables individuals, public and private institutions, and companies to make choices that are good for them and for the world they live in (UN 2014)'. The United Nations has called for 'a data revolution for sustainable development', arguing that 'improving data is a development agenda in its own right', and that the divides between rich and poor can be mitigated through the provision of more data that will enable more efficient adaptation to the emergence of problems at all levels of society (UN 2014). Indeed, the 'data gap' is increasingly held to be the cause of growing inequalities (Stuart et al. 2015).

In media and communication studies, Big Data is used for generating new understandings of political, economic and everyday life through communication on Twitter, Facebook and other social media platforms. Big Data has changed human communication's actors, structures, systems, contents, effects, contexts, and power structures. boyd and Crawford (2012) argue that Big Data creates challenges and opportunities for communication research, knowledge, research ethics and power structures. Communication research about Big Data has, for example, focused on online agenda-setting and online attention (Neuman et al. 2014), Big Data analytics in targeted online advertising (Coudry & Turow 2014), Big Data's aspects of communication power (Andrejevic 2014), data journalism (Fink & Anderson 2015), automated text extraction and classification as tools for measuring culture (Bail 2014), the analysis of political communication during election campaigns (Larsson & Moe 2012), and the prediction of users' attitudes and behaviours (such as their political affiliation, see Colleoni et al. 2014). In 2014, the journal *Big Data & Society* was founded. Between 2014 and 2016 it published more than 130 articles, demonstrating that Big Data communication research is a booming sub-field of media/communication studies.

The study of smart cities and citizen sensors analyses how Big Data is transforming urban life (Greenfield 2013, Kitchin 2014, Krivy 2016, Thrift 2014, Townsend 2013). The development and application of Big Data is driving a transformation in the understanding of city governance and planning. This transformation is taking place with the aid of ubiquitous sensing technology, often termed the Internet of Things, whereby digital devices connected to everyday objects, such as roads, litterbins and street lights, enable new forms of city management. Much of the research into these applications of Big Data argues that new digital technologies can enable citizens and governments to connect in more meaningful ways, empower communities, distribute knowledge, and allow better control over public goods and services. Already the majority of the world's population live in cities, and by 2050 it is projected that 75% of the global population will be urban. Many cities around the world are seeking to become 'smart' by using networked, digital technologies and urban Big Data to tackle a range of issues, such as improving governance and service delivery, creating more resilient critical infrastructure, growing the local economy,

becoming more sustainable, improving mobility, offering greater transparency and accountability for collective activities, enhancing the quality of life, and increasing safety and security. In short, the desire is to use digital technology to improve the lives of citizens, advance city management and foster economic development.

In the field of management and organisation studies, Big Data is deployed for understanding consumers and users' individual preferences, tastes, lifestyles, behavioural choices, attitudes, interests, and so on. This application of Big Data to the individual enables differentiated pricing and targeted and personalised advertising. Big Data also transforms every aspect of the production process, including the surveillance of employees and the monitoring and datafication of products, transport and logistics. Big Data is also used for understanding and predicting the development of financial markets. George et al. (2014) argue that Big Data enables organisations to identify new markets and products, gather new management knowledge, and track members of workgroups. Other research focuses on how to use Big Data for managing a product's lifecycle (Li et al. 2015) as well as managing the supply chain (Hazen et al. 2014). Google's chief economist Hal R. Varian (2014) argues that Big Data analytics should be used as a standard research method in economics (see also Einav & Levin 2014). Another strand of research has been termed consumer analytics (Erevelles et al. 2016). This focuses on the analysis of consumer interests and satisfaction, and on identifying brand strategies (Tirunillai & Tellis 2014).

Even this brief summary shows that Big Data research is a rapidly growing research field. At the same time, however, it is highly fragmented. Big Data researchers are often preoccupied with their complex data collection and analysis processes. They rarely find the time or opportunity to reflect on the broad changes that theory, methodologies, knowledge and society are undergoing in the age of algorithmic knowledge. This collection seeks to rectify this gap through surveying the application of Big Data and new forms of algorithmic governance through the lenses of digital capitalism, labour, and politics.

The former editor of *Wired* magazine, Chris Anderson, famously claimed that Big Data and the development of algorithmic knowledge puts an end to the need for theory, causal modelling and hypothesising: 'With enough data, the numbers speak for themselves [...] [When] faced with massive data, this [traditional] approach to science – hypothesize, model, test – is becoming obsolete' (Anderson, 2008). Big Data promises an epistemological revolution. It is claimed that Big Data will make existing methodological approaches in the social and natural sciences obsolete, and will mean the death of theory. At any rate Big Data, with its focus on context and revealing unseen relations, is increasingly breaking down disciplinary boundaries.

Savage and Burrows (2007) discuss how research methods, theories and epistemologies have changed in the age of Big Data. They argue that 'the repertoires' of research methods 'need to be rethought' so that there is 'greater reflection on

[...] the proliferation of social data gathered by others [...] [and] a radical mixture of methods coupled with renewed critical reflection' (Savage and Burrows 2007, 895–896). Evgeny Morozov (2014) points out that Big Data also poses fundamental challenges to ethics and political regulation: 'Why rely on laws when one has sensors and feedback mechanisms? If policy interventions are to be – to use the buzzwords of the day – 'evidence-based' and 'results-oriented,' technology is here to help.' Savage and Burrows stress the importance of Big Data methodologies, whereas Morozov (2014) reminds us of the political and ethical implications of algorithmic knowledge.

The diverse processes that constitute digital transformations and Big Data capitalism have not been adequately engaged with in terms of their epistemological, ontological and ethical implications. This volume seeks to address this deficiency through nine presentations and responses, which collectively use and develop conceptual tools from the fields of critical political economy, governmentality studies, political theory and communication theory. Political economy is 'a distinct way of understanding how economies work and how they interact with the larger societies around them' (Wolff and Resnick 2012, 1). Governmentality studies is a field of inquiry that analyses 'any method of government' (Foucault 2008, 13), 'the development of real governmental practice' and its rationalisation in 'the exercise of sovereignty' (22).

This volume provides an overview of the difference that digital and Big Data capitalism has made to politics, activism and theory. It engages with key epistemological, ontological and ethical questions arising from the transformations of digital subjects and objects. These questions include the following:

- How does the digital impact the logic of governance and power?
- How does the digital change the nature of knowledge and the understanding of causation?
- How does the digital deal with new problems of uncertainty, risk, complexity and unpredictability?
- How does the digital impact critique, activism and political organisation?
- How does the digital interact with changes within capitalism and labour?
- How can critical theories explain the role of the digital in society?
- How does the digital impact reproduction and gender relations?
- How does the digital change the relationship between culture and nature, as well as between humans and their environment? How does the digital shape the Anthropocene?

3. Big Data Capitalism ²

Although most observers of society will agree that capitalism concerns the accumulation of capital, there is no general agreement on how to define capital or who produces it. Marx (1867) and Marxists tend to argue that capital is money

that is increased through exploitation of labour and the sale of commodities. Followers of Bourdieu (1986) argue that capital is more general, extending to the realms of politics and culture. Bourdieu distinguishes between economic, political/social and cultural capital, and also uses the notion of symbolic capital, which he claims interacts with all other forms of capital.

No matter how one defines capital and capitalism, many scholars and observers agree that capitalism is a societal formation that is based on the logic of the accumulation of money and power. It tries to instrumentalise everything for this purpose, and therefore produces a highly instrumental society based on what Horkheimer (2004) terms instrumental reason.

If capitalism is a societal formation, then digital capitalism may be a stage and phase of its development and/or a dimension and mode of the production of life and society. In turn, Big Data capitalism is a way of signifying the latest development of the digital within the broader context of the economy, politics, culture, ideology, domination and exploitation.

The basic sociological question concerning the digital asks at what level of capitalism and society we should situate digital transformations. We can speak of four main positions. The first argues that the digital constitutes a radical transformation of society, such that we no longer live in a capitalist or modern society, but in a radically new type of society. So for example Nico Stehr (1994) argues that the knowledge society means that ‘the age of labor and property is at an end’ (iix), and that the ‘emergence of knowledge societies signals first and foremost a radical transformation in the *structure of the economy*’ (10) and, as a result, the ‘emergence of a new structure and organization of economic activity’ (122). For Manuel Castells, writing at the turn of the millennium, the rise of the ‘network society’ means that a ‘new world is taking shape’ (Castells 2000, 367). Castells also argues that the ‘information technology revolution induced the emergence of informationalism, as the material foundation of a new society’ (Castells 2000, 367).

The second, more critical, position argues that information society discourse is a neoliberal ideology that presents information technology as constituting a radically new society, one which promotes techno-optimism and techno-determinism. Garnham (1998/2004, 165), for example says that information society theory is ‘the favoured legitimating ideology for the dominant economic and political powerholders’. Walter Runciman (1993, 65) argues that ‘it cannot be claimed that any new sub-type of the capitalist mode of production has emerged [...] ‘Terms such as ‘managerial’ capitalism, or ‘late’ capitalism, or ‘finance’ capitalism, or ‘corporatist’ capitalism have all generated more confusion than illumination’ (Runciman 1993, 54; see also Freedman 2002).

This sceptical line of thought, while recognising that society has undergone profound changes, questions the assumption that we live in a radically new society. There is, however, also a variety within this approach. So, third, we find positions that argue that digital capitalism is the dominant dimension or type of contemporary capitalism. And fourth, there are positions that argue

that digital society/capitalism is a form or development that is subsumed under other modes of capitalist development.

The third type of argument argues that digital capitalism is the dominant dimension or type of contemporary capitalism. This assumption can be found in approaches that speak of cognitive capitalism. Cognitive capitalism theory has been advanced in particular by autonomist Marxist approaches. Yann Moulier-Boutang (2011) argues that cognitive capitalism is ‘founded on the accumulation of immaterial capital, the dissemination of knowledge and the driving role of the knowledge economy’ (50). ‘We can distinguish three principal configurations in the history of capitalism: first, mercantile capitalism, which was based on the hegemony of mechanisms of merchant and finance accumulation and developed between the start of the sixteenth century and the end of the seventeenth. Next came industrial capitalism, which was based on the accumulation of physical capital and the driving role of the large Manchester-style factory in mass-producing standardised goods. Then came cognitive capitalism’ (50) as the ‘third type of capitalism’ (56).

Jean-Marie Monnier and Carlo Vercellone (2010) argue that cognitive capitalism is ‘a new historical system of accumulation’, in which ‘the cognitive and intellectual dimensions of labour take on an increasingly important role and displace the previous centrality of fixed capital and material labour’ (76). ‘[I]ndustrial capitalism succeeded mercantile capitalism, and then gave rise to a new historical system of accumulation called cognitive capitalism’ (76). ‘Cognitive capitalism is the result of a restructuring process through which capital attempts to control collective conditions of knowledge production and tends to absorb and redirect its energy toward a new logic of capital accumulation’ (83).

Toni Negri (2008) speaks of ‘the era of *cognitive capitalism*’ that followed ‘the phase of manufacturing and the subsequent phase of heavy industry. In this cognitive era the production of value depends increasingly on creative intellectual activity’ (64). ‘[I]mmaterial labor power (involved in communication, cooperation, and the production and reproduction of affects) occupies an increasingly central position in both the schema of capitalist production and the composition of the proletariat’ (Hardt and Negri 2000, 53). Immaterial labour constitutes ‘a third and current paradigm in which providing services and manipulating information are at the heart of economic production’ (Hardt and Negri 2000, 280). The ‘dominant figures of property in the contemporary era – including code, images, cultural products, patents, knowledge, and the like – are largely immaterial and, more important, indefinitely reproducible’ (Hardt and Negri 2017, 187). Toni Negri characterises the digital aspects of immaterial production as a digital assemblage (see his contribution to this book).

For Franco ‘Bifo’ Berardi, the move to digital capitalism ‘marks a shift from the cognitive model of conjunctive concatenation to a model of connective concatenation’ (2015, 11), by which he means a negation of embodied experience. Thus ‘with the digital, we have reached the end-point of this process of

increasing abstraction, and an apex in the increasing dissociation of understanding from empathy' (17). This is of fundamental importance in understanding algorithmic governance through the reduction of the world to code and the digitalisation of the sign. For Berardi, the contemporary stage of capitalism is 'semiocapitalism', where language and economy combine. This is because any kind of production (whether material and immaterial) is a process of 'combination and recombination of information (algorithms, figures, digital differences)' (113). Therefore, in this new stage, 'digital abstraction adds a second layer to capitalist abstraction' (161). In this process of abstraction (following Baudrillard), signs proliferate and interact, losing any links to their original referents or meanings.

Berardi makes the important point that Big Data capitalism has implications for governance, in that the 'abstract concatenation of technical functions replaces conscious elaboration, social negotiation, and democratic decision' (Berardi 2015, 217). In other words, 'the automatic connection of a-signifying segments replaces the dialogic elaboration of an order, and adaptation replaces consensus' (Berardi 2015, 217). Algorithmic governance responds or adapts to perturbations and changes through pattern recognition rather than the creation of knowledge or an act of interpretation.

This separation or alienation from embodied processes of creativity and judgement is also taken up in Maurizio Lazzarato's (2014) *Signs and Machines*. Lazzarato argues that Big Data capitalism can be understood as the production of subjectivity through machinic enslavement, a concept he takes from Deleuze and Guattari: an assemblage, which 'no longer distinguishes between human and non-human, subject and object, or words and things' (Lazzarato 2014, 13). By 'enslavement', Lazzarato means the cybernetic conception of automated governance, control and regulation, 'ensuring the cohesion and equilibrium of the functioning whole' (25). In this process, the human does not stand separate to or above the machine, but is contiguous with machines and inside machinic processes, as one more molecular component to be combined and recombined with others.

For Lazzarato, the rise of digital capitalism means that 'one always acts within an assemblage, a collective, where machines, objects and signs are at the same time "agents"' (30). Capitalism is thus a 'semiotic operator' managing the flow of asignifying signs (without a subject as referent) which act directly on material flows: 'The sign machines of money, economics, science, technology, art, and so on, function in parallel or independently because they produce or convey meaning and in this way bypass language, significations, and representation' (60). Lazzarato also identifies transformative effects that produce Being and go beyond the Anthropocene. In this context he draws on the work of Bruno Latour:

Through asignifying semiotics machines 'speak', 'express themselves', and 'communicate' with man, other machines, and 'real' phenomena.

Through ‘power signs’ they interact with the expression and content of the atomic and chemical strata of matter, the biological strata of living being [...] Machines and asignifying semiotics are able to ‘see’ these strata, ‘hear’ them, ‘smell’ them, record them, order them, and transcribe them, something that is impossible for human senses and language. (87–88)

In the new forms of being and thought instantiated by digital capitalism, the subject is no longer interpolated as *homo oeconomicus* – a rational reflective subject. For Lazzarato, ‘we have moved beyond “cognitive capitalism” (100) and its privileging of dualistic linguistic and representational constructions of digital objects and digital subjects. Instead, we must take into full account the shift from ‘work’ to ‘process’ and from ‘subjection’ to ‘enslavement’ (119).

David Harvey is a representative of the fourth type of argument in relation to the question at what level of capitalism and society digital transformations should be situated. He has characterised contemporary capitalism as a regime of flexible accumulation (Harvey 1989), a new imperialism (Harvey 2003) and a form of neoliberal capitalism (Harvey 2005) that are based on the processes of accumulation by dispossession and financialisation. These constitute potentials for actual crisis because real accumulation diverges from the accumulation of fictitious capital. Digital technologies within this overall transformation of capitalism play, for Harvey, a mediating role. They are tools of time-space compression. ‘I use the word ‘compression’ because a strong case can be made that the history of capitalism has been characterized by speed-up in the pace of life, while so overcoming spatial barriers that the world sometimes seems to collapse inwards upon us’ (Harvey 1989, 240). For Harvey, these transformed conditions of capitalism require and call forth the development of digital technologies: ‘Computerization and electronic communications have pressed home the significance of instantaneous international coordination of financial flows’ (Harvey 1989, 161). ‘The production of space examines how new systems (actual or imagined) of land use, transport and communications, territorial organization, etc. are produced, and how new modes of representation (e.g. information technology, computerized mapping, or design) arise’ (Harvey 1989, 222).

In his most recent work *Marx, Capital and the Madness of Economic Reason*, Harvey (2017) elaborates on the role of the digital in contemporary capitalism. ‘What was initially conceived as a liberatory regime of collaborative production of an open access commons has been transformed into a regime of hyper-exploitation upon which capital freely feeds. The unrestrained pillage by big capital (like Amazon and Google) of the free goods produced by a self-skilled labour force has become a major feature of our times. This carries over into the so-called cultural industries’ (Harvey 2017, 96). ‘It is also interesting that some of the most vigorous sectors of development in our times – like Google and Facebook and the rest of the digital labour sector – have grown

very fast on the back of free labour' (Harvey 2017, 102). 'Factory labour still dominates in some parts of the world (e.g. East Asia) but in North America and Europe it is much diminished and replaced by various other labour systems (digital labour and the like)' (Harvey 2017, 57).

Harvey acknowledges the relevance of digital labour and digital capital today, but at the same time cautions against assuming that they constitute a new stage of development. He stresses the continued relevance of physical labour and the old inequality between capital and labour within the digital industries, as well as within capitalism as a whole. 'In the case of digital labour, for example, labour practices have emerged that are uncannily similar to the putting out system of early textile manufacturing in Britain in the late eighteenth century' (Harvey 2017, 104). This adds up to a redefinition of capital:

as money in motion rather than value in motion. Such a redefinition facilitates concentration on the churning speculative market in property rights to culture, knowledge and entrepreneurial endeavours as well as to the widespread practices of speculation in asset markets as the distinctive form of contemporary capitalism. Hence the claim that we are entering a new phase of capitalism in which knowledge is pre-eminent, and that a brilliant techno-utopia based on that knowledge and all its labour-saving innovations (such as automation and artificial intelligence) is just around the corner or, as someone like Paul Mason maintains, already here. Such a redefinition may look about right from the perspective of Silicon Valley, but it falls flat on its face in the collapsing factories of Bangladesh and the suicide-ridden employment zones of both industrial Shenzhen and rural India where microfinance has spread its net to foster the mother of all sub-prime lending crises. (Harvey 2017, 105).

Harvey also stresses that Big Data has turned into an ideological fetish: 'The idea, for example, that the construction of smart cities managed through the mining of vast data sets can be the answer to all urban ills such that poverty, inequalities, class and racial discriminations and the extraction of wealth through evictions and other forms of accumulation by dispossession will all disappear is plainly ludicrous. It is counter-productive if not counter-revolutionary. It creates a fetish fog – a vast distraction – between political activism and the urban realities, pleasures and travails of daily life that need to be addressed' (Harvey 2017, 126).

These, then, are the main positions taken by authors in relation to the effect of Big Data capitalism upon society. There is ample evidence, however, to contest the first two positions (Fuchs 2008, 2014). The first one underestimates the continuities of power and capital. If we lived in a new type of society that was non-capitalist, then the crises of capitalism that usher in unemployment, precarity, nationalism and international conflicts would necessarily need to

have been abolished. But today we are experiencing an ongoing economic crisis of capitalism, accompanied by a crisis of the state and political crises that have together constituted a legitimisation crisis of political formations such as the European Union. The second position overestimates continuity and ends up with a static model of economic, political and societal development. It was one of Marx's main insights that capitalism is a dynamic, complex, evolutionary system that lives and develops through the exploitation of labour, social struggles and crises. Capitalism remains the same by changing itself. It develops the productive forces and differentiates the relations of economic and social production in order to reproduce what Marx called 'the whole old shit'³ (Marx and Engels 1845/1846a/1959, 35) of alienation and exploitation.

The emergence and differentiation of digital technologies is the consequence of the development of the productive forces that increase the organic composition of capital. Developing the productive forces requires an increasing role knowledge (the general intellect) and education in society and the economy so that quantitative increases at a certain point turn into new qualities (Fuchs 2016b, 2014, 2008). The third and fourth positions do not agree at which level of capitalist organisation this shift takes place, but they do agree that capitalism is a dynamic system and that the emergence of digital machines, digital capital and digital labour is an expression of capitalist differentiation that today constitutes a significant dimension of the capitalist economy and society.

The computer is a universal machine because it can turn many aspects of the world into digital patterns. This characteristic explains the ubiquity of computing in everyday life. The apps on your smartphone have something to tell you about almost every situation you may find yourself in, from telling you what to do when you get lost in the streets to playing games on the Tube as a pastime. But the computer's universality is not universal enough. It reduces life to calculability: zeros, ones and quantities. Computer algorithms cannot understand love, ethics, morals, solidarity, care, affects, and other distinct human qualities. The reduction of the human to computing and instrumental reason therefore also brings with it certain dangers, such as the application of digital machines for exploitation and domination. At the same time, the human use of computing also advances new potentials for cooperation, community, solidarity, resistance and sociality that, even from within capitalism, point *beyond* it. The computer within capitalism is therefore the antagonistic digital machine. Digital and Big Data capitalism is an antagonistic societal formation that deepens alienation and exploitation while at the same time advancing potentials for liberation (Fuchs 2017).

Contemporary capitalism is a complex unity of diverse interacting and mutually encroaching capitalisms, including finance capitalism, neoliberal capitalism, imperialism, digital/communicative capitalism, hyper-industrial capitalism, mobility capitalism, authoritarian capitalism and Big Data capitalism. (Fuchs 2014, Chapter 5). The relation of these dimensions is variable. Empirical studies of concrete capitalist phenomena in specific regimes of

space-time show which dimension is dominant for this specific phenomenon. For example, in 2014, 33.5% of the world's largest 2,000 corporations' profits were situated in the FIRE sector (finance, insurance and real estate), 19.0% in the mobility industries, 18.6% in the assemblage and manufacturing industry, and 17.3% in the communication and information industry (see Fuchs 2016a, Table 1). The data indicates that transnational corporations' structures are to varying degrees characterised by finance capitalism, mobility capitalism, hyper-industrial capitalism and informational/communicative/digital capitalism. And these dimensions interpenetrate: digital media corporations in Silicon Valley and elsewhere are based on large injections of venture capital (a specific type of finance capital). Their goal is to make an initial public offering on the stock market. They are prone to creating financial bubbles. Digital communication is both cause and effect of mobility and time-space compression (Harvey 1989). As a consequence, the transportation of people and commodities has been growing and accelerating. Digital commodities and digital commons are not weightless goods. They require not just information labour, but also capital's exploitation of the physical labour of miners and assemblers in Africa and China, who are situated in an international division of digital labour (Fuchs 2014).

Finance capitalism, mobility capitalism, hyper-industrial capitalism, digital capitalism and further capitalisms constitute a dialectical capitalist unity that consists of interrelated, contradictory moments. Capitalism is a unity of many capitalisms that develops dynamically and historically. A dimension that makes the picture even more complex is authoritarian capitalism. Authoritarian capitalism is a form of capitalism that in recent times, in the context of the economic and political crisis of capitalism, has become strengthened, which poses the question of how neoliberal capitalism and authoritarian capitalism are related (Fuchs 2018).

Notes

¹ See: <https://icts-and-society.net/events/digital-objects-digital-subjects-a-symposium-on-activism-research-critique-in-the-age-of-big-data-capitalism-the-6th-icts-society-conference/>

² This section was authored solely by Christian Fuchs.

³ Translation from German to English [CF]. The English translation of this passage from *The German Ideology* in the Marx and Engels-*Collected Works* is, as in many other cases, imprecise, as it translates 'die ganze alte Scheiße' (Marx and Engels 1845/1846a/1957, 35) as 'old filthy business' (Marx and Engels 1845/1846b/1976, 49). There are different types of filth, including dust, mould, rubble, rust, cigarette butts, food particles and shit. So shit is just one type of filth, although certainly a particularly unpleasant one that you do not want to find mixed into your food, which

of course happens under unsanitary industrial conditions that aim at the maximisation of profit at the expense of human health, which is why the Richard Linklater movie *Fast Food Nation* asks how the shit comes into the burgers that school children and others eat. There are indications that fast food sold in major chains is indeed poo fast food (MacDougall 2017). To just say that capitalism produces and reproduces filth is therefore an underestimation. Marx's original formulation got it right by stressing the connection of capitalism and shit. Capitalism is not just shit, but makes us get treated like shit, produce shit, consume and eat shit.

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