



DIGITAL SOCIOLOGY

DEBORAH LUPTON

ROUTLEDGE



DIGITAL SOCIOLOGY

We now live in a digital society. New digital technologies have had a profound influence on everyday life, social relations, government, commerce, the economy and the production and dissemination of knowledge. People's movements in space, their purchasing habits and their online communication with others are now monitored in detail by digital technologies. We are increasingly becoming digital data subjects, whether we like it or not, and whether we choose this or not.

The sub-discipline of digital sociology provides a means by which the impact, development and use of these technologies and their incorporation into social worlds, social institutions and concepts of selfhood and embodiment may be investigated, analysed and understood. This book introduces a range of interesting social, cultural and political dimensions of digital society and discusses some of the important debates occurring in research and scholarship on these aspects. It covers the new knowledge economy and big data, reconceptualising research in the digital era, the digitisation of higher education, the diversity of digital use, digital politics and citizen digital engagement, the politics of surveillance, privacy issues, the contribution of digital devices to embodiment and concepts of selfhood, and many other topics.

Digital Sociology is essential reading not only for students and academics in sociology, anthropology, media and communication, digital cultures, digital humanities, internet studies, science and technology studies, cultural geography and social computing, but for other readers interested in the social impact of digital technologies.

Deborah Lupton is Centenary Research Professor in the News and Media Research Centre, Faculty of Arts & Design, University of Canberra.

‘Anyone with an interest in the future of sociology should read this book. In its pages Deborah Lupton provides an informative and vibrant account of a series of digital transformations and explores what these might mean for sociological work. *Digital Sociology* deals with the very practice and purpose of sociology. In short, this is a road-map for a version of sociology that responds directly to a changing social world. My suspicion is that by the end of the book you will almost certainly have become a digital sociologist.’

David Beer, *Senior Lecturer in Sociology, University of York, UK*

‘This excellent book makes a compelling case for the continuing relevance of academic sociology in a world marked by “big data” and digital transformations of various sort. The book demonstrates that rather than losing jurisdiction over the study of the “social” a plethora of recent inventive conceptual, methodological and substantive developments in the discipline provide the raw material for a radical reworking of the craft of sociology. As such it deserves the widest readership possible.’

Roger Burrows, *Professor in the Department of Sociology, Goldsmiths, University of London, UK*

‘With a clear and engaging style, this book explores the breadth and depth of ongoing digital transformations to data, academic practice and everyday life. Ranging impressively across these often far too disparate fields, Lupton positions sociological thinking as key to our understanding of the digital world.’

Susan Halford, *Professor of Sociology, University of Southampton, UK*

‘Lupton’s compelling exploration of the centrality of the digital to everyday life reveals diversity and nuance in the ways digital technologies empower and constrain actions and citizenship. This excellent book offers researchers a rich resource to contextualize theories and practices for studying today’s society, and advances critical scholarship on digital life.’

Catherine Middleton, *Canada Research Chair in Communication Technologies in the Information Society, Ryerson University, Toronto, Canada*

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Introduction

Life is digital

Life is Digital: Back It Up

(Headline of an online advertisement used by a company selling digital data-protection products)

Let me begin with a reflection upon the many and diverse ways in which digital technologies have permeated everyday life in developed countries over the past thirty years. Many of us have come to rely upon being connected to the internet throughout our waking hours. Digital devices that can go online from almost any location have become ubiquitous. Smartphones and tablet computers are small enough to carry with us at all times. Some devices – known as wearable computers (‘wearables’ for short) – can even be worn upon our bodies, day and night, and monitor our bodily functions and activities. We can access our news, music, television and films via digital platforms and devices. Our intimate and work-related relationships and our membership of communities may be at least partly developed and maintained using social media such as LinkedIn, Facebook and Twitter. Our photographs and home videos are digitised and now may be displayed to the world if we so desire, using platforms such as Instagram, Flickr and YouTube. Information can easily be sought on the internet using search engines like Google, Yahoo! and Bing. The open-access online collaborative platform Wikipedia has become the most highly-used reference source in the world. Nearly all employment involves

some form of digital technology use (even if it is as simple as a website to promote a business or a mobile phone to communicate with work-mates or clients). School curricula and theories of learning have increasingly been linked to digital technologies and focused on the training of students in using these technologies. Digital global positioning systems give us directions and help us locate ourselves in space.

In short, we now live in a digital society. While this has occurred progressively, major changes have been wrought by the introduction of devices and platforms over the past decade in particular. Personal computers were introduced to the public in the mid-1980s. The World Wide Web was invented in 1989 but became readily accessible to the public only in 1994. From 2001, many significant platforms and devices have been released that have had a major impact on social life. Wikipedia and iTunes began operation in 2001. LinkedIn was established in 2003, Facebook in 2004, Reddit, Flickr and YouTube a year later, and Twitter in 2006. Smartphones came on the market in 2007, the same year that Tumblr was introduced, while Spotify began in 2008. Instagram and tablet computers followed in 2010, Pinterest and Google+ in 2011.

For some theorists, the very idea of ‘culture’ or ‘society’ cannot now be fully understood without the recognition that computer software and hardware devices not only underpin but actively constitute self-hood, embodiment, social life, social relations and social institutions. Anthropologists Daniel Miller and Heather Horst (2012: 4) assert that digital technologies, like other material cultural artefacts, are ‘becoming a constitutive part of what makes us human’. They claim against contentions that engaging with the digital somehow makes us less human and authentic that, ‘not only are we just as human in the digital world, the digital also provides many new opportunities for anthropology to help us understand what makes us human’. As a sociologist, I would add to this observation that just as investigating our interactions with digital technologies contributes to research into the nature of human experience, it also tells us much about the social world.

We have reached a point where digital technologies’ ubiquity and pervasiveness are such that they have become invisible. Some people may claim that their lives have not become digitised to any significant extent: that their ways of working, socialising, moving around in space, engaging in family life or intimate relationships have changed little because they refuse to use computerised devices. However, these individuals are speaking from a position which only serves to highlight the now unobtrusive, taken-for-granted elements of digitisation. Even when people themselves eschew the use of a smartphone, digital camera or social media platform, they invariably will find themselves

interacting with those who do. They may even find that digital images or audio files of themselves will be uploaded and circulated using these technologies by others without their knowledge or consent.

Our movements in public space and our routine interactions with government and commercial institutions and organisations are now mediated via digital technologies in ways of which we are not always fully aware. The way in which urban space is generated, configured, monitored and managed, for example, is a product of digital technologies. CCTV (closed-circuit television) cameras that monitor people's movements in public space, traffic light and public transport systems, planning and development programmes for new buildings and the ordering, production and payment systems for most goods, services and public utilities are all digitised. In an era in which mobile and wearable digital devices are becoming increasingly common, the digital recording of images and audio by people interacting in private and public spaces, in conjunction with security and commercial surveillance technologies that are now part of public spaces and everyday transactions, means that we are increasingly becoming digital data subjects, whether we like it or not, and whether we choose this or not.

Digitised data related to our routine interactions with networked technologies, including search engine enquiries, phone calls, shopping, government agency and banking interactions, are collected automatically and archived, producing massive data sets that are now often referred to as 'big data'. Big data also include 'user-generated content', or information that has been intentionally uploaded to social media platforms by users as part of their participation in these sites: their tweets, status updates, blog posts and comments, photographs and videos and so on. Social media platforms record and monitor an increasing number of features about these communicative acts: not only what is said, but the profiles of the speaker and the audience, how others reacted to the content: how many 'likes', comments, views, time spent on a page or 'retweets' were generated, the time of day interaction occurred, the geographical location of users, the search terms used to find the content, how content is shared across platforms and so on. There has been increasing attention paid to the value of the big data for both commercial and non-commercial enterprises. The existence of these data raises many questions about how they are being used and the implications for privacy, security and policing, surveillance, global development and the economy.

How we learn about the world is also digitally mediated. Consider the ways in which news about local and world events is now gathered and presented. Many people rely on journalists' accounts of events for

their knowledge about what is going on in the world. They are now able to access news reports in a multitude of ways, from the traditional (print newspapers, television and radio news programmes) to the new digital media forms: Twitter feeds, Storify accounts, online versions of newspapers, live news blogs that are constantly updated. Twitter is now often the most up-to-date in terms of reporting breaking news, and many journalists use tweets as a source of information when they are constructing their stories. Journalists are now also drawing on the expertise of computer scientists as part of using open-source digital data as a source of news and to present data visualisations (sometimes referred to as 'data journalism'). Further, the ability of people other than trained journalists to report on or record news events has expanded significantly with the advent of digital technologies. 'Citizen journalists' can video or photograph images and tweet, blog or write on Facebook about news happenings, all of which are available for others to read and comment on, including professional journalists. Traditional news outlets, particularly those publishing paper versions of newspapers, have had to meet the challenges of new digital media and construct new ways of earning income from journalism.

Digital technologies have also been used increasingly for mass citizen surveillance purposes, often in ways about which citizens are unaware. This element of the digital world became highlighted in mid-2013, when an American contractor working for the US National Security Agency (NSA), Edward Snowden, leaked thousands of classified documents he had secretly obtained as part of his work to the *Guardian* and *Washington Post* newspapers. These documents revealed the extent of the American and other anglophone (British, Australian, Canadian and New Zealand) governments' digital surveillance activities of their own citizens and those in other countries. The documents showed that these activities included accessing telephone records, text messages, emails and tracking mobile phone locations in the US, UK and Europe, as well as surveillance of citizens' internet interactions and the phone call data of many political and business leaders. It was revealed that the NSA and its British counterpart, the Government Communications Headquarters (GCHQ), were able to access users' personal metadata from major American internet companies, including Google, Apple, Microsoft and Facebook as well as intercepting data from fibre-optic telephone and internet networks.

This book on digital sociology examines many aspects of digital society. Given the spread of digital technologies into most nooks and crannies of everyday life for people in developed countries (and increasingly in developing countries), it is impossible for one book to cover all the issues and topics that could be incorporated under a

sociology of digital technologies. My more modest aim in this book is to introduce a range of interesting social, cultural and political dimensions of digital society and to discuss some of the important debates occurring in research and scholarship on these aspects. I contend that sociologists should not only be thinking about and studying how (other) people use digital technologies but also how they themselves are increasingly becoming 'digitised academics' and the implications for the practice and definition of the discipline of sociology.

Some sociologists have speculated that in a context in which many diverse actors and organisations can collect and analyse social data from digital sources, the claim of sociologists that they have superior knowledge of researching social life and access to social data is challenged. The internet empires of Google, Facebook and Amazon as well as many other companies and agencies have become expert at managing data collection, archiving and interpretation in ways about which sociologists and other social scientists working in higher education can only dream. Is there a 'coming crisis' of empirical sociology (Savage and Burrows 2007, 2009), and indeed has it now arrived? Must sociologists suffer from 'data envy' (Back 2012: 19) or what otherwise has been termed 'Google envy' (Rogers 2013: 206) in this age of the corporatisation of big data? How can they manage the vastness of the digital data that are now produced and the complexities of the technologies that generate them? Is there still a role for sociologists as social researchers in this era in which other research professionals can easily access and analyse large data sets? As I will demonstrate in this book, rather than constituting a crisis, the analysis of digital society offers new opportunities for sociologists to demonstrate their expertise in social analysis and take the discipline in new and exciting directions.

If it is accepted that 'life is digital' (as the advertisement quoted at the beginning of this chapter put it so succinctly), I would argue that sociology needs to make the study of digital technologies central to its very remit. All of the topics that sociologists now research and teach about are inevitably connected to digital technologies, whether they focus on the sociology of the family, science, health and medicine, knowledge, culture, the economy, employment, education, work, gender, risk, ageing or race and ethnicity. To study digital society is to focus on many aspects that have long been central preoccupations of sociologists: selfhood, identity, embodiment, power relations and social inequalities, social networks, social structures, social institutions and social theory.

This book develops ideas and discusses ideas in which I have been interested for about two decades now. In the mid-1990s I began

thinking and writing about how people conceptualised and used the types of computers that were available in those days: personal computers, the large, heavy objects that sat on people's desks, or the bulky laptops that they lugged around in the early version of 'mobile' computers. I first became intrigued by the sociocultural dimensions of computer technologies when I began to notice the ways in which computer viruses were discussed in popular culture in the early 1990s. Personal computers had been in use for some time by then, and people were beginning to recognise how much they had begun to depend on computer technologies and also what could go wrong when hackers developed 'malware' (or malicious software) in attempts to disrupt computer systems. My research interests at that time were in health, medicine, risk and embodiment (including writing about the metaphors of and social responses to HIV/AIDS). I was fascinated by what the metaphor of the computer virus revealed about our understandings of both computer technologies and human bodies (which have increasingly come to be portrayed as computerised systems in relation to the immune system and brain function) and the relationships between the two.

These interests first culminated in an article on what I described as 'panic computing' where I examined the viral metaphor in relation to computers and what this revealed about our feelings towards computers, including the common conceptualisations of computers as being like humans (Lupton 1994). I followed up with another piece reflecting on what I described as 'the embodied computer/user' (Lupton 1995). As this term suggests, the article centred on such features as the ways we thought of our personal computers as extensions of or prosthetics of our bodies/selves, blurring the conceptual boundaries between human body and self and the computers people use. An empirical project with Greg Noble then built on this initial work to investigate how personal computers were conceptualised and used in the academic workplace, including identifying the ways in which people anthropomorphised them, gave them personalities and invested them with emotions (Lupton and Noble 1997, 2002; Noble and Lupton 1998). Two other interview-based projects with Wendy Seymour addressed the topic of how people with disabilities used computer technologies, again focusing on such features as people's emotional and embodied relationships with these technologies (Lupton and Seymour 2000, 2003; Seymour and Lupton 2004).

Some of these earlier interests are taken up and re-examined in this book in a context in which computers have moved off the desktop, significantly shrunk in size and connect to the internet in almost any location. Now, more than ever, we are intimately interembodied with

our computing technologies. We are not only embodied computer/users; we are digitised humans. In the wake of the different ways in which people are now using digital technologies, I have become interested in investigating what the implications are for contemporary concepts of self, embodiment and social relations.

My more recent research has also involved the active use of many forms of digital tools as part of academic professional practice. Since 2012 I have been engaging in what might be called a participant observation study of the use of digital media in academia, trying various tools and platforms to see which are the most useful. I established my own blog, 'This Sociological Life', and began blogging not only about my research but also my observations about using social and other digital media for academic purposes. I joined Twitter and used platforms such as Facebook, Pinterest, Slideshare, Storify, Prismatic, Delicious, Scoop.it and Bundlr for professional academic purposes. The contacts and interactions I have made on Twitter and in following other academics' blogs, in particular, have been vital in keeping up to date with others' research and exchanging ideas about digital society. All of this research and the practical use of social and other digital media, from my earlier forays to my contemporary work, inform the content of this book.

KEY TERMS

When referring to digital technologies I mean both the software (the computer coding programs that provide instructions for how computers should operate) and the hardware (physical computer devices) that work together using digital coding (otherwise known as binary coding), as well as the infrastructures that support them. Contemporary digital technologies use computing platforms, the underlying environment in which software operates, including operating systems, browsers, applications (or apps) and the processing hardware that supports the software and manages data movement in the computer.

The digital is contrasted with analogue forms of recording and transmitting information that involve continuous streams of information, or with non-electronic formats of conveying information such as printed paper or artworks on canvas. Non-digital media technologies include landline telephones, radio, older forms of television, vinyl records, audio and visual tape cassettes, print newspapers, books and magazines, paintings, cameras using film and so on. While all of these 'old' or 'traditional' media and devices still exist, and some of them are still used regularly by large numbers of people, they can also be

rendered into digital formats. Artefacts and artworks in museums and art galleries, for example, are now often photographed using digital cameras and these images are uploaded to the museum's or gallery's website for viewing by those who cannot view them in person.

This leads to the concept of digital data. When referring to digital data I mean the encoded objects that are recorded and transmitted using digital media technologies. Digital information is conveyed by non-continuous sequences of symbols (often 0s and 1s). Digital data include not only numerical material (how many likes a Facebook page receives, how many followers one has on Twitter) but also audio and visual data such as films and photos and detailed text such as blog posts, status updates on social media, online news articles and comments on websites. As I emphasise in this book, digital data are not just automatically created objects of digital technologies. They are the products of human action. Human judgement steps in at each stage of the production of data: in deciding what constitutes data; what data are important to collect and aggregate; how they should be classified and organised into hierarchies; whether they are 'clean' or 'dirty' (needing additional work to use for analysis); and so on.

The transferability of digital formats to different technologies capable of interpreting and displaying them is pivotal for the convergence of the new digital technologies: the fact that they can share information with each other easily and quickly. These technologies can also perform a multitude of functions. Smartphones not only make telephone calls but connect to the web, take digital photographs and videos, run apps, record voice data and play music, television programmes and films. Games consoles such as Nintendo's Wii can now browse the internet and connect to social media platforms. Various devices used each day – smartphones, cameras, MP3 players, desktops, laptops, tablets, wearable computers – can share information between themselves, facilitated by common interfaces and cloud computing (which involves the use of a network of a large number of computers connected to remote servers hosted on the internet to store, manage and process digital data).

It has been argued that to speak of 'the internet' these days is to inaccurately represent it as a singular phenomenon, when it is in fact comprised of a multitude of different digital platforms that are interconnected (Hands 2013). The internet has not always been this complex, however. In its early days it was a technology designed to establish data communication networks for the sharing of resources between separate computers (hence the term 'internet') that previously had been used mainly by the military, universities and information technology experts and enthusiasts. The World Wide Web (often

referred to as ‘the web’ for short), invented by Sir Tim Berners-Lee in 1989, provided the infrastructure to use hyperlinks to access the internet. However the web was only readily available to the general public via the first commercial provider in 1994. The web, therefore, is not synonymous with the internet, but rather is a convenient way of accessing the internet. Web browsers such as Google Chrome and Internet Explorer provide the means by which the web can be searched and interacted with. Browsers are able to access Uniform Resource Locators (URLs) or hyperlinks that are used to identify and locate web resources such as web pages, images or videos.

The digital technologies of the last century (now often retrospectively referred to as ‘Web 1.0’) were based on websites and devices such as desktop or laptop computers. People could view information online and use facilities such as emails, online banking and shopping, but for the most part had little role to play in creating online content (although some users did interact with others in internet chat rooms, listservs, discussion groups and multi-player online games). Computers at first connected to the internet via telephone lines, and thus their users were physically limited in the extent to which they could be online. Software applications were loaded on to individual desktops or laptops.

Since the early years of the twenty-first century, the emergence of platforms and websites that were accessible online rather than loaded individually on to one’s desktop computer, the development of technologies such as wireless (‘wi-fi’) and broadband internet access and related devices have resulted in a proliferation of technologies. Ubiquitous wireless computing technologies allow for users to be connected to the internet in almost any location at any time of the day using their mobile devices that can easily be carried around with them. Some digital devices can be worn on the body, such as self-tracking wristbands or headbands used to collect biometric data, smartwatches and Google Glass, a device that is worn on the face like spectacles. Social media sites such as Facebook, Twitter, Google+, Instagram and YouTube that facilitate the online sharing of personal information and images with potentially many others have become extremely popular among internet users. These developments have been characterised as ‘Web 2.0’ (or ‘the social web’) by many commentators. An ‘Internet of Things’ is now beginning to develop (also often referred to as ‘Web 3.0’), in which digitised everyday objects (or ‘smart things’) are able to connect to the internet and with each other and exchange information without human intervention, allowing for joined-up networks across a wide range of objects, databases and digital platforms.

There is some contention about when exactly the features of Web 2.0 emerged in terms of a history of the internet, given that some of the aspects described above, such as Wikipedia and some early versions of social media sites, had already been around for some years by the time the term Web 2.0 had entered common use. It is difficult, therefore, to designate a specific and precise timeframe in which the apparent Web 2.0 began. The names given to the different manifestations of internet technologies ('1.0', '2.0', '3.0' and so on) mimic the terminology developed by software developers, but do not do justice to the complexity and messiness of how the internet has developed over the years (Allen 2013).

Whatever terminology is chosen, there is little doubt that the ways in which we communicate with other people, access news, music and other media, play computer games and conduct our working lives have changed dramatically in many aspects over the past decade. While websites designed mainly to communicate information in a one-way format are still available and used for some purposes, they have been complemented by a multitude of online platforms that allow, and indeed encourage, users to contribute content and share it with other users in real time. These activities have been dubbed 'prosumption' (a combination of production and consumption) by some internet researchers to convey the dual nature of such interaction with digital technologies (Beer and Burrows 2010; Ritzer 2014; Ritzer *et al.* 2012). Prosumption using digital media includes such activities as writing blog posts, contributing information to support or fan forums, uploading images, status updates and tweets, and commenting on, liking, retweeting, curating or sharing other users' content. These activities represent a significant shift in how users interact with and make use of digital technologies compared to the very early days of the internet. The ethos of prosumption conforms to the democratic ideals of citizen participation and sharing that are central features of discourses on contemporary digital media use, particularly social media platforms (Beer and Burrows 2010; John 2013). Prosumption had been a feature of some activities before the advent of digital technologies or the internet (among fan cultures or as part of craftwork, for example). However, digital media have afforded the rapid expansion as well as new forms of prosumption (Ritzer 2014).

The classification practices, or tagging (also sometimes called 'folksonomy'), in which users engage comprise another form of prosumption. Users choose whatever words or terms they wish to tag digital content. These can sometimes be sarcastic or critical as part of efforts to entertain others or denote one's emotional responses to content. One common example is the use of the hashtag symbol (#) on Twitter,

which not only serves to classify content (for example, I often use #digitalsociology when posting on Twitter about topics related to this subject) but is also often used as a way of expressing opinion or evaluation (#excited, #disgusted). These tagging practices produce ‘meta-data’, or information that indicates the categories into which content may fall, and are therefore vital to allowing others to find content. This is a form of classification, a practice that is vitally important to the way in which the content of Web 2.0 platforms and devices is organised, accessed and circulated (Beer and Burrows 2013).

When I write a blog post or journal article, for example, I engage in the production of metadata by deciding what tags (or ‘key words’, the term used by academic journals) best describe the content of that particular piece of writing. Once I have tagged the piece, the metadata produced by the tags I have selected helps others to find it when they engage in online searches. If I have not used the most relevant or obvious terms, this may mean that my content may not be found as easily, so tagging practices can be very important in making content ‘discoverable’. Metadata also include such features of mobile phone calls as the numbers called, the length of the calls and the geographical location from which they were made, as well as the terms people enter into search engines, what websites they visit, how long they spend browsing websites, to whom they send emails and so on. While the detailed content of these communications is not revealed by metadata, such information can reveal much about people’s use of digital technologies, particularly if aggregated from various sources.

I use the term ‘algorithm’ often throughout the book. An algorithm is a sequence of computer code commands that tells a computer how to proceed through a series of instructions to arrive at a specified endpoint. In short, algorithms are used to solve problems in software. Computer algorithms are becoming increasingly important in facilitating the ways in which digital technologies collect data about users, sort and make sense of these data and generate predictions about the user’s future behaviour or make suggestions about how the user should behave. Thus, for example, when Amazon sends users an email making suggestions about books they might be interested in, it has used algorithms to determine each individual’s possible interests (and purchasing choices) based on their previous searches or purchases on its platform. The Google Go app (once authorised by the user) can draw on the user’s Gmail content and Google searches, using algorithms, to calculate what information the user might require next. The study of algorithms in recent social scholarship has focused attention not only on the increasingly important role played by these types of computer codes in digital society, but also on their cultural and political dimensions.

SCOPING DIGITAL SOCIOLOGY

Sociological research into computer technologies has attracted many different names, dispersed across multiple interests, including ‘cyber sociology’, ‘the sociology of the internet’, ‘e-sociology’, ‘the sociology of online communities’, ‘the sociology of social media’ and ‘the sociology of cyberculture’. When computer technologies first began to be used widely, researchers often used the terms ‘information and communication technologies’ (ICTs) or ‘cyber technologies’ to describe them. The terms ‘digital’, ‘Web 2.0’ and ‘the internet’ have superseded that of the ‘cyber’ to a large extent in both the academic literature and popular culture. The term ‘digital’ is now frequently employed in both the popular media and the academic literature to describe the expanding array of material that has been rendered into digital formats and the technologies, devices and media that use these formats. As part of this general discursive move, ‘digital sociology’ is beginning to replace older terms. This change in terminology is consonant with other sub-disciplines that focus on digital technologies, including digital humanities, digital cultures, digital anthropology and digital geography.

While there certainly have been a number of sociologists who have been interested in researching computer technologies since they attracted popular use, in general sociologists have devoted less significant and sustained attention to this topic compared to their colleagues in communication and media and cultural studies. In the context of the US, Farrell and Petersen (2010), in remarking upon what they term ‘the reluctant sociologist’ in relation to internet-based research, express their surprise at this lack of interest, particularly given that sociologists have traditionally been in the forefront of adopting and testing new research methods and sources of data for social research studies. While the occasional argument has appeared in journals that US sociologists should be researching online media technologies (DiMaggio *et al.* 2001), it would appear that sociologists in that country tended to abandon communication and media research in general when it moved to journalism schools and an accompanying focus on the social psychology of persuasion in the middle of the last century. As a consequence, although the sociology of culture has flourished in the US, for quite some time American sociologists tended to eschew research into the mass media (Farrell and Petersen 2010; Nichols 2009; Pooley and Katz 2008).

In the UK, the interdisciplinary field of cultural studies (often conjoined with media studies) that emerged in the 1970s dominated research and theorising relating to the mass media and, subsequently,

computer technologies. Cultural studies scholars were particularly interested in ‘cyberculture’, rather than the rather more banal terms ‘information society’ and ‘sociology of information technologies’ that tended to be employed in sociology (Webster 2005). Indeed, the choice of terms is telling. The ‘cyber’ focus of cultural studies emphasises the futuristic, science-fiction dimensions of computerised technologies, while terms referring to ‘information technologies’ direct attention at the grounded, factual and utilitarian use of such devices for accessing information (Webster 2005).

For a long time, when cultural studies scholars were writing about cyberculture and other aspects of media and popular culture, British sociologists remained focused on such topics as work, crime and social class. Researchers in cultural studies were more interested in the uses people made of popular culture, while sociologists of culture tended towards examining the constraints to their freedoms posed by social structures such as social class, gender and ethnicity (Webster 2005). Few connections were made between these bodies of literature. Thus, for example, the influential and wide-ranging volume *The Cybercultures Reader* (Bell and Kennedy 2000) was edited by Britons David Bell, a critical geographer, and Barbara Kennedy, an academic in film, media and cultural studies. While the work of a few sociologists (including myself) was included in this reader, most other contributions were from academics affiliated with communication, media and cultural studies, literary studies, critical theory or technoscience.

My own country, Australia, like the US, has experienced the introduction of schools of journalism and mass media studies and a resultant withdrawal – to some extent – of sociologists from mass and digital media research. The British cultural studies tradition is also strong in Australia. Cultural studies in Australia as an academic discipline tends to be very separate from both media and communication studies and sociology. Each one – media and communication, sociology and cultural studies – has its own individual association and annual conferences, and there tends to be little communication between researchers associated with each discipline. Media studies and communication studies in Australia have oriented themselves towards the US tradition, while sociology and cultural studies are more influenced by British scholarship. Here again the bulk of Australian research on digital technologies has been published by researchers located within media and communication or cultural studies departments and in journals devoted to these disciplines, rather than by sociologists.

The situation is quickly changing, however. In recent years interest in digital society finally appears to be growing in sociology, and ‘digital sociology’ has recently become used more frequently. The first journal

article published to use the term ‘digital sociology’ of which I am aware was by an American sociologist in an American journal (Wynn 2009). In this piece Wynn outlined various ways in which digital technologies can be used both for research purposes (using digital devices to conduct ethnographic research, for example) and in teaching. Digital sociology as a term and an endeavour is most commonly found in the British context. At the end of 2012 the British Sociological Association approved a new study group in digital sociology which held its first event in July 2013. Goldsmiths, University of London, offers the first masters degree in digital sociology. The first book with this title was published in 2013 (Orton-Johnson and Prior 2013), a collection edited by two British sociologists featuring contributions predominantly from other sociologists located in the UK and continental Europe. While digital sociology is still not a term that is used to any obvious extent by American sociologists, the American Sociological Association now has a thriving section entitled ‘Communication and Information Technologies’ that incorporates research on all things digital. In Australia as well digital sociology has not been used very commonly until very recently. A breakthrough was achieved when two sessions under the title digital sociology were held for the first time at the Australian Sociological Association’s annual conference in November 2013.

A particular feature of sociological enquiry and theorising is the tendency to be reflexive, including in relation to one’s own practices as a sociologist. Sociologists view the world with a particular sensibility (Gane and Back 2012; Holmwood 2010) that is part of the sociological imagination, a term drawn from one of the most influential writers in the discipline, the American C. Wright Mills, that is frequently employed to gloss an approach to studying the world that is distinctively sociological. The sociological sensibility adopts critique not only of other disciplines but of sociology itself. Drawing on the work of another classic sociologist, Pierre Bourdieu, Holmwood (2010: 650) uses the term ‘sociological habitus’ to suggest that sociology is a habituated set of practices and dispositions that often leads to self-subversion and a tendency to internal interdisciplinarity in its stance. According to Savage (2010), such intensely introspective and reflexive critiques of sociology and agonising over its future may itself be considered a sociological peculiarity, rarely found in other academic disciplines.

What is notable about digital sociology as it has recently emerged as a sub-discipline, particularly in the UK, is not only the focus on the new technologies that have developed since the turn of the twenty-first century, but also the development of a distinctive theoretical and

methodological approach that incorporates this reflexive critique. Digital sociology is not only about sociologists researching and theorising about how other people use digital technologies or focusing on the digital data produced via this use. Digital sociology has much broader implications than simply studying digital technologies, raising questions about the practice of sociology and social research itself. It also includes research on how sociologists themselves are using social and other digital media as part of their work. The same types of concerns and theoretical approaches tend to be shared by sociologists writing on digital media and others commenting on related issues such as the future of sociology as a discipline, which types of research methods should be employed and how they should be conceptualised, the ways in which issues of measure and value have become prominent in contemporary societies, the emergence of a knowledge economy and the new political formations and relations of power that are evident. While not all of these scholars may categorise themselves as specifically digital sociologists, their work has contributed significantly to the distinctive direction of the sub-discipline as it has recently emerged.

It should be emphasised here that digital scholarship is necessarily a multidisciplinary area. Sociology itself, like any other discipline, is a permeable and dynamic entity. Accordingly I certainly do not limit my discussion in this book to publications by those writers who would identify themselves as sociologists. Scholars in several other disciplines have had interesting things to say about the social and cultural dimensions of digital media technologies that are directly relevant to the concerns of this book. The fields of mass communication, media studies, cultural geography and digital anthropology in particular, and even some aspects of computer science research, such as that focusing on human–computer relations, have much to offer, as do interdisciplinary areas, such as science and technology studies, internet studies and digital cultures. Discrete areas of research have begun to develop as well that examine the social, cultural and political dimensions of specific features of the digital world, including software studies, game studies, mobile media studies and platform studies. Ideally, these fields should be engaging with and benefiting from each other's work.

While others may have their own views on what digital sociology encompasses, I have developed a four-fold typology that summarises my definition of the sub-discipline. This is as follows:

- *professional digital practice*: using digital tools as part of sociological practice – to build networks, construct an online profile, publicise and share research and instruct students;

- *analyses of digital technology use*: researching the ways in which people's use of digital technologies configures their sense of self, their embodiment and their social relations, and the role of digital media in the creation or reproduction of social institutions and social structures;
- *digital data analysis*: using naturally occurring digital data for social research, either quantitative or qualitative; and
- *critical digital sociology*: undertaking reflexive analysis of digital technologies informed by social and cultural theory.

Professional digital practice

As I observed above, the working lives and identities of sociologists have already been profoundly affected by digitisation. Many aspects of academic research and teaching have been transformed by new digital technologies. Professional digital practice relates to how sociologists (and other academics) are using these tools. In general sociologists have been slow to personally engage in using social media and other digital technologies for professional practice (Daniels and Feagin 2011; Farrell and Petersen 2010; Mitchell 2000). This is slowly beginning to change, however, as more and more sociologists and other academics realise the potential of such tools in generating networks with people both inside and outside the academic world, disseminating research widely, increasing the impact of their research and learning about others' research. Some sociologists have contended that using social media and open-access platforms for publishing has become a vital aspect of engaging as a public sociologist, by facilitating public engagement and interest in and access to research findings. Professional digital use, however, carries with it potential risks as well as possibilities. Sociologists have begun to recognise and write about these various dimensions from a sociologically informed perspective.

Analyses of digital technology use

While, as I observed above, sociologists in general have devoted comparatively little attention to computer technologies in favour of other research topics, since the introduction of personal computers and then the internet a body of sociological literature has developed addressing how people use these technologies. More recently the widespread use of digital technologies, their entry into all realms of everyday life and their use in establishing and maintaining social networks have generated sociological interest in how the self is presented via digital technologies, their incorporation into everyday

routines and activities, how people learn about the world using them, the differences in access to and use of these technologies, their uses for surveillance and the implications for concepts of privacy. The big data phenomenon has also sparked a growing scholarly interest in the ethical and political aspects of large digital data sets. The popularity of social media sites has incited sociological enquiries into how best to access and analyse people's engagement with these media. To investigate these topics, sociologists have applied both qualitative methodologies (such as interviews, focus groups and ethnographic research) and quantitative approaches such as surveys. This kind of digital sociological research has clear overlaps with research in digital anthropology, digital cultures, internet studies and digital geography. Central to most sociological analyses of the digital world, however, are questions of power relations and how they operate to affect and produce social relations, self or group identities and social and economic disadvantage and privilege.

Digital data analysis

Another dimension of digital sociology is the use of large digital data sets to conduct social research. Titles such as 'digital social research', 'webometrics', 'web social science' and 'computational social science' tend to be used to refer to conducting this type of 'e-research'. The focus of this strand of research is on the collection and use of data and the tools to analyse these data. Followers adopt an approach that is drawn largely from computer science, and are interested in the most efficient use of tools to store and analyse digital data. Their methods use 'naturally' or incidentally generated data that are already collected by various web platforms (for example, Facebook and Twitter posts, Instagram images, search engines, text messages and GPS data). Some researchers who adopt this approach to digital data analysis are also interested in ways of recording and analysing data for qualitative analysis, including images, videos and audio data. While these approaches seem quite widely used in such fields as information science and technology and communication studies, thus far they seem little used by sociologists, perhaps because few sociologists have training in how to access and analyse these big data sets.

Critical digital sociology

A number of major themes have emerged in recent years in the sociological literature cohering around how the new digital media, the data they produce and the actors involved in the collection, interpretation

and analysis of these data confront sociology as a discipline. These issues and questions go to the heart of debates and discussion about how sociology as a discipline should be conceptualised and carried out. Some sociologists have begun to interrogate the ways in which the use of new digital technologies may affect their employment conditions and their presentation of their professional selves. They have offered critiques not only of digital society as a whole but of their own position as increasingly digitised subjects, and of how sociology should deal with the challenges of the new forms of knowledge that are produced by digital technologies. A perspective on digital social research that acknowledges that the methods and devices used to conduct this research are themselves constitutive of social life and society has developed. Other sociologists have begun to investigate ways of using digital technologies and digital data as part of creative, inventive and innovative ways of conducting sociology in research and teaching.

THIS BOOK

The chapters in this book address all of these dimensions of digital sociology. Chapter 2 provides a foundation for the ensuing chapters by reviewing the major theoretical perspectives that are developed in the book. These include analyses of the global information economy and new forms of power, the sociomaterial perspective on the relationship between humans and digital technologies, presumption, neoliberalism and the sharing subject, the importance of the archive, theories of veilance (watching) that are relevant to digital society and theories concerning digitised embodiment. In Chapter 3 I move on to new ways of conceptualising research in the digital era. This chapter summarises many of the methods that are currently employed by digital social researchers, providing numerous examples of innovative and creative projects that have contributed to innovative ways of rethinking sociology. The discussion also raises the issue of theorising methods, drawing on a body of literature that has developed on positioning the methodological device as itself a sociocultural artefact and agent in the conduct of research.

Chapter 4 addresses the topic of the digitised academic by outlining the ways in which sociologists and other academics use digital technologies as part of their professional practice. The discussion in the chapter adopts a sociological perspective on this topic by examining not only the possibilities and limitations of using social media as an academic, but the deeper implications for professional identity and the

politics of digital public engagement. Chapter 5 develops a critical sociology of big data. After reviewing the emergence of the big data and its rapid diffusion into commercial, government and personal enterprises, I identify the social, cultural, ethical and political aspects of this phenomenon, again adopting the perspective that positions digital data as sociomaterial objects.

The final three substantive chapters address the ways in which people interact with digital technologies. Chapter 6 examines the diversity of digital technology use across social groups and geographical locations. I begin with 'the big picture', drawing on several large-scale reports that have identified trends in use both within certain countries and cross-nationally. The chapter then moves on to discuss the more contextually based qualitative investigations that provide insights into the complexities of digital social inequalities and the culturally situated expectations and norms that structure digital engagement practices. The gendered nature of digital technology use is discussed in detail, and the potential for digital technology use to exacerbate social marginalisation and discrimination against minority groups is also canvassed.

Chapter 7 follows on from some of these issues. I examine the politics of digital veillance, activism, privacy debates, calls for openness of digital data and citizen digital public engagement. It is argued that while digital activism and moves to render digital data more open to citizens can be successful to some extent in achieving their aims, claims that they engender a major new form of political resistance or challenge to institutionalised power are inflated. Indeed, digital technologies can provide a means by which activists can come under surveillance and be discredited by governments. Other negative aspects of citizen digital engagement are outlined, including the ways in which the internet can incite discrimination and vigilantism and promote the dissemination of false information.

In Chapter 8 I address embodiment and selfhood as they are enacted via the use of digital technologies. I argue that digital software and hardware now have far more of a capacity to be intimately involved in our lives. More than ever, they are becoming part of our identities as they store more data about our experiences, our social relationships and encounters and our bodily functioning. Their material design and use are also experienced at an embodied and affective level – elements of digital society that are often neglected in sociological analyses.

The brief conclusion in Chapter 9 summarises the main themes and arguments of the book and makes a case for an optimistic and forward-thinking view of what digital sociology can offer.

Theorising digital society

In this chapter I introduce the dominant theoretical perspectives that will be drawn upon and developed further in the other chapters. These perspectives are by no means exhaustive of all the interesting work that has been published relating to digital society, but they represent some of the approaches that I have found some of the most intriguing for developing digital sociology.

THE GLOBAL INFORMATION ECONOMY AND NEW FORMS OF POWER

Contemporary social theory has increasingly represented societies in the developed world as characterised by networks, across which information circulates and spreads. The emergence of new ways of developing social networks via online technologies such as social media platforms has inspired many sociologists and other social theorists to devote their attention to how these technologies are shaping and reshaping social lives.

Manuel Castells is one influential writer on the sociology of digital networks. His concept of ‘network society’, as expressed in several books and articles (e.g. Castells 2000a, 2000b, 2012), positions networks as the basis for contemporary societies’ structure and power relations. In what Castells characterises as ‘the information age’,

industrial processes have been superseded by electronic communications facilitated by the new information technologies. Power is now multidimensional, residing in networks such as the global financial, political, military–security, information production, criminal and multimedia networks. All these networks are involved in defining the rules and norms of societies. Castells asserts that digitally mediated information has become key to economic productivity. Knowledge-based information technologies produce even more knowledge and information, contributing to a new information-based economy that is dispersed globally and is highly interconnected, using digital and other networking technologies and practices. According to Castells, digital technologies such as social media have played a major role in creating a new social structure, global economy and a new virtual culture. His work has led the way in acknowledging the importance of these technologies in contemporary social formations.

The features of new ways of knowing about the world, new forms of information and novel commercial uses for digital data have received attention from several other sociologists. They have argued that digital technologies have changed the ways in which economic value is produced and distributed and commodities conceptualised (Beer 2013a; Featherstone 2009; Lash 2007; Mackenzie 2005; Savage and Burrows 2007). According to these writers, knowledge itself has become transformed via these processes. Many cite Nigel Thrift's (2005, 2006) writings on the information economy and what he entitles 'knowing capitalism' to support their position. Thrift argues that the capitalist economic system is increasingly turning to information as a source of profit, underpinned by increasing the rate of innovation and invention through refigurings of space and time. The affordances of the internet have contributed to this move. Digitisation has the effect of rendering knowledge into information that can easily be accessed via digital technologies. The internet is configuring a new scholarly apparatus that engenders different modes of research, scholarship and communication (Featherstone 2009).

The internet empires (or 'megaplatforms') of the Google, Facebook, Apple and Amazon companies have dominated the digital world and changed the ways in which knowledge is produced and reproduced. The term 'Googilization' (Vaidhyanathan 2011) has been used to describe the ways in which the Google company has expanded its influence into many domains of social, economic and political life. Google is viewed as exerting a powerful effect not only on the ways in which search engines operate and the aesthetics of platforms and apps, but also education, academia, information services, social research, advertising, geographic services, email, publishing and web commerce.

On a broader level, each act of communication via digital media has become a valuable entity by being transformed into digital data that can be aggregated into massive data sets. Whether it is a like on Facebook, a comment on Twitter or a search engine enquiry, these acts of communication have become commoditised. Many commercial and government agencies and organisations now collect and use digital data as part of their operation. A digital data economy has developed, built on techniques of accessing digital data from the various archives in which they are stored for commercial purposes. Where once it was the physical labour of workers that produced surplus value, now the intellectual labour of the masses has monetary value, constituting a new information economy in which thought has become reified, public and commodified (Smith 2013; Thrift 2005, 2006).

It has been contended that power relations are shifting now that the digitised coding of people, things and places has become ubiquitous. Power now operates principally through modes of communication (Lash 2007; Mackenzie 2005; Mackenzie and Vurdubakis 2011; Smith 2013). Instead of the structural model of power that tended to represent societies as systems of largely fixed hierarchies, this approach views power as horizontal, rhizomatic, fluid and dynamic. The mass media are no longer viewed and theorised as ‘top-down’ mass persuaders, able to manipulate the masses to which they are disseminated and representative of the monopolistic concentration of power over public representations. Rather, it is acknowledged that the new mobile and interactive media embodied in Web 2.0 platforms and devices are dispersed, multimodal, a web of nodes that incorporate prosumption but also constant surveillance and information-gathering on users (Beer 2013a; Beer and Burrows 2010; Lash 2007; Smith 2013). The old media exerted power over the content of the messages they disseminated but had little knowledge of their audiences. In contrast, the new media not only incorporate content from their audiences but know their audiences in ever finer-grained detail (Beer 2013a; Best 2010; Featherstone 2009).

This is a perspective that adopts a Foucauldian approach to power in its emphasis not on the merely repressive dimensions of power relations (the traditional sovereign model of power in which an authoritative individual or group exerts power coercively over subjugated citizens), but on its everyday, dispersed and often voluntary nature. Power produces capabilities and choices at the same time as it delimits them (Foucault 1995). Lash (2007: 70) argues that via the newly digitised information economy and its ‘neo-commodities’ of data, a type of ‘post-hegemonic power’ operates in increasingly subtle ways. This ‘leaking out’ of power from the traditional hegemonic

institutions to everyday, taken-for-granted practices means that the age of ubiquitous computing and ubiquitous media is also that of ubiquitous politics. Power becomes immanent to forms of life, and thus is not recognised as such because of its invisible and taken-for-granted nature (Lash 2007: 75).

For Lash (2005, 2006), the global information society is characterised by openness of systems, non-linear movement and flux as well as flows of information. Lash (2006) notes that flux is characterised by tensions, struggles for power, whereas pure flow presupposes unrestricted movement. He argues for the importance of ‘putting flux back into the flows’: to problematise the smoothness of flows of information, ‘to develop a global politics of flux versus flow’ (Lash 2005: 17). This distinction between flux and flow of digital networks and data is an important one. It contravenes a dominant representation of digital data as circulating freely (as in the more utopian visions of writers such as Castells), and emphasises that there are difficulties and blockages in the flows inherent to the global information society.

DIGITAL TECHNOLOGIES AND DATA AS SOCIOMATERIAL OBJECTS

The focus on the ceaseless movement of digital data, while accurately articulating the networked nature of contemporary societies and the speed and ease with which information travels across the networks, also tends to obscure certain dimensions of digitisation. As sociologists and other social theorists have begun to argue, digital data are neither immaterial nor only minuscule components of a larger material entity. This perspective adopts a sociomaterial approach drawn from science and technology studies, an interdisciplinary field which has provided a critical stance on media technologies in general, and computerised technologies more specifically. In recent years, actor network theory, drawing on the work of sociologist of science Bruno Latour (e.g. Latour 1987, 2005), has achieved a dominant position in science and technology studies. In emphasising the role and agency of non-human actors in shaping human actors, actor network theory directs attention at the materiality and heterogeneous nature of human experience and subjectivity. Exponents contend that humans are always imbricated within networks comprised of human and non-human actors and cannot be isolated from these networks. This perspective has proven to be an insightful approach in scholarship on digital society, particularly in relation to understanding such digital phenomena as networks, social media platforms and data.

The concept of the assemblage is a useful way of understanding the hybrid phenomena that form when human and non-human actors

interact. Drawing on actor network theory as well as Deleuzian philosophy, the assemblage concept denotes an intermingling of the human and non-human in various dynamic ways (Haggerty and Ericson 2000; Latour 2005; Latour *et al.* 2012; Marcus 2006; Palmås 2011). The assemblage provides an approach to understanding the individual's relationship to and use of digital technologies that emphasises that each actor, whether human or non-human, shapes the other in a mutually constitutive relationship. It also provides a theoretical basis for understanding how nonhuman actors interact with each other, as takes place in the Internet of Things.

Assemblages are viewed as 'messy objects' in their complexity and mutability (Fenwick and Edwards 2011). Thus, for example, Fenwick and Edwards (2011) discuss the ways in which data and the devices used to create them have become a driving force in contemporary education, shaping decisions about what to teach students and how to use resources. By this process, the education system is rendered accountable to the data that are collected, used to monitor and calculate student learning outcomes. This massive and complex data-gathering assemblage used for governance purposes, however, is precarious, open to contingencies and messiness by virtue of its sheer size and complexity, its enrolment of many diverse agents and the possibility for gaming the system or engaging in resistant acts: cheating on test scores, for instance, or when teachers refuse to administer standardised tests, or when the data are subjected to contestations and challenges about what they really demonstrate. Counter-networks emerge to challenge existing networks, so that the power of a network of actors is never assured.

In this literature, the digital data objects that are brought together through digital technologies – including 'like' or 'share' buttons, individuals' browser histories, personalised recommendations and comments on social media posts as well as the hardware and software that structure the choices available to users – are assemblages of complex interactions of economic, technological, social and cultural logics (Caplan 2013; Langois and Elmer 2013; Mackenzie 2005; Mackenzie and Vurdubakis 2011). Representing digital phenomena as objects serves the purpose of acknowledging their existence, effects and power (Caplan 2013; Hands 2013; Langois and Elmer 2013; Marres 2012).

The cultural and political analysis of computer software is sometimes referred to as software studies. Writers in software studies place an emphasis not on the transmission or reception of messages, as in the old model of communication, but rather have developed a socio-material interest in the ways in which acts of computation produce

and shape knowledges. Computer codes are positioned as agents in configurations and assemblages (Fuller 2008), producing what Kitchin and Dodge (2011) refer to as ‘coded assemblages’. Indeed, the pervasive nature of software in everyday life is such that Manovich (2013b) argues that it has become ‘a universal language, the interface to our imagination and the world’. He contends, therefore, that social researchers should be conceptualising people’s interactions with digital technologies as ‘software performances’ which are constructed and reconstructed in real time, with the software constantly reacting to the user’s actions.

Software is no longer static: it is constantly responding to inputs from its users and from other networked systems: updating data, recognising location as the user moves around in space, noticing what activities the user is engaging in on her or his device (Helmond 2013; Manovich 2013a; Rogers 2013). Manovich (2013a: 36) gives the example of a user engaging with the Google Earth platform. Due to the constantly updated nature of Google Earth, each time the user accesses the platform she or he is viewing a ‘new Earth’, with new data available. Similarly, many Wikipedia entries are dynamic, being updated or edited regularly. Users can also create ‘mashups’ by bringing information from a range of digital platforms together in completely new and individually customised ways. Because these technologies are interactive platforms, they are subject to constant renewal and change, including changes contributed by users themselves. This is a completely new way of understanding and experiencing the nature of ‘information’ itself. As Manovich (2013b) comments, humans and software interact in ways that can be difficult to disentangle from each other:

What are interactive-media ‘data’? Software code as it executes, the records of user interactions (for example, clicks and cursor movements), the video recording of a user’s screen, a user’s brain activity as captured by an EEG or fMRI? All of the above, or something else?

Digital data are also positioned as sociomaterial objects in this literature. Whereas many commentators in the popular media, government and business world view digital data as the ultimate forms of truth and accurate knowledge, sociologists and other social theorists have emphasised that these forms of information, like any other type, are socially created and have a social life, a vitality, of their own. Digital data objects structure our concepts of identity, embodiment, relationships, our choices and preferences and even our access to services or spaces. There are many material aspects to digital data. They are the

product of complex decisions, creative ideas, the solving and management of technical problems and marketing efforts on the part of those workers who are involved in producing the materials that create, manage and store these data. They are also the product of the labour of the prosumers who create the data. These are the 'invisible' material aspects of digital data (Aslinger and Huntemann 2013).

Algorithms play an important role in configuring digital data objects. Without the knowledge of digital technology users, algorithms measure and sort them, deciding what choices they may be offered. Digital data objects aggregated together, often from a variety of sources, configure 'metric assemblages' (Burrows 2012) or 'surveillant assemblages' (Haggerty and Ericson 2000) that produce a virtual *doppelgänger* of the user. Algorithms and other elements of software, therefore, are generative, a productive form of power (Beer 2009; 2013a; boyd and Crawford 2012; Cheney-Lippold 2011; Mackenzie 2005; Mackenzie and Vurdubakis 2011; Ruppert *et al.* 2013).

Scholars who have adopted a sociomaterial perspective have also highlighted the tangible physicality of aspects of digital technology manufacture and use. Despite the rhetoric of seamless, proficient operation that so commonly is employed to discuss the internet and ubiquitous computing, the maintenance that supports this operation is messy and contingent, often involving pragmatic compromises, negotiations and just-in-time interventions to keep the system working. Geographical, economic, social, political and cultural factors – including such basic requirements as a stable electricity supply and access to a computer network – combine to promote or undermine the workings of digital technologies (Bell 2006a; Bell and Dourish 2007, 2011; Dourish and Bell 2007). The materiality of digital hardware becomes very apparent when devices that are no longer required must be disposed of, creating the problem of digital waste (or 'e-waste') that often contains toxic materials (Gabrys 2011; Miller and Horst 2012).

Given the high turnover of digital devices, their tendency towards fast obsolescence and the fact that they are often replaced every few years in wealthy countries by people seeking the newest technologies and upgrades, vast quantities of digital waste are constantly generated. The vast majority of discarded digital devices end up in landfill. Only a small minority are recycled or reused, and those that are tend to be sent from wealthy to poor countries for scrap and salvaging of components. When they are outmoded and discarded, the once highly desirable, shiny digital devices that were so full of promise when they were purchased simply become another form of rubbish – dirty, unsightly and potentially contaminating pollutants (Gabrys 2011). The

electricity supplies that power digital technologies and digital data storage units themselves have environmental effects on humans and other living things, such as the release of smoke and particles from coal-fired electricity generating plants. 'The digital is a regime of energies: human energy and the energy needed for technological machines' (Parikka 2013).

The materiality of digital objects is also apparent in debates over how and where digital data should be stored, as they require ever-larger physical structures (servers) for archiving purposes. Despite the metaphor of the computing 'cloud', digital data do not hover in the ether but must be contained within hardware. Furthermore, digital data are very difficult to erase or remove, and thus can be very stubbornly material. At the same time, however, if stored too long and not used, they may quickly become obsolete and therefore useless, if contemporary technologies can no longer access and make use of them. Digital data, therefore, may be said to 'decay' if left too long, and may be lost and forgotten if they are not migrated to new technological formats. Digital memory is volatile because the technologies used to store and access data change so quickly. Analogue materials that are rendered into digital form for archival purposes and then destroyed may therefore be lost if their digital forms can no longer be used (Gabrys 2011).

PROSUMPTION, NEOLIBERALISM AND THE SHARING SUBJECT

As noted above, in the global information economy a kind of digital vitality has been generated, in which information and data have taken on value in themselves. The practices of prosumption are major contributors to this economy, providing constant streams of information about the preferences, habits and opinions of digital technology users that can then be used for targeted marketing, advertising and other commercial promotional purposes (Beer 2009; Beer and Burrows 2013; Ritzer *et al.* 2012). Many users of social media enjoy creating content such as writing comments or blogs, producing fan sites or making mashups or digital graphic visualisations. Such activities can be a form of creative work. The opportunity for others to acknowledge or demonstrate their appreciation of the content can be a powerful motivating force for prosumption (Beer and Burrows 2013).

Some writers on digital society have discussed the broader political implications of the use and impact of digital technologies. Several have remarked upon the ways in which these technologies serve a neoliberal

political mode of governance. Neoliberalism is a political orientation that has taken hold across the developed world. Its main tenets are the notion of the atomised human actor who is responsible for her or his life chances and outcomes, the power of the market economy and competition in achieving the best outcomes for all and the withdrawal of the state from providing support services to the socioeconomically disadvantaged. The ideal subject, according to neoliberal principles, is self-regulated and takes responsibility for her or his own destiny. Individuals are expected and encouraged to be self-reflexive, or to view their lives as projects that require entrepreneurial investment of time and energy (Ventura 2012). Neoliberalism underpins many dimensions of sociological theorising in response to digital technologies, including sociologists' identification of the ways in which the surveillance and monitoring functions afforded by these technologies may be used in the interests of promoting self-management and competitive behaviours over state regulation and intervention.

Prosumption may also be theorised taking up Foucault's work on the practices of selfhood that make up human actors: those activities that are directed at self-care or self-improvement (Foucault 1988). Through these technologies, people learn about their environment and the other people with whom they share their lives. Indeed, it has been argued that social media platforms such as Instagram and Facebook encourage the production and circulation of greater intimate knowledge about and between participants than ever before. These technologies, via status updates and visual imagery, allow friends and family members who may not live in the same geographical area and who rarely meet face-to-face to engage regularly with each other across space and time. They construct a chronological account of various aspects of a person's life that they wish to share with friends or followers: in the terminology of Facebook, indeed, a 'timeline' combining words with photos or videos to present the user's persona. However, the regular and continued use of these technologies also demands a type of work – social labour – to conform to the demands of these media and those with whom users interact (Fuchs 2012; Lambert 2013; Marwick 2012; M. Sauter 2013).

Foucault's writings on the confession in his *History of Sexuality* (1979) have also been taken up to theorise the ways in which people configure and represent themselves on social media sites as part of ethical self-formation. It is argued that as part of the moral economy of many forms of social media, users of these media are incited to confess or reveal aspects of their private lives to other observers, who may choose to comment on or otherwise demonstrate approval or disapproval through such functions as 'liking' or sharing the content.

By both revealing the intimate details of their lives and responding to others' reactions, users may engage in self-reflection and self-improvement as well as participating in the evaluation of others' actions and practices. Such social media use may therefore be thought as an ethical and social practice that contributes not only to self-formation but the reproduction of social norms and expectations to which people are expected to adhere (Boellstorff 2013; Marwick 2012; T. Sauter 2013).

Theorists who have sought to position social media participation in the context of the global knowledge economy have contended that digital entrepreneurs and companies are able to sell more to consumers through the harnessing of the enthusiasms of consumer communities, the automating and mass dissemination of 'word of mouth' and the use of algorithms to make suggestions about future purchases based on past choices. The commodity is not only the item that is sold but information about the item and its consumers as well as the communities that form around consumption that themselves generate value by producing information and innovative ideas as well as generate experiences for the consumers involved that have value for them (Beer 2013a; Beer and Burrows 2013; Thrift 2005, 2006).

Cultural studies scholars such as Henry Jenkins and his collaborators (Ford *et al.* 2013) are interested in what they term 'spreadable media' or media produced digitally that circulate or 'spread' across multiple sites, platforms and cultures in messy and difficult to govern ways. They contend that users' choices about sharing digital content with others are reshaping the media landscape, representing a shift from distribution to circulation. Producers of content attempt to make their content in ways that will inspire users to share it with their friends or followers via social media. To achieve this, the content has to be meaningful in some way to the person who redistributes it, thus involving active participation and decision-making on their part (Ford *et al.* 2013). The term 'spreadable' is used to denote the properties of media content that render it more or less easy to share and distribute. It includes technical resources, economic structures, attributes of the content itself and the social networking devices and software that facilitate circulation. It differs from, although is related to, 'sticky' content or 'destination viewing' – content that is located in a specific media site to which the content producers attempt to attract audiences. 'Sticky' content becomes 'spreadable' when it moves from a static position on a media site to other destinations across the cultural landscape (Ford *et al.* 2013).

The concept of the sharing subject is central to spreadable media. The sharing subject seeks to recirculate content as part of their identity

and participation in social networks and communities, harbouring the belief that such sharing will have an impact on their networks and contribute to conversations (John 2013; Payne 2012). In ‘communicative capitalism’ (Payne 2012), media companies and corporations actively seek to monetise content sharing and circulation – to achieve ‘virality’ – and to direct this in ways that contribute financially to themselves but not to the creators of the content. The media industry quickly learned to co-opt the creative efforts of fans engaging in prosumption, for example, as part of their attempts to sell ever more products to these fans. Fans were manipulated into becoming the marketers for media products, helping to publicise them by their prosumption practices and their generation of metadata (Bird 2011).

Thus simultaneous discourses of participatory democracy (Beer 2009, 2013a) and (far less overt) that of capitalising upon and delimiting this freedom operate in many social media platforms. Critics contend that these technologies are one dimension of a vast network of systems of monitoring, measuring and regulating the population and subgroups within the population that direct attention at individual behaviours rather than social processes. Social media, for example, are often represented as promoting individual creativity and freedom via the opportunities they offer for prosumption. But there remain well-defined limits to how this creativity and freedom of expression are allowed to operate. Some writers draw on political economy perspectives to highlight the lack of access many people still face and the discrimination and exploitation that are inherent in many digital relationships and in the manufacture of the technologies themselves. Marxist thought lives on in several critiques of digital technologies, as particularly exemplified by the work of Fuchs and collaborators, who have written about the exploitation of prosumers on sites such as Facebook and also the poor working conditions faced by paid workers engaged by the computer hardware and internet empires (Fuchs 2011, 2012, 2014b; Fuchs and Dyer-Witheford 2013).

These commentators emphasise that many platforms that encourage prosumption practices are also attempting to monetise these activities in classical capitalist endeavours. Counter to the idealised notion of the sharing subject that can be creative and resistant to dominant discourses, industry has begun to use this ideal for its own ends. Differential power relations and exploitation, therefore, are reproduced on the internet just as they are in other social sites, challenging taken-for-granted assumptions about the ‘democratic’ nature of the internet. The interests of the corporate entities that established the Web 2.0 tools and platforms that encourage content creation and sharing often differ from those who are creating the content, who are

seeking democratic participation and support the ethos of sharing as a gift (John 2013). The ‘moral economy’ of content creation and sharing conflicts with the capitalist economy of those who seek to gain financially. Content producers and sharers are engaging in unpaid labour which, to them, has affective and moral value, the surplus value of which financially benefits others (Bird 2011; Ford *et al.* 2013; Fuchs 2012; Fuchs and Dyer-Witheford 2013; Lupton 2014a; Payne 2012). The terms of service of the platforms that prosumers use are more frequently making clear that the content they contribute to these platforms does not belong to them, but rather to the developers of the platforms (Lupton 2014a). People’s creative efforts, therefore, have become harnessed to the media and data industries, but many of them may not be fully aware of this, particularly if they do not closely read the terms and conditions of the platforms they use or if the platforms are vague about how they use the data that are uploaded by users.

THE IMPORTANCE OF THE ARCHIVE

The specific features of how digital data are produced and the ways in which these data are now archived are vital to how they are understood as new forms of social data. The internet is a living archive: it generates, stores, distributes and transmits data (Smith 2013). Online archives have become complex and self-referential, such that ‘There are archives on the Internet. There are archives of archives on the Internet. There are archives of the Internet. And then there is the Internet itself as an archive and as archival’ (Smith 2013: 383). Digital archives render digital data searchable and distributable, both essential features that contribute to their apparent value. Given that the current global information economy depends on these processes, questions arise concerning the politics of the knowledge kept in these archives, the politics of ownership and control of these data and the politics of the human, or the privacy rights and identities that may be challenged by the existence of these archives (Smith 2013).

Beer and Burrows (2013) identify four components of popular cultural digital data archives. These components include profiles, or the information that users enter about themselves to take part in online activities and linkages and data intersectionality, or the connections that are made between digital devices, sites or platforms, each containing data derived from different methods. Another component feature of digital data is metadata or tagging practices. The final component feature is that of play: the ludic dimensions of using digital media as part of popular culture that generates data. Beer and Burrows

then go on to outline a framework of four interrelated and overlapping types of digital archives related to popular culture in which these data are stored, based on the content. The first is that of transactional data, or data produced via the vast range of routine activities in which computer users engage online, whether using their own device or as part of a broader organisation's digital system. These data are produced via such activities taking place online as banking and purchasing, searches, customer loyalty programmes, ticket booking, interactions with government agencies and the like. Examples of these types of archives include Amazon, Spotify and iTunes. These archives contain both the cultural forms that are consumed and the data that users generate as part of their consumption (on their preferences, for example). Next, Beer and Burrows suggest the archive of the everyday, in which digital data about people's everyday activities, social relationships, likes, friends and followers are stored via such platforms as Twitter, Facebook, Tumblr, YouTube, Flickr and Instagram. The third type of digital archive they identify is that comprised of viewpoint or opinion commentaries, typically expressed on digital forums such as online news sites, blogs/micro-blogs and websites that specifically elicit users' opinions or ratings on goods, products, services or celebrities, such as Patient Opinion, Amazon and Trip Advisor and various websites that have been established for the fans of celebrities or sports teams. Finally, there is the crowdsourcing archive, created by users contributing data specifically to create new forms of knowledge via aggregates of data or to raise money for enterprises. Examples of this archive are Wikipedia, Kickstarter, Quora and PatientsLikeMe.

Many other digital data archives that are not directly related to popular culture exist, such as those generated by government agencies, educational institutions, healthcare services, security organisations and corporations. Many organisations are realising the value of digitising and archiving data. Census data, for example, is archived by the government agency that collects it. Increasing numbers of digital data sets are collected by educational institutions to monitor and track their students' progress by creating 'learning profiles'. Various healthcare agencies and services are attempting to bring together medically related digital data on the patients they treat, including electronic medical records. Museums and libraries are increasingly using digital methods to preserve material in their archives. Organisations such as the New York Philharmonic have created digital repositories for such material as programmes, scores, images, business documents and audio material. Universities use e-repositories to collect their researchers' output, and academic journals now publish their material online in searchable archives.

Much of this material remains accessible on the web, perhaps permanently, meaning that retrospective surveillance over a historical time period can easily be performed. What has been described as ‘the right to be forgotten’ has subsequently received much attention by media and legal researchers as part of the new legal specialisation of digital privacy rights (Rosen 2012). It has been argued, indeed, that we are now living in an era characterised by ‘the end of forgetting’, in which digital data linger indefinitely as forms of recording and archiving information (Bossewitch and Sinnreich 2013). Because they are machines, and not the fleshly brain-matter upon which traditional memory relies, digital technologies are viewed as providing more accurate records of events. Digital technologies act as ‘cognitive prostheses’, their records extending, enhancing and even replacing memories (Bossewitch and Sinnreich 2013: 226).

DIGITAL VEILLANCE

Another important theoretical perspective that is relevant to digital sociology is that offered by scholars contributing to the literature on veillance (watching) in contemporary societies. Due to digital and other surveillance technologies, the social sphere has become heavily mediated, with new technologies extending the field of vision in public space and opportunities for monitoring and recording the actions of individuals (Biressi and Nunn 2003; Bossewitch and Sinnreich 2013). Watching in everyday life, frequently undertaken using digital technologies, has become normalised as a life-practice, part of the constellation of the configuration of identity and embodiment (Ball 2014; Rosenzweig 2012).

It has been observed by many commentators that the vast masses of digital data that are generated by security technologies, devices and apps and stored on platform archives may be used for various forms of watching. The data that are collected when people use the internet, as well as the content that they upload and share with others as part of their prosumption practices, are subject to monitoring and oversight by various other actors, including digital developers and companies and one’s friends and followers on social media. Indeed, this type of monitoring and collection of data on the users of online technologies has become a central dimension of the digital information economy. Digital veillance is not only an apparatus of government security agencies, but is integral to the commercial economy and such institutions as healthcare, policing and the education system. Facilitated by the internet, a global surveillance economy and multifaceted

surveillant assemblage has developed, in which nations both collaborate in providing digital surveillance systems and advice and monitor each other using these systems (Ball and Murakami Wood 2013). The full extent of espionage activity that is undertaken using access to digital data has only recently been revealed by the Snowden files, which demonstrated that many nations are engaging in major, detailed digital surveillance of their own citizens.

Writers on the social, cultural and political dimensions of veillance have identified a number of different modes. In simple terms, surveillance denotes ‘watching over’, or ‘watching from above’, usually in relation to those in power watching over others (Mann and Ferenbok 2013). Digital surveillance is undertaken using technologies such as CCTV cameras, radio frequency identification chips (RFIDs) and the biometric monitoring that is undertaken by various agencies as part of security arrangements, as well as the surveillance practices carried out by commercial enterprises seeking to extract monetary value from digital data created by users. Sometimes people are aware that they are being watched using these technologies; sometimes such surveillance is covert. Digital surveillance may be coercive, used to punish or overtly discipline individuals or social groups, or it may be benign, a form of security or governance designed for efficiency and promoting economic growth or physical wellbeing.

Digital surveillance technologies differ from previous forms of watching in their pervasiveness, the scope of data they are able to collect and store, their potential longevity and the implications for privacy they evoke. These types of surveillance operate via digital recording of people’s activities, the storage of these data in archives and the use of algorithms to generate and manipulate the data and to make predictions about people’s behaviour. These surveillance data have a much longer life and capacity to be disseminated across time and space than previous forms of surveillance (Bossewitch and Sinnreich 2013; Mann and Ferenbok 2013; Werbin 2011).

Lyon and Bauman’s (2013) book on ‘liquid surveillance’ makes extensive reference to the ways in which digital data circulate as part of systems of veillance. Building on Bauman’s extensive writings on ‘liquid modernity’ and Lyon’s body of work on surveillance societies, this book emphasises that due to the new practices and technologies emerging in late modernity, surveillance has become uncontained and pervasive. Liquid surveillance is the apotheosis of the move towards monitoring and measuring humans and non-humans. The mobility and ubiquitous nature of new surveillance technologies (many of which are digital) mean that it has become increasingly difficult for people to know when they are being monitored. Surveillance, thus, is

‘seeping and spreading into many life areas where once it had only marginal sway’ (Lyon and Bauman 2013: 3).

Digital technologies have intensified or generated new forms of veillance. I referred earlier in this chapter to the term ‘surveillant assemblage’, which has been employed to describe the ways in which digital data are used to create ‘data doubles’ (Haggerty and Ericson 2000). The surveillant assemblage is configured via the production and aggregating of various forms of digital data, producing a new kind of assemblage that is constantly changing as more data are produced. Bodies and identities are fragmented into a series of discrete components as digital data and reassembled via this process of reconfiguration. This assemblage then becomes the target of various forms of intervention: greater security measures, increases or reductions in social security payments, medical therapies, educational interventions and so on. Groups that once were not subject to routine surveillance are now targeted by the dispersed liquid technologies of digital surveillance (Haggerty and Ericson 2000).

Foucault’s writings have been very influential in writings on veillance, including those referring to digital devices. His work on biopolitics and biopower in particular has delineated the forms of watching and exclusion that involve the detailed monitoring of both individuals and populations. Foucault’s writings on governmentality, or the managing of populations by specific political rationalities, have also been taken up by scholars writing about forms of veillance that are used for such management. The influential concept of panoptic surveillance (Brignall 2002; Elmer 2003) draws on Foucault’s use of the metaphor of the panopticon in his *Discipline and Punish* (1995), itself derived from the writings of the English philosopher Jeremy Bentham. Panoptic surveillance is a feature of non-coercive disciplinary power involving the few watching the many. The panopticon is an exemplary prison in which a small number of prison guards watch a large number of prisoners from a central hidden position. The idea of this concept of watching is that because the prisoners are never able to tell when they are being watched, they learn to engage in self-discipline, internalising the guards’ regulatory gaze. The concept of CCTV cameras as a security measure relies to some extent upon this assumption: we are never quite sure if an operator is monitoring the images produced by the cameras, or even if they are actually turned on, so we may modify our behaviour accordingly.

Panoptic surveillance contributes to a politics of exclusion and inclusion that continues to operate in relation to the field of public visibility configured through and with digital surveillance technologies. People from specific social groups that are categorised as

the undesirable Other by virtue of their race, ethnicity or nationality, age or social class are subjected to far more intensive monitoring, identification as ‘dangerous’ or ‘risky’, and exclusion on the basis of these factors than are those from privileged social groups (Biressi and Nunn 2003; Werbin 2011). The term ban-optic surveillance (a variation of panoptic surveillance) has been employed to more specifically describe the use of data to ban or exclude certain individuals and social groups from particular regions, countries or public spaces, or from access to employment, social services, insurance and so on (Ajana 2013; Pavone and Esposti 2012; Sutrop and Laas-Mikko 2012).

Panspectric veillance (also sometimes referred to as dataveillance) refers to a broader range of digital technologies and uses of data. The panspectron is a concept developed by DeLanda (1991), again in response to the concept of the panopticon. DeLanda contrasted the panspectron with the panopticon, noting that the latter relies on human senses (mainly vision), while the former uses mostly digital sensors and signals to create large data sets for veillance purposes. DeLanda was writing almost twenty-five years ago, when the use of personal computer technologies was in its infancy, the internet was not available for widespread access and social media had yet to be invented. A more recent application of his concept of panspectric veillance notes its relevance to contemporary business practices involving the generation and use of large digital data sets about consumer behaviour. This generation of data also often involves the use of RFID chips embedded in consumer products to trace their distribution and consumers’ buying patterns (Palmås 2011).

It is here that big data, algorithms and predictive analytics are playing important roles. Given these developments in the use of digital data, I would argue that yet another form of veillance using digital technologies has developed that is used increasingly more often as part of dataveillance and ban-optic surveillance: that of algorithmic veillance. The algorithms used to make decisions and predictions about the value of some consumers compared with others, based on their digital consumption activities, or even in some cases about the threat they may pose to others (as in identifying potential terrorists, criminals or illegal immigrants), act to exclude some individuals at the same time as they privilege and work to include others (Crawford and Schultz 2014; Lyon and Bauman 2013).

The practices of *sousveillance* (literally meaning ‘watching from below’) have also been promoted by the emergence of digital technologies that provide ordinary people with the means to watch others. *Sousveillance* involves citizens not only watching each other but also

conducting surveillance of those in authority. Many people now have access to devices such as smartphones, wearable computing (like Google Glass) and sensor-embedded technologies to capture images or information for their own use. It is often used in relation to citizen participation, citizen journalism and political transparency, as it is argued that the democratisation of surveillance has the effect of empowering citizens to watch and report on abuses of power on the part of the powerful (Ganascia 2010; Kingsley 2008; Mann and Ferenbok 2013).

Some writers have used the term *synoptic veillance* (Doyle 2011), the inverse of *panoptic veillance*, to describe social and other forms of watching which involve the many watching the few. This takes place in relation to fandom cultures, for example, in which celebrities post content on social media that is viewed and followed by many others. It also occurs when material that individuals who are non-celebrities have uploaded to social media sites such as YouTube 'goes viral', or attracts many viewers or followers. More specifically, a further new concept of veillance, *social surveillance* (Marwick 2012), has been employed to describe the interactive watching of each other that takes place on social media sites. Social surveillance may be viewed as one form of *participatory veillance*, which involves the voluntary engagement in watching or being watched by others. Participatory veillance is a feature of signing up to use social media platforms, when people consent to their data being collected as part of the conditions of their use of these sites, or other technologies, such as customer loyalty schemes (enshrined in such features as 'terms and conditions' and 'privacy policy' that are included on digital sites or agreement to the acceptance of 'cookies') (Best 2010; Lupton 2014a). It also takes place when people engage in self-monitoring practices of their bodies or everyday habits (Lupton 2012) or share their geo-location details with others (Hjorth and Pink 2014).

Another form of veillance, dubbed *uberveillance*, is also often participatory, but can be used for imposed, covert or coercive surveillance measures that may challenge people's rights to privacy. This term has been invented to denote, in particular, the use of tracking technologies that can be inserted within or worn upon the body. These include wearable computing used for monitoring biometric data and identifying spatial location, as well as RFID chips. RFID chips are being used increasingly in such technologies as electronic passports, credit and debit cards, motor vehicle driving monitoring systems and medical technologies such as heart pace-makers and prosthetic knees to assist with post-operation analytics and for monitoring patients with dementia. These devices can be used to track individuals'

movements and activities in real time. Many users of such technologies are unaware of the capacity of the digital signals they emit to identify their geo-location and the ways in which these data may be used for surveillance purposes (Michael and Clarke 2013; Michael and Michael 2013).

THEORISING DIGITISED EMBODIMENT

From the perspective of the sociomaterial approach, the ways in which nonhuman actors interact with humans are a central topic of understanding social life, subjectivity and embodiment. This approach moves away from a focus on the discursive that had dominated social and cultural theory for some time, to addressing the material dimensions of social relations and human experience. So, too, the sociology of the body that was a dominant interest of scholars at the end of the last century has engendered a greater awareness of human embodiment and interembodiment: the fleshly dimensions of human subjects and their interactions with others' bodies and with objects.

Theories of material cultures and consumption in anthropology and cultural studies are also enlightening to understand the ways in which the new digital media are 'appropriated' or 'domesticated' into everyday practices and routines (Hartmann 2013). Scholars who are interested in material culture focus their attention on the ways in which material artefacts are invested with social, cultural and personal meaning when they are manufactured and used as part of everyday life. They contend that study of such things is vital to understanding both the ways in which cultures are enacted and reproduced and the significance that objects have in specific cultural contexts. Many digital anthropologists are associated with this approach (Miller and Horst 2012). Writers in cultural and media studies have focused attention for some decades now on the ways in which people engage with and use media as part of their everyday routines in the home and at work, including digital devices (Lupton and Noble 2002; Richardson 2009; Salovaara *et al.* 2011). The concept of appropriation refers to the incorporation of objects into habitual practices, while that of domestication relates to the ways in which objects are altered in some way via these routine practices.

Importantly, this research emphasises the active participation of individuals in taking up media. It goes beyond the prosumption perspective by contending that *all* consumption involves some kind of work on the part of the user when they are incorporating an object into their everyday routines. It focuses on the enabling and constraining

dimensions of the use of objects and how objects shape or discipline users just as users reconfigure objects. From this perspective, consumption is viewed broadly as the interaction of human bodies with objects in specific contexts and spaces. People consume objects by incorporating and domesticating them, bringing them into their everyday worlds, melding them to their bodies/selves and bestowing these objects with their own biographically specific meanings. They become 'territories of the self', marked by individual use, and therefore redolent of personal histories (Nippert-Eng 1996). This concept of territories of the self acknowledges that bodies and selves are not contained within the fleshly envelope of the individual body, but extend beyond this into space and connect and interconnect with other bodies and objects. These processes are inevitably relational because they involve embodied interactions and affective responses at both the conscious and unconscious levels.

The period spanning the two decades from the early 1980s to the first few years of the twenty-first century was the era of 'the cyber' in social, cultural and political theory and research. During this cyber era, frequent references were made not only to the cyborg but also to cyberspace, cyberfeminism, cybercultures, cybercrime, cyber-racism, postcolonial cyborgs, cyberpunk, cyber-queer, cyber-bullying and so on. Cyberspace was portrayed as a virtual, non-physical network in which users interacted with each other by employing computer technologies. The term at first tended to suggest an experience that was disembodied, comprised of one's digital avatar moving through another world that was entirely separate and different from that of the material world. The term 'virtual reality' also signified an experience that was different from material reality, not quite real.

Despite the cultural currency of all things cyber late last century, it is clear that these terms and their accompanying theoretical insights have lost momentum, and now have 'almost an antique feel' (Bell 2007: 2). These days, referring to cyberspace seems inappropriate, old-fashioned and clunky, too closely tied to the imaginaries of science fiction and failing to recognise the ordinary and taken-for-granted nature of computer technologies. The terms 'posthuman' and 'transhuman' also circulated in earlier writing on technocultures, and continue to be frequently used in the literature on the human-technology encounters. Yet these terms too fail to recognise the routine incorporation of new digital technologies into everyday lives. To be human, as I argued in Chapter 1, means for many the use of digital technologies on a regular basis. More contemporary terms focus on the technical features or capabilities of the technologies rather than attempting to position these technologies as somehow offering an alternative world separate from a

more ‘real’ experience (Paasonen 2009). There is no need to jettison cyber theory altogether, however. Indeed, I would assert that there is significant value and scope in revisiting cyborg theory in the light of new technologies that have become so seamlessly incorporated and domesticated into everyday life.

The technoscience feminist scholar Donna Haraway’s seminal writings on the cyborg remain important in conceptualising the ontology and politics of human–digital encounters. Her essay ‘Manifesto for cyborgs’ (Haraway 1985) is one of the most influential pieces of writing in cyberculture studies. In this work, Haraway argues that there are two types of cyborg that operate at different ontological levels. One type is the material cyborg that is configured via the military–industrial–entertainment complex. In the 1980s, when Haraway was writing, this was the cyborg of science–fiction films, the warrior macho human–machine or the medicalised body that is normalised by technologies and earns profits for pharmaceutical and medical device companies. This literal cyborg continues to exist and has become increasingly digitised in the context of mobile and wearable digital devices.

The second type of cyborg identified by Haraway, and the one that represents her substantial contribution to the theoretical literature on technocultures, is that of the metaphorical or ontological cyborg. The cyborg is a figure that challenges assumptions and binaries, that is politically disruptive, progressive and oppositional in its hybridity and liminality. It is this cyborg as metaphor that Haraway seeks to take up and use to support her theorising of the interrelationship of humans and nonhumans. Haraway adopts a strongly relative sociomaterial perspective on human actors as they interact with other actors, both living (such as animals) and non-living. In her concept of the cyborg she is trying to express the broader idea that no human bodies/selves are stable or natural. Rather, we are multiple bodies and multiple selves, depending on the context in which we find ourselves and the other bodies and nonhuman entities with which we interact.

The material cyborg is only one such assemblage that may be configured. For Haraway, therefore, the cyborg represents the actor–network assemblage both literally and metaphorically (and, indeed, she acknowledges the influence of Latour in developing her ideas; see Penley *et al.* 1991). In an article published in 2012, Haraway notes that she no longer views cyborgs as machine–organism hybrids ‘or indeed hybrids at all’, but rather as ‘imploded entities, dense material semiotic “things” – articulated string figures of ontologically heterogeneous, historically situated, materially rich, virally proliferating relatings of particular sorts’ (Haraway 2012: 301). Haraway’s reference to ‘string

figures' relates to the cat's cradle game, played using string manipulated on the hands to produce complicated patterns, and which can be swapped from one pair of hands to another as part of sharing the creation. She employs this metaphor in her later work as a means of emphasising the intertwinings, complicated patternings, knottings, webbings and collaborations of technoscience and the bodily assemblages it configures.

The metaphor of entanglement is now frequently adopted in sociomaterial writings. Like Haraway's cat's cradle metaphor, the entanglement metaphor emphasises the inextricably intertwined relationship of human subjects with material objects. However, the entanglement metaphor, more than that of the cat's cradle, bespeaks messiness, occasional chaos, disorder. Unlike the cat's cradle, which is highly ordered and patterned, entanglements may be completely spontaneous and unanticipated and therefore unpredictable in their forms and consequences. Unlike metaphors such as 'cloud computing', which tend to represent digital technologies as seamless, stable and pure, the entanglement metaphor acknowledges the heterogeneity and instability of technological agents' interactions with human actors (Shepard 2013).

This chapter has covered an extensive theoretical ground. All of the approaches and perspectives I have discussed have much to offer a sociocultural analysis of the politics of digital technologies; new forms of knowledge formation and power relations in digital society; the various ways in which digitalveillance operates; and how computer software and hardware act to configure subjectivity, embodiment and social relations. In the next chapter I discuss research methods, but do so in a way that also incorporates social theory. A body of literature in sociology has developed that has begun to theorise methods of research, thus breaking down the traditional distinctions between theory and method. As this chapter shows, the scholars who have contributed to this literature offer a way forward for both conceptualising and undertaking digital sociology research.

Reconceptualising research in the digital era

This chapter focuses on sociological and other social research in the digital era. The aim of the discussion is not to outline how to do digital research in detail (there are several fine introductory handbooks available for these purposes). Rather I present an overview not only of some of the approaches that are available and their possibilities and limitations, but also of the more theoretical and critical stances that sociologists are taking to digital social research. I also devote attention to innovative ways of performing digital social research that are part of attempts to invigorate sociological research practice as a way of demonstrating the new and exciting directions in which sociology can extend in response to digital society.

DIGITAL SOCIAL RESEARCH METHODS

Before detailing the ways in which digital social research may be undertaken, it is important to provide the context for debates about how research practices relate to the future direction of sociology. One of the main contentions of several sociologists writing on digital sociology is that sociologists in general should develop new ways of 'doing sociology' in response to the digital age, particularly if practitioners of

the discipline are to retain their pre-eminent position as experts in social research. This is not to contend that older-style social research methods should necessarily be discarded in favour of those using new digitised approaches. Sociologists should both investigate the various approaches that can be adopted to undertake digital social research and continue to interrogate these approaches themselves for how they shape and interpret the data they produce. These debates confront broader questions about the nature of the discipline itself, including the future of sociological research and theorising in the digital era.

As I briefly outlined in Chapter 1, there are various ways of approaching researching digital society. In the past sociologists and other researchers have employed both qualitative and quantitative methods to investigate how people are using digital technologies. Quantitative methods have included surveys asking people what technologies they use and why, and discerning differences between social groups. Qualitative approaches have employed one-to-one interviews or focus groups to promote more detailed discussion, while ethnographic techniques involve the researcher making observations of how people interact with digital technologies, often in specific sites that are defined by geographical locations.

These time-honoured approaches to social research are still valuable ways of enquiring into the nature of digital society and its implications for self-identity, embodiment, everyday life, group membership, social institutions and social inequality, all traditional questions of interest for sociologists and other social researchers. There are many different ways in which digital devices and platforms can be used for social research, both to generate and record data. Even the older-style methods of research have themselves become digitised. Social surveys are now often completed on computers and the data automatically entered into a database, and paper surveys are digitised when the data are eventually entered into a computerised system for analysis. Online surveys are now used increasingly by both academic and commercial social researchers. They are attractive options as they are able to attract very large numbers of respondents at little expense, and can reach respondents who might otherwise be difficult to access.

Qualitative research methods can also be conducted using online tools and digital devices. One-to-one interviews are now usually conducted using digital sound recorders and the resultant data analysed using computerised methods. Specialised software is now available not only for analysing and coding verbal transcripts but also images-based material, such as videos. Such techniques as video-conferencing, Skype, chat rooms, internet discussion groups and social media platforms can be employed as ways of conducting interviews or group

discussions. Field notes may be recorded using mobile digital devices such as tablet computers, note-taking software or voice-recording functions on smartphones. Digital tools such as cameras, video recorders and geo-location devices can be employed as part of ethnographic fieldwork and research participants' own collection of data.

Unlike forms of social research that require the intervention of researchers to collect the data they want to analyse from their respondents, the vast bulk of digital data is generated unobtrusively, as part of other routine activities. These include moving around in public space, making telephone calls, sending emails, browsing the web, using search engines, engaging with government services, purchasing goods online or using customer loyalty schemes, all of which produce digital data on users' activities, as well as more deliberate content-generation practices, such as blogging and uploading status updates, images, likes, tweets and retweets or comments to social media platforms and so on. These masses of aggregated, quantifiable digital data that are generated as an outcome of internet use are variously referred to as transactional, trace, by-product or big data.

As outlined in Chapter 2, another more analytical term that has begun to be employed by digital social researchers is that of 'digital data objects'. Rogers (2013) makes the case for drawing a distinction between 'digitised data objects' and 'natively digital data objects'. The former relates to material that was in a pre-existing analogue form and then has become digitised ('migrated to the web', as Rogers puts it). This includes images, films, audio recordings, documents, books or artefacts that have been scanned, re-recorded or photographed to make new digital versions that can be uploaded to websites such as online museum displays or historical archives. People working in the digital humanities have devoted a great deal of time to digitising such materials. Natively digital data objects are produced from properties of the web formulated for specific purposes as part of its operation ('born in the web'). They are attractive to digital social researchers because they appear to offer a truthfulness and validity that researcher-generated data do not. They provide a window into social practices and identities that take place when people are not consciously aware that they are being surveyed, interviewed or otherwise canvassed for their opinion.

Ways of accessing data archives and the skills to analyse the data stored therein are key methodological issues for researchers who wish to use them. For sociologists, these digital data objects pose a number of questions and challenges. The quantity of such digital data that are available and their continual, unrelenting production are unique features that hitherto have not been encountered by sociologists and

other social researchers. The scale of these data offers great opportunities but it can also be daunting, raising questions about how to delimit the field of research.

I referred in Chapter 1 to the argument put forward by some that empirical sociology is facing a crisis of legitimacy and claims to exclusiveness in the face of widespread access to massive digital data sets and tools to analyse these data on the part of a range of actors, from government organisations and security agencies such as the NSA, to commercial enterprises, to digital technology users themselves. It has been contended by a number of sociologists that, as a consequence, the position of sociologists as pre-eminent empirical researchers – skilled collectors, analysers and interpreters of social data – has been subjected to major challenges (Savage 2013; Savage and Burrows 2007, 2009). Social research in any context is a ‘shared accomplishment’ rather than the sole endeavour of the researcher, including not only human actors but the technologies involved (Marres 2012: 140). This has become even more the case in relation to digitally enacted social research. Other researchers and organisations outside the university have always been involved in social research. With the advent of big data, however, social research has been redistributed across a wider range of entities capable of conducting such research, as well as across a diverse array of methods and devices (Marres 2012; Marres and Weltevrede 2013; Ruppert 2013; Ruppert *et al.* 2013).

Not only are sociologists faced by the fact that other actors or agencies can make use of digital data objects and thus jostle for position with sociologists as social research experts; they may also experience difficulties in grappling with the computing skills required by large digital data sets. A small group of social scientists are highly skilled at quantitative digital data analysis and are able to engage in the types of computer coding and software use required to better access and analyse digital data. Computational social scientists have for some years engaged in various forms of computer-based research using quantifiable data. Their approaches are influenced by network science techniques drawn from computing science, social network researchers, webometrics (the use of statistical techniques to identify characteristics of websites and platforms) and quantitative methods in media and communication studies (for an overview of the methods they adopt, see Ackland 2013).

Despite its title, computational social science is not an approach that is common in the academic social sciences but is instead employed in corporate environments and government agencies. Some sociologists are proficient in these approaches, but they are few. Indeed several commentators have contended that sociologists and other social

researchers may experience a digital analysis divide, in which only a small number may have the tools and experience to easily engage in digital media analysis while the vast majority will not (Mahrt and Scharrow 2013; Manovich 2012; Savage and Burrows 2007). The more sophisticated uses of digital data for which there are not ready-made and accessible tools may require sociologists to acquire expertise in computing or to collaborate with computer scientists or digital tool developers in research (Aslinger and Huntemann 2013; Bruns 2013; Halford *et al.* 2013; Marres 2012; Marres and Weltevrede 2013).

TOWARDS A LIVE SOCIOLOGY

This emphasis on the need for computing skills, however, is only one small dimension of rethinking how sociology should move forward in the context of digital society. A new way of conceptualising how the discipline should be defined and what its practitioners should attempt to achieve has been called for by some sociologists. These arguments often refer to the need to incorporate digital technologies into sociological practice in innovative and inventive ways, both as the objects and conduits of enquiry. Several sociologists have contended that if social, economic and political lives have become increasingly experienced in and through digital technologies, if we are to 'know these lives' we must rethink sociological practice (Ruppert *et al.* 2013: 24).

These new ways of doing sociology may not necessarily involve highly technical data science or coding literacy, but they do incorporate various types of digital technologies to generate, analyse and visualise social data. Older social research methods require reassessment in the context of the opportunities offered by natively digital data objects and the devices that can be used to configure, analyse and visualise them. For Latour and colleagues (2012), the data generated by users' interactions with digital technologies provide the opportunity for nothing less than the opportunity to rethink social theory. They assert that in the age of the digital, where information about people can be found on search engines, actors have become defined by their digital networks: 'the more you wish to pinpoint an *actor*, the more you have to deploy its *actor-network*' (Latour *et al.* 2012: 592; emphasis in the original).

This reconsideration of what social researchers should attempt to achieve and the methods and objects that they employ is an element of a trend in sociological writing that is beginning to critically examine the status of contemporary sociology. Back and Puwar (Back 2012; Back and Puwar 2012) call for a 'live sociology' to deal with 'lively

data’ – creative, imaginative, playful and new ways of performing sociology that are also public and critical. Rather than being inhibited by the alternative forms of social research now available to many actors other than sociologists, Back and Puwar argue for the challenge of inventing new methods of research, new sociological devices. Back defines ‘dead sociology’ as that which tends to render the data it analyses (quantitative or qualitative) as lifeless, not recognising the vitality inherent within them. It also tends to employ ‘zombie concepts’ drawn from ‘old sociology’ that do not fit well the current state of the dynamic, fluid social world. Importantly for the topic of this book, Back argues that dead sociology fails to come to terms with the digitised nature of social life, expressed in a kind of technophobia expressed by sociologists for learning about or using new digital media as well as a failure to conduct research into digital technologies. A final aspect of dead sociology he identifies is its parochial nature, its failure to recognise the globalised, dispersed nature of social relations and institutions (a phenomenon that again is implicated in the emergence of digital society).

Here, then, is a vision of a different kind of sociological sensibility, one that retains the sociological imagination and reflexivity of previous approaches but which incorporates new modes of practice, or what Back and Puwar (2012) refer to as ‘sociological craft’. They define live methods for sociology as incorporating a number of dimensions or approaches, including new tools for ‘real-time’ and ‘live’ investigation as parts of social research (particularly those that can harvest and analyse digital transactional data), but also retaining a longer view of the historical context of these data and their futures. This is where digital technologies can be employed as part of the practice or craft of live sociology.

Dave Beer (2014), for his part, has invented the term ‘punk sociology’ to similarly encapsulate his contentions that sociology needs to avoid becoming moribund and that sociologists should actively take up the challenge to consider new approaches. In Beer’s formulation, punk sociology looks outward, is subversive and willing to try new approaches, and also is ready to engage with alternative forms of knowledge outside sociology. It means investigating forms of research and representations of social life that are beyond the textual, such as audio-visual material, and, as Beer (2014: 38) puts it, coaching ‘ourselves to see sociology in sources where we may not be expecting to see it’. It also includes working with, rather than on, participants in sociological research, and experimenting with different approaches to writing about one’s work: blogging, podcasts, YouTube videos and tweets, for example. Beer asserts that sociology needs to be reactive,

energetic and nimble and even confronting like the original punk musicians were, in response to the social changes that are continually occurring and new forms of social research that are emerging (particularly those related to digital media and digital data). He encourages sociologists to take courage in conveying ideas that may still be raw and engaging with others' responses to them, a practice that social media avenues encourage.

THEORISING METHODS

Another important move in sociology and other social theory is the developing literature that examines the ways in which social research methods are themselves socially configured objects. This approach to research methods moves away from the traditional division between 'theory' and 'methods' by, in effect, theorising methods. It includes not only interrogating the research practices or methods that are employed but also seeing the objects that are used as part of sociological craft as actors, shaping how sociologists conduct their research. From this perspective, social research methods both produce and are configured by the social world: they are both material and social (Law and Ruppert 2013; Lury and Wakeford 2012b).

The term 'methodological devices' is frequently used in this literature to denote the material objects and immaterial ideas that come together to configure ways of conducting social research. This discursive use of 'devices' is not to be confused with my more general use of the term in relation to digital devices: that is, computer hardware such as desktop computers, tablets, smartphones, MP3 players, wearable computers and so on. The term 'device' in this literature rather acknowledges the relationship between method and object: that they are linked together and constitute each other (Law and Ruppert 2013; Lury and Wakeford 2012a; Ruppert *et al.* 2013). Methodological devices, like other devices, 'do things' (Law and Ruppert 2013: 229). It is emphasised by these sociologists that social research methods are not only themselves sociocultural artefacts but also work to 'make up' and may profoundly influence the phenomena they set out to study: 'Possessed of a double social life, they are shaped *by* the social, and in turn they act as social operators to *do* the social' (Law and Ruppert 2013: 233; emphasis in the original).

From this perspective, a methodological device can be viewed as an assemblage of material artefacts, human users, practices, ideas and spaces that is constantly subject to change. Such devices are not only methods for research, but also themselves may be viewed as objects of

analysis. It is therefore difficult to disentangle the distinctions between object, subject and technique of research. The focus of enquiry into methodological devices is not simply how appropriate, accurate or ethical they are for various purposes, but rather their potentialities, capacities and limitations, how they configure the objects they are attempting to study and measure and how they serve political purposes. Social research methods are themselves assemblages even as they work to configure other types of assemblages: it is in this sense that they may be said to possess a 'social life' (Savage 2013), and even histories and biographies, of their own.

So, too, when sociologists and other social researchers enact research, they are entering into assemblages of human, methodological research devices and data that shift and move as the conditions under which research takes place change. These research assemblages in turn produce research object assemblages. These different assemblages are configured and interrelate with each other: social research assemblages, social researcher assemblages and research object assemblages.

In relation to research using digital technologies and digital data, how digital data objects are identified, formatted and analysed using the various techniques that are available to social (and other) researchers becomes an interesting research question in itself. When applied to digital sociology, this debate centres not simply on 'how to do research' but on the very nature of the generation of knowledge and information as this is performed on the web (Rogers 2013). When analytic formats and categories are already formed by the available digital data analysis tools, these formats and categories may themselves become a subject for research (Marres and Weltevrede 2013; Postill and Pink 2012; Rogers 2013). As scholars writing in software studies have contended, the software that structures the working of digital objects has its own politics (Fuller 2008; Kitchin and Dodge 2011; Manovich 2013a). These objects (including digital hardware and software) are not always predictable, manageable or orderly. They have a structuring and shaping effect on what data are able to be collected, what data are considered important and what data can be stored for analysis.

Thus, for example, search engines possess what Rogers (2013: 19) refers to as 'algorithmic authority' and act as 'socio-epistemological machines': they exert power over what sources are considered important and relevant. From this perspective, the results that come from search engine queries are viewed not solely as 'information', but also as social data that are indicative of power relations. These investigations can reveal how topics, events, organisations and individuals achieve prominence in public debates and framings of some issues over others

and how social relationships and power relationships are constituted and maintained.

The digital data object as a research object assemblage can also become the focus of social analysis. Langois and Elmer (2013) argue that the digital data object is comprised of three distinct characteristics. As a media object it is comprised of a semantic layer (drawn from content such as images or texts posted on platforms). As a network object, it connects to other media objects and their networks. Finally, as a phatic object, it establishes specific types of presence and relation between users, by demonstrating users' preferences, tastes and opinions (for example, through their use of the Facebook 'like' button, the content of Pinterest boards that they construct or their choice of links that they share on Twitter). All three of these elements of the digital object work together to configure its meaning and all three can be analysed by researchers interested in their social effects.

CREATIVE WAYS OF DOING DIGITAL SOCIAL RESEARCH

Digital methods of research may bring together multiple forms of data derived from different sources, overlaying them or juxtaposing them in efforts to create knowledges and understandings (Mackenzie and McNally 2013). Sensor-based devices and visualisation tools, for example, can be combined with other forms of qualitative data elicitation, such as interviews and ethnographic observations, to produce rich portraits of social lives.

Ethnographic research, particularly as undertaken by anthropologists, has contributed major insights into how people in various cultural and geographical locations use digital technologies. However, the very ubiquity and dispersal of new digital devices have challenged traditional notions of ethnographic research. Given the dispersal of the internet across many different types of device, platform and tool, and the complex relationship between 'the online' and 'the offline' worlds, the notion of undertaking fieldwork as a participant observer in a specific and well-defined 'field site' has become problematised. The ethnographic field of the digital is a messy and constantly changing site of research, involving intersections and collaborations between the different technologies and human actors involved. The internet is not just one thing; it is many, used in different combinations by different people for different purposes in specific cultural and geographical contexts (Miller 2011; Miller and Horst 2012; Postill and Pink 2012).

Digital anthropologists have begun to grapple with these complexities and are able to offer insights that are useful for other social

researchers. For example, Sarah Pink (2009) has developed the concept of the 'ethnographic place' which need not necessarily be only or solely a material space, a bounded locality, but rather a collection of interrelated objects, people and places that are drawn together for the purposes of the researcher. Adopting this approach, the digital technology use of a group, including their activities both online and offline (where distinctions between the two can easily become blurred) and the interactions between these worlds, can be conceptualised as the (digital) ethnographic place of investigation. It incorporates the understanding that the site of research is not static but rather dynamic, constantly changing. There is also the recognition that ethnographers themselves are participating in the configuration of this ethnographic place by following the social media posts and updates of participants, sometimes by contributing to them and by recording or archiving them (Postill and Pink 2012).

Developing techniques for the analysis of digital visual images and the use of digital visualising tools for sociological research is also important. The sub-discipline of visual sociology includes elements of the creative representation and documenting of social issues and problems as well as the interpretation of these images as parts of sociological analysis. Traditionally using images drawn from photography and videos, as well as artwork, visual sociology lends itself to digitised imaging technologies (Graham *et al.* 2011; Lapenta 2011). Visual sociology seeks to identify the implications of these technologies and to use them productively to analyse the contemporary social world.

New digital visual technologies act in various ways that are integral to and have profound effects on social life, social institutions and social relations. They participate in the management and creation of personal social space and in achieving and comprising connections between people, spaces and objects (Graham *et al.* 2011). Digital media technologies constitute new kinds of visual production and audiences for these productions online, ranging from the highly intimate to the highly public. Mobile and wearable devices, such as smartphones and tablets, and platforms, such as Flickr, YouTube, Facebook and Twitter, facilitate constant visual documentation of one's own life and the sharing of this material to a worldwide audience. Location-based and spatial mapping technologies ('geomedia'), such as Google Earth, and digital games rely on sophisticated imaging, while digital editing software affords the creation and manipulation of a wide variety of images (Lapenta 2011). These devices, which 'constitute new epistemologies of space, place and information' (Lapenta 2011: 2), provide fertile opportunities for sociologists to engage in ethnographic and participant observation research using a wealth of visual images. As Les Back

puts it, their use involves not so much a sociology ‘of’ but a sociology ‘with’ (Back 2012: 33).

Tracking and mapping devices have been used as part of artistic works to create new visualisations of cities. In the Amsterdam Real-Time project, conducted in 2002, 60 volunteers moving around the city carried a GPS-enabled device for a week. Their data were used to plot their individual movements together with those of the other volunteers to produce a visual map of how they encountered space in the city of Amsterdam. These people’s movements produced a new map of the city, one that displayed the everyday use of space. The GPS devices thus enable artistic and imaginative expression, serving to visually display everyday practices and use of space as part of quotidian routines and relationships, producing ‘personal portraits’ of spaces such as cities (Pinder 2013).

The practice of ethno-mining combines quantitative digital data with situated and rich ethnographic research that is able to provide a sociocultural context for the data (Aipperspach *et al.* 2006; Anderson *et al.* 2009; Boase 2013). It is an approach that developed from the use of sensor-based technologies that could automatically track people’s movements as part of projects by researchers in the field of human–computer interaction. Anthropologists have since taken up the approach to conduct ethnographic research informed by digital data derived from sensors and other technologies. In a series of projects by anthropologists working for Intel addressing computer use and temporality, the participants’ time spent on their digital devices and their geo-locative data derived from their mobile phones were tracked and visualised using digital graphic tools. The visualisations were shown to the study participants, who collaborated with the researchers to produce interpretations of what the data were demonstrating about their habits of use of digital devices (Anderson *et al.* 2009).

In another ethno-mining study, participants in four households and their laptop computers were outfitted with a location-tracking tag and software was installed on each computer to log keyboard and mouse activity, application use and power status. Qualitative data were collected via interviews and observations of the participants’ behaviour in their homes, both focusing on where people spent time in this space in relation to the use of their laptops. The quantitative data that were collected were processed using an algorithm that was developed from the researchers’ ethnographic observations of and interviews with the participants, while the data generated by the sensor-based and automatic logging technologies contributed insights to the ethnographic data. The researchers developed graphic maps showing the participants’ customary movements around their homes

in relation to their laptop use, and again used these visualisations to prompt further discussions with the participants (Aipperspach *et al.* 2006).

In Back's writing on live sociology he highlights the importance of moving in space as a researcher, documenting not only what people say about their experiences and thoughts but also the material dimensions of their lived environments: the sensations and emotions that are produced through these environments and experiences (Back 2012; Back and Puwar 2012). His Live Sociology project trained researchers in the use of digital technologies, including using these technologies for collecting, analysing, archiving and curating ethnographic social research. Research participants were involved as co-collaborators in these processes to promote a diversity of sociological vantage points. The research trainees were asked to walk around with digital cameras and audio recorders to conduct listening experiments of local phenomena (Back 2012). One of Back's current projects is *Every Minute of Every Day* (2013), an experiment in real-time ethnography which uses digital technologies to record sound and images as well as written texts to document the relationship of local communities with hospices located in their areas. The local residents as research co-collaborators used these technologies to create their own data as contributions to the project.

Artists, designers and sociologists can work together to engage in creative forms of social research, addressing digital technology use or using digital devices to research other aspects of social life. In an example of playful and provocative social research, a research team comprised of designers used objects they entitled 'Domestic Probes' to explore the possible new roles of technology in the home (Boehner *et al.* 2012). Participants in the research were given packets containing the following probes:

- a 'dream recorder' (a repackaged digital memo-taker that allowed participants to record details of a vivid dream for ten seconds);
- a 'listening glass' (a drinking glass packaged with instructions for participants to use it to amplify interesting sounds they noticed in their homes and then to write on it what they had heard);
- a 'bathroom pad' (a paper notepad with about 20 pages, each one featuring a short news item to which participants were invited to respond in writing on the page);
- a disposable camera with a list of instructions for participants to take images around their homes;
- a piece of paper with a grid pattern, intended for participants to draw floor plans of their homes;

- a ‘friends and family map’ (a piece of paper upon which participants were requested to draw a map of their closest social ties);
- pieces of paper upon which participants were asked to write down their household rules;
- a large sheet of photographic paper with instructions asking participants to place household objects on it and make a collage of their shapes;
- a pinhole camera to take an image of ‘an interesting view’ from the home;
- a telephone jotter pad with various questions printed on it for participants to respond to in words or drawings; and
- a visitor pad with space for visitors to the home to record comments about their visits.

The participants were asked to keep these items for a while in their homes and to respond to them as and when they felt like it. After about a month, the researchers returned to their homes and collected the probes. They used the participants’ responses in developing prototypes for new household objects and to think about the use of technology in the home in different ways. The point of such activities, argue the designers, was not to undertake standard social research that led to findings or results about existing practices, but rather to stimulate both participants and designers to think in unexpected and inventive ways.

While this project was about technology (in terms of designing new technologies) and used various forms of devices and technologies, it was not specifically directed at *digital* technologies. Nonetheless, such innovative approaches could be taken up by sociologists to engage in live sociology related to researching digital media technologies. The researchers on this project suggest using probes to start a conversation and to enliven traditional social research methods such as questionnaires or interviews.

Another example of the potential of this approach is a study in which one of the designers on the above project, William Gaver, collaborated with sociologist Mike Michael (Michael 2012; Michael and Gaver 2009). This project involved using digital technologies as ‘threshold devices’, again in the context of the home, that are designed to ‘look out’ of the domestic setting as part of exploring concepts of home and the boundaries between the home and outside. One device that was employed was a ‘video window’, which displayed views from the outside of the home that could not usually be seen via windows using a digital video camera and a wall-mounted display of the images it portrayed. These technologies were used as part of a broader investigation into the complexities of the relationship of the home with its

natural–cultural environment, and, more specifically, how technologies mediate the world outside the home and act to configure the home.

USING NATIVE DIGITAL DATA OBJECTS

The approaches outlined above are essentially variations on generating social research data using new digital technologies. As I observed above, however, digital technologies themselves generate and archive data as part of their operation. As devices ‘that observe and follow activities and “doings”’ and thereby ‘track the doing subject’ (Ruppert *et al.* 2013: 34, 35), they configure native digital data objects. Native digital data objects are often already cleaned, ordered and formulated ready for research because the companies or government agencies that collect them use them for their own purposes. However, to some extent, they can be repurposed in various ways by academic researchers, market researchers, policy think-tanks and other commercial enterprises. Such researchers now often refer to ‘harvesting’, ‘mining’ or ‘scraping’ the web to gain access to these data.

Using digital data analysis tools, free or otherwise, individuals from various kinds of occupations or with diverse political motivations can access big data and employ these data for their own ends. Commercial companies also frequently use ‘text mining’ or ‘sentiment analysis’, particularly in relation to social media content, or the analysis of fragments of statements used when users are commenting on issues, using such methods as natural language–processing software. These analyse the structure and content of the words used in social media texts in relation to each other, or more simplistically, software that simply counts the number of times words are used (Andrejevic 2013; Breur 2011).

There are various open-source tools that are freely available to any internet user to engage in forms of social research using digital data. These all involve some form of web scraping. Once the data are scraped, the tools provide the opportunity to analyse or visualise the data collected. Many of these digital research tools, as well as some that have been developed by members of the Digital Initiatives group led by Richard Rogers, are listed on its website (Digital Methods Initiative). This website is an invaluable resource which provides details and hyperlinks to digital scraping tools in five categories: media analysis, data treatment, natively digital, device centric and spherical. These tools are able to perform a multitude of analyses, including monitoring online media outputs, capturing and analysing social media content, such as tweets, identifying the time-stamps of websites (or

when they were last modified), checking whether a URL has been censored and harvesting metadata and content from iTunes, Wikipedia, Twitter, Facebook and Amazon.

Many tools are available to represent digital data visually, including graphs, social network and word cloud visualisations. Tools such as Topsy provide the opportunity for anyone to search the web for words or terms across social media platforms. Topsy generates a list of mentions of these words or terms and links to each of them, and also provides numbers and graphs of these mentions and a sentiment score. It can compare words and terms as well and graphically represent how often each one is mentioned compared to the others.

Google offers several free web scraping tools. These include Google Trends (which analyses the popularity of search terms entered into Google) and Google Books Ngram Viewer (which draws on a corpus of millions of books published between the 1500s and 2008 that have been digitised by Google). Thus, for example, I can very easily produce a graph using Google Trends that can show how often the term 'digital sociology' has been entered into Google as a search term compared with 'digital anthropology' and 'digital cultures', to provide an indication of interest in these terms relative to each other. As an exponent of digital sociology, the resultant graph gives me some indication of when people using the Google search engine began to use the term 'digital sociology' (for the record, it was May 2009), and how much interest there is in the term in comparison to the others that I have put in the tool. Using the Topsy social media analysis tool, I can see how often these terms have been tweeted about in a defined time period comparative to each other, as well as trace mentions of each one across the internet, thus allowing more detailed analysis of social media discussions of these topics.

Google Ngram Viewer has been used to engage in linguistic research tracing changes in the use and meaning of words or terms over centuries. A group of computational linguistics researchers, including several who were involved in developing the Ngram Viewer project (Michel *et al.* 2011), for example, conducted an analysis of the evolution of grammar, and compared how the use of English irregular verbs (such as burned/burnt, strived/strove, dwell/dwelt) changed over the centuries between 1800 and 2000 and also how these words were used in the UK compared with the USA. It has been argued that this approach to online news items can identify changes in tone in the material that may predict political unrest and economic events. One study used a digitised global news archive over a period of 30 years to examine 'global news tone'. The researcher went beyond the standard analysis by seeking to identify the geographical location and latent tone of the

words employed and quantifying these dimensions of the news texts. Using this analysis, he was able to forecast such events as the revolutions in Egypt, Tunisia and Libya (Leetaru 2011).

To try Ngram Viewer for myself, I searched for the terms 'cyber-space' and 'cyborg' to test my argument that these terms have lost some of their currency since the early 2000s. When I searched for these terms between 1980 and 2008, I found that this was indeed the case, at least as demonstrated by the number of mentions of these words during this period in the corpus digitised by Google. Both words hardly appeared in the Google Books database until 1988, when they began a gradual rise in number of mentions, reaching a peak in 2000 for cyberspace and in 2002 for cyborg, after which the frequency of their use declined. Cyberspace was far more commonly used than cyborg, although both terms had similar trajectories of use. Unfortunately, as Google Ngram Viewer currently only includes books published before 2009, I was unable to trace the frequency of further mentions over the past few years, a period in which I would predict these words would have been used less often in books.

Several digital social researchers have been interested in tracing the history of internet sites, including cultural change as it occurs over time on these sites. Identifying the history of searches on engines provides 'stories' relating to the politics of knowledge: of how content is manipulated, how some views are prioritised and others excluded on search engines. Here the search engine is understood as 'an authoring device' in constructing a particular story or viewpoint (Rogers 2013). Thus, for example, Rogers (2013) and colleagues made a collection of Iraqi websites stretching back some years to determine the types of information that had been available on Iraqi society that differed from official government accounts. They also compared Wikipedia articles on the fall of Srebrenica, the Srebrenica massacre and genocide written in Dutch, Serbian and Bosnian, examining the edit history over six years and the sources used as a means of tracing the political nature of knowledge generation and manipulation on that site. Such genealogies of websites are important ways of tracking and identifying how issues come to the fore, whose voices are given prominence and whose are ignored or censored. This type of research is able to provide insights into how knowledge is generated and negotiated online, and also the gaps and inconsistencies involved in this process.

The quantities of data that big digital data sets provide lend themselves to graphic visualisation as a means of most easily identifying patterns in the data (Bruns 2012). Graphic visualisation tools can be employed to analyse social networks and investigate how social media

use is socially and culturally contextual. Several free tools are available to perform social media network analysis. One such tool is Gephi, a free and open-source interactive visualisation and exploration platform for networks and complex systems. Bruns (2012) used Gephi to graphically visualise Twitter activity data cohering around specific hashtags and replies to individual users to examine the networks established between users. This analysis allowed him to identify shifts in the hashtag network, including changing participation by contributors and the response of the overall hashtag community to new stimuli, such as the entry of new participants or the availability of new information. The study focused on how Twitter operates as a space for conversation in relation to specific topics (as designated by hashtags used in front of key terms).

For people who are interested in exploring the types of metadata that are generated by their own use of social media, various tools are available that allow them to scrape their own data from their email, Facebook or LinkedIn account and produce statistics, graphs and other data visualisations that show data on who they are linked to, how these people may be linked with each other in various networks and the frequency of interactions one has with them. I used the LinkedIn Maps tool for this purpose to see what data it produced. Drawing on my LinkedIn connections, the tool produced a multi-coloured image of network clusters that showed how my contacts were linked with each other. This was an interesting exercise in demonstrating who knew who among my contacts and how the clusters identified were distinct as well as overlapping. Not surprisingly, the clusters were structured around predominantly the features of geography and field of research, so that the British sociologists, for example, were closely clustered, as were my Australian academic contacts and colleagues from my university. There were also several connections identified in the cluster map of people that I had no idea were linked in any way.

In a far more complex project involving the use of visual images, Hochman and Manovich (2013) analysed images that were uploaded to the photo-sharing social media platform Instagram. In their 'big visual data' research they identified what they call 'the visual signatures' of 13 global cities, drawing on 2.3 million Instagram images from these cities. Their research was directed at identifying patterns of Instagram use that reveal local social and cultural events by using techniques that draw on metadata but also the visual content of the actual images. They describe their approach as 'data ethnography', as they are able to move between large-scale analyses of tens of thousands of images and more detailed analysis that can reveal patterns of

individual users. For example, they examined the photos shared on Instagram by people located in the Brooklyn area of New York City when Hurricane Sandy hit that city and those taken by users in Tel Aviv on national memorial days. They argue that this new paradigm is able to analyse individual users of digital media not through hierarchies and categories but rather through relations, transitions and sequences. Their website – Phototrails – provides many examples of the data visualisations produced as part of this research project.

Very few sociologists have yet made use of web harvesting techniques in their research practices. One exception is Dave Beer (2012c), who has experimented with using the social media data aggregator Insightlytics to compare the ways in which the terms ‘sociology’ and ‘celebrity’ were employed on Twitter. He looked at how often these appeared over a defined time period, the geographical origins of the tweets, the other terms combined with each word, the influential commentators who made reference to the terms, the sentiment accompanying the mention of the terms and aspects of individual tweets employing the terms. As Beer notes, there are significant limitations to this kind of broad-brush analysis. While it can be useful in identifying basic patterns in a vast number of data, this technique should only be viewed as a starting point for social analysis. Digital transactional data and the algorithms used to sort them were not created with the purposes of social researchers in mind. They therefore can often be unwieldy and inconvenient for researchers to use, and do not fit their specific research questions. This may result in the data that are available for use shaping the generation of research questions, rather than the opposite occurring (Beer and Taylor 2013).

Two other sociologists, Noortje Marres and Esther Weltevrede, have also experimented with web scraping devices and reflected on the ways in which such devices, as sociomaterial objects, shape social research practices and how ‘the social’ is defined. They contend that ‘scraping disturbs the distinction between the “inside” and the “outside” of social research’ (Marres and Weltevrede 2013: 315). Web scraping tools and practices operate under different conditions and assumptions from those that are usually employed in academic social research. The data these strategies access, as native digital data objects, come already formatted. Scrapers act as ‘analytical machines’ because they define and order, and thus pre-format, the data they scrape according to certain conventions embedded within the software (Marres and Weltevrede 2013: 326). Like Beer, Marres and Weltevrede remark that there are limitations to what academic researchers can do with web scraping tools as they must accept the conventions and structures of the platforms in which these data are generated. However,

they extend this observation by contending that addressing the ways in which this formatting takes place can become a focus of sociological enquiry. Web scraping is both an automatic process generated by the software being employed and a social process, subject to the decisions of those who code the software, to the sharing of the data thus generated and to discussion among those employing different tools as to which work the best. Social researchers can both use the tool and analyse how the tool operates as a form of web epistemology (Rogers 2013) that shapes the content, forms and categories of knowledge that can become available.

THE LIMITATIONS OF DIGITAL DATA ANALYSES

Digital social research offers many possibilities. However, there are also significant limitations for social researchers who are interested in employing big digital data sets, online data collection and analytic tools, some of which have already been touched upon in this chapter. Not everyone has equal access to big digital data sets. I remarked earlier in this chapter about the lack of computing skills most sociologists possess, and how this may limit their opportunities to go beyond the simple analyses offered by open-source analytic tools. There is a growing divergence in the ways in which big data can be accessed and used. The move towards open-source data initiatives and the provision of tools to access and analyse these data have led to some forms of digital data becoming more widely available for analysis. These types of tools enable any interested person to engage in social research, without requiring any training in research methods. Yet, while some digital data are open to the use of all, as the massive data sets collected by commercial internet corporations have become increasingly valuable entities access to them has been progressively closed off.

Social media platforms such as Facebook, YouTube, Flickr and Twitter began purely as means of online communication, the sharing of images and networking, but as their popularity and influence have grown, they have become commercialised, forums for advertising and tools for the provision of data that can be mined and sold on. While the content that is prosumed on these platforms appears to be a transparent and rich source of data for social researchers, this increasing move towards ownership of the data limits the extent to which researchers may access them by scraping. The number of times a user can visit a website to scrape data is now often limited by 'terms and conditions'. Platforms such as Twitter and Facebook have instituted rules around data mining which limit it to use of their own application

program interfaces (APIs). A two-tier system now may operate, in which some access to data is freely available to all but access to more detailed data is limited to those willing to pay for these data (Bruns 2012, 2013; Burgess and Bruns 2012; Langois and Elmer 2013). Manovich (2012: 470) subsequently argues that three categories of actors (or, to use his term, 'data classes') may now be identified in the context of digital data. The first category is comprised of those who create the data, either inadvertently or deliberately (anyone who uses or is monitored by digital technologies). The second category includes the people or organisations that have the means to archive these data (a far smaller group). The third and even smaller category is made up of those individuals or organisations that are able to access and analyse the data from these archives.

The data that are freely available using the platform's APIs represent only a tiny fraction of all the data collected and stored by the platform, which raises questions about the representativeness of the data that may be analysed (boyd and Crawford 2012; Bruns 2012; Burgess and Bruns 2012; Edwards *et al.* 2013; Vis 2013). The issue of representativeness has been raised by other critics, who have pointed out that researchers often simply choose to use the data that are conveniently available rather than engage with issues of representative sampling. Twitter or Facebook users, for example, are from certain defined social groups, and are by no means representative of the general public. This lack of representativeness can also be a problem with other forms of eliciting data using online tools. For example, online surveys may attract respondents who are not representative of the general population. This occurred in the Great British Class Survey (Savage *et al.* 2013), which was conducted by sociologists in conjunction with the BBC. Although a large number of respondents completed the online survey, they were skewed towards the typical BBC viewer class profile: the well educated and economically privileged in professional occupations. The researchers were then forced to conduct a second survey using standard quota sampling procedures and face-to-face questioning conducted by a social research company that were able to attract responses from a more socially-diverse group.

In addition to these difficulties faced by academic researchers who are interested in social media analysis, Bruns (2013) raises a number of others. He observes that the sheer quantities of digital data that researchers are faced with mean that they must constantly make choices about how to select certain data to analyse. They simply cannot analyse all the data on a particular topic or from a particular social media platform, for example. Technical matters such as data storage capacity are also integral to the decisions that researchers interested in

online material must make. Bruns also cautions that academic researchers invest blind trust in the open sources or commercial social media analysis tools that are available to them uncritically, without raising questions about their validity and reliability. It is also very difficult to replicate the findings of other researchers, given that the tools and data sets used are often unstable, and social media platforms often do not allow researchers to publicly share their data sets.

Many broader concerns have been articulated in relation to social research practices using native digital data. As I explain in more detail in Chapter 5, digital data are as subject as any other forms of data (quantitative or qualitative) to inaccuracy, bias, distortions and errors at any stage of their production and analysis. Despite the aura of objectivity and scientific neutrality that surrounds digital data (because they are generated by computer technologies, often in vast quantities), like any other form of data, digital data are the product of human decision-making. The content of online material may change over time as it is revised or even removed altogether from the internet. Much of the big data analysed can only provide very partial information, often devoid of contextual features such as the gender, age, ethnicity, geographical location, social class and education level of the contributors of the data (boyd and Crawford 2012; Edwards *et al.* 2013; Mahrt and Scharkow 2013).

A further difficulty in terms of judging the validity of the data is that some contributors attempt to game the system, or conduct hoaxes, posting incorrect information or doctored images represented as factual (Procter *et al.* 2013). The people who are the sources of these data manipulate them in certain ways for their own ends, choosing to upload certain images over others, for example, or sharing or retweeting carefully selected items to present a certain persona to friends and followers on social networks. Search engine results or Twitter trending topics can be manipulated by those seeking commercial or political advantage (Lazer *et al.* 2014). So, too, digital data such as 'likes', 'shares' and 'followers' can easily be gamed (by being bought or by using bots, for example; see Baym 2013).

Regardless of the validity of big data, several critics have pointed out that while they include many digital data objects, massive data sets are limited in terms of their explanatory power. They are able in the main to provide counts and evidence of correlations and connections between different variables, but beyond this they are not particularly insightful. Big data provide little explanation of the context in which they are produced (Andrejevic 2013; Uprichard 2012, 2013). The meaning of the data may be lost or misunderstood because other indicators of meaning may not be included in the digitised materials: the

social and cultural context in which the original texts were produced, or the relevance of words or texts to each other. For example, the interpretation of ‘sentiment’ in social media data is undertaken by natural language-processing algorithms. But because these are generated by computer codes, rather than interpretations by humans, such analysis easily misses nuances and ambiguities of meaning. Words and other elements of cultural texts become reduced to computer data alone (Beer and Taylor 2013; Gooding 2013). Without detailed knowledge of the context, it is often difficult to judge the tenor of content when users are commenting on social media, such as whether they are being serious or sarcastic.

Notes of caution have also been articulated in relation to the increasing digitisation of materials. Gooding (2013: 1), for example, has referred to archives of digitised material as potentially constituting ‘a virtual rubbish dump of our cultural heritage’. He writes that several major concerns have been expressed within the humanities about digitisation of materials. One is that quantification and information will come to be privileged over the traditional, more in-depth and interpretative analyses of cultural material that involve close reading or examination of the texts. Another concern is that little has been published about the use of large-scale digital archives of cultural material for purposes other than quantification. Furthermore, the mass digitisation of materials may be of poor quality compared to small digitised collections that have been developed with a high degree of human intervention to ensure standards are high. Large-scale digitisation, which often relies on automated mass scanning techniques, can often result in poor metadata and mistakes in the digitisation process so that important information is lost. The value of these data, therefore, may be compromised for researchers.

Some critics have addressed the ethical issues of using data from online communities and forums for research. These issues incite consideration of such questions as whether or not such communities constitute public or private space or whether researchers should make themselves known to communities when studying their interactions. Some researchers have contended that if information that users post about themselves is posted on public websites and platforms, then such data should not be considered private or confidential, and should be open to researchers to use regardless of whether or not the individuals know their content is being used for research. Others argue that researchers should take care to let people know that they are using their data, particularly if they are posting about personal matters (Boase 2013; Mahrt and Scharkow 2013; Moreno *et al.* 2013). As I discuss in greater detail in Chapters 5 and 7, the use

and commercialisation of big data by digital companies and government agencies has raised many issues concerning the extent to which people understand how their data are being used and whether they should be able to gain access to their own data.

By virtue of the long tradition of social research in sociology, sociologists have been sensitised to the ethical and political dimensions of the processes of sorting and classification that are intrinsic to the production and use of data (Uprichard 2013). Sociologists and other critical analysts, therefore, play a vital role in continuing to challenge the accepted truths of big data or digital social data. It is in the emphasis of the contextual and constructed nature of digital data, including their political purposes and effects, that sociologists and other social and cultural scholars are able to develop insights. Data mean nothing without interpretation and contextualisation, and these scholars are trained to achieve precisely this. Due to these caveats, big data analyses should be considered as only a small part of an analysis of social behaviour. It is here that the types of innovative approaches outlined earlier in this chapter offer ways of incorporating digital technologies into creative and insightful sociological enquiry.

THE CRITICAL REFLEXIVE POSITION

Digital sociology can contribute to the revitalising of ‘dead sociology’ in many important ways. Digital technologies as methodological devices and as subjects for research provide exciting, creative and innovative new ways of conducting sociological research. They offer an opportunity to enliven sociology and other social research by contributing new forms of data and ways of including research participants as co-collaborators in research projects. Sociologists offer many important perspectives on digital social research. Not only are they able to investigate people’s digital technology use from both broad and in-depth perspectives, they are able to position this use within the social, cultural and political context in which it takes place. They are able to interrogate their own position as researchers and to query the nature of research methods from a critical perspective. All of these perspectives contribute to a potentially rich and vital sociology in which practitioners reflect upon their own positioning as researchers and site their approaches within a theoretical perspective that acknowledges the ways in which social research practices both document and create social lives.

Adopting a critical reflexive sociological perspective on sociologists as digital media researchers, one could ask the following questions.

What are sociologists doing when they seek to analyse digital media? To what extent are they simply taking up digital media analysis tools to harvest data and to what extent are they challenging these tools' usefulness or even focusing attention on the tools (and digital platforms and digital data) themselves as objects of research? There are different layers of analysis that can be engaged in by sociologists, each of which adopts a somewhat different perspective on the epistemologies and ontologies of digital devices, software and data. We can use computer functions and tools such as Google Ngram, Google Trends, Google Search and autocomplete simply as *search* tools, as any digital users do, but we can also position them as *research* tools, ways of exploring and revealing social and cultural conventions, norms and discourses. At the same time, as reflexive digital sociologists, we need to view these tools as very blunt instruments, and acknowledge that in using them we are required to invest our faith in the validity and reliability of the data they produce. And further, as critical analysts of the digital, we can reflect on how these tools position ourselves as researchers and their implications for social research in general.

Thus, for example, when I use a tool such as Google Trends, as a sociologist I may do so in various ways. I may use the tool and accept the results it produces unproblematically. Here the data it produces is my main interest. I may be interested in investigating how the tool produces and structures the data, challenging the 'black box' of its inner workings and logic. The tool itself is here becoming the object of my analysis. I may want to explore the social and political implications of how Trends is part of the Google apparatus of shaping and structuring knowledge, or the 'Googilization' of the world (Vaidhyanathan 2011). I may want to do all of these things simultaneously. All of these are intriguing ways of investigating the digital world sociologically.

This chapter has examined the issue of how digital sociology may be practised in terms of research methods. In the next chapter, I go on to outline more specifically the use of digital technologies for professional practice as a sociologist. As in the present chapter, the discussion takes a reflexive position by not only outlining what kinds of strategies may be adopted by sociologists (and other academics) to 'digitise' themselves, and the possible benefits and drawbacks of adopting these strategies, but also examining the deeper implications for concepts of academic identities and work.

The digitised academic

In this chapter I look at how academics are becoming digitised knowledge workers, with a particular focus on sociologists. The higher education workplace has become increasingly digitised, with many teaching and learning resources and academic publications moving online and the performance of academics and universities monitored and measured using digital technologies. Some sociologists and other academics are also beginning to use social media as part of their academic work. Digital technologies are therefore becoming an important element of constructing and performing the professional self for many workers in higher education. I examine the benefits and possibilities offered by digital technologies but also identify the limitations, drawbacks and risks that may be associated with becoming a digitised academic and the politics of digital public engagement. Throughout the chapter I will make reference to findings from my own online survey of academics who use social media for professional purposes (see the Appendix for further details).

DIGITAL PUBLIC SOCIOLOGY

As part of the continuing reflexive critique in which sociologists like to participate as part of their sociological sensibility, periodically there are examinations by sociologists about the future of their discipline.

Many of these enquiries contend that public sociology is a vital aspect of what contemporary sociology should be attempting to achieve. What the term 'public sociology' involves has itself been subjected to lengthy analysis and debate (Burawoy 2005; Holmwood 2007). For some, public sociology involves engaging in political activism, agitating for social justice and human rights and challenging inequalities, while for others, it is more broadly related to engaging in public discourse to audiences outside the academy as expert commentators on contemporary social issues: that is, to be public intellectuals.

One of the most well-known pieces on public sociology is 'For public sociology', an article by American sociologist Michael Burawoy (2005), derived from his presidential address to the American Sociology Association's annual conference in 2004. In the article Burawoy (2005: 4) defines the challenge of public sociology as 'engaging multiple publics in multiple ways'. He discusses the importance of making sociology visible to those outside the profession as part of legitimising and bolstering support for it, showing people how important and relevant it is. Such arguments suggest that sociologists have retreated into their ivory towers and become focused on internal debates and professional advancement instead of engaging directly with the social groups that are the topics of their research (Holmwood 2007). It is clear, however, that many sociologists view public engagement as integral to their professional work for a number of reasons, including a personal belief that such engagement should be fundamental to the praxis of sociologists.

Burawoy (2005: 7) comments on the potential of public sociology to bring sociology into 'a conversation with publics, understood as people who are themselves involved in a conversation'. The recursive nature of public engagement by academics who conduct social research is evident in this statement. Sociology itself is about the examination of social processes and institutions, of which the discipline and its practitioners are parts. Sociologists study the social world and their research findings may in turn have an influence on social relations and social structures. Furthermore, sociologists themselves are part of society and thus contribute to the understanding and construction of the entity of which they are members. As I go on to contend below, this has implications for the ways in which sociologists use social and other digital media as part of their presentation of their professional selves or in their research.

When Burawoy was writing about public sociology, social media had not begun to enter private and professional worlds. A decade after his talk, the concept of digital public sociology may now be introduced, relating to the practice of using social and other digital tools to

perform public sociology. The higher education sphere has become profoundly transformed by digital technologies in the past ten years. As participants in the digitised knowledge economy, the work and output of academics has become increasingly presented online. In many cases scholars' 'academic personae' may have been constructed for academics using defined formats by their universities (the information webpage about their research, teaching and qualifications that is part of the university website, for example), the academic journals and books that publish their work, sites such as Amazon and Google Books which publicise their books and invite reviews of them, the libraries that purchase their books, the other academics who publish course readings, articles or blog posts referring to their work, or readers who review their work on review websites. As a result of all this internet-based activity, many academics have a far greater online presence than many other professionals. However, much of this kind of representation of academics is beyond their control, as it is produced, or at least shaped, by others.

Institutional imperatives are also beginning to encourage sociologists and other academics to render their research findings more accessible. The increasing move towards open-access publishing – including mandates from public research funding bodies in several countries for academics to make their research readily available to the public – also supports the concept of public sociology. While the traditional mass media, particularly the news media, provided a major forum for such public commentary, the new digital media offer far more ways to do this. They allow sociologists to have more control over the tenor of the messages they wish to disseminate in public forums, as scholars are able to publish material themselves, without a mediator. Blogging, tweeting, curating Facebook pages, editing Wikipedia entries, engaging in professional networking websites such as Academia.edu, ResearchGate and LinkedIn, making podcasts and YouTube videos and so on are all ways of employing digital media for professional academic purposes.

So, too, in recent years there has been increasing interest in offering higher education in online formats, including not only the relatively small-scale offerings from universities as part of their accredited courses that have been available for many years now, but 'massive open online courses' (MOOCs). MOOCs have been offered by prestigious universities such as Princeton, California Berkeley, MIT, Harvard and Stanford since 2012. They provide access to higher education to people from around the globe who may previously have been prevented from undertaking university-level study because of their geographical location or lack of money. MOOCs have been viewed

by some commentators on higher education as potentially transforming the ways in which university education is delivered and funded. Many questions have been raised about how MOOCs will affect the higher education sector, including their quality, their success in terms of retaining a high proportion of the large numbers of students who enrol, whether they offer a viable business model (how will universities be able to continue to fund them?) and the extent to which they may offer a viable alternative to the traditional model of learning and degree accreditation. Most providers of MOOCs have not charged fees, but there is evidence that at least some of the universities offering them will begin to charge students and offer accreditation towards diplomas and degrees. Such forms of teaching also require universities to examine how their teaching staff are trained to offer them effectively. Both smaller-scale courses and MOOCs require those academics who are involved in them to acquire digital technology skills and understand the complexities of teaching effectively in online formats.

Only a small proportion of academics currently actively and regularly use social and other digital media as part of their professional work. This number appears to be slowly growing, however, as moves towards making research data and publications and teaching materials available outside the academy become more dominant in higher education. Perhaps unsurprisingly, given the focus of their work, academics in media and communication studies have been at the forefront of employing digital media to present their professional selves (Barbour and Marshall 2012). Martin Weller (2011), an academic specialising in educational technology, has discussed the concept of 'the digital scholar' in detail in his book bearing this title, with the subtitle 'How technology is transforming scholarly practice'. At least one handbook has been published on the subject, entitled *Social Media for Academics: A Practical Guide* (Neal 2012). As these signs suggest, a momentum appears to be developing in which academics are beginning to realise the benefits of using digital media for scholarly practice and learning how to do so.

Sociologists are only beginning to recognise the value of digital media, although websites such as the LSE's Impact of the Social Sciences are providing many useful accounts of and guides to how to use these tools. It has been argued by some commentators that engaging in professional digital use as part of sociological practice will do much to raise the profile of sociology and demonstrate its relevance and importance in an era in which a shrinking academic employment market, suspicion among conservative governments of social scientists and general economic austerity are threatening funding

for sociological research and teaching and subsequent employment opportunities for sociologists. It can also serve to encourage students to take up sociology, if they are exposed to greater public engagement on the part of the academics teaching them and to methods of using digital tools themselves. Engaging in digital sociology, therefore, may be viewed as a 'social impact investment' for future research and teaching (Casilli 2012).

Using social media platforms can be a highly efficient way of connecting with other academics working in a similar area as well as interested people from outside academia. These tools allow participants to join networks arranged around topic or discipline areas and to contribute in discussions and sharing information within these networks. Blogging sites such as WordPress and micro-blogging platforms such as Twitter can be used as easily accessible forums in which academics can communicate their ideas in short form. Unlike traditional journal articles that are locked behind paywalls, these platforms are free to access and material can be instantly published, allowing academics to share some of their research findings quickly. They therefore allow scholars to promote their research and share it with a far greater audience than they would usually find in the traditional forums for publication. Links can be provided to journal articles so that longer academic pieces can be followed up by readers.

Blogs and micro-blogging platforms also allow interested readers to comment and engage with authors, thus facilitating public engagement. Individuals can ask a question in a blog or Twitter post and receive responses, or readers may simply choose to use the comments box to make remarks on a piece that has been published. Sites such as Academia.edu, ResearchGate and LinkedIn, as well as academics' university profile webpages, are ways of providing information about themselves. In Academia.edu and ResearchGate, both of which were designed specifically for academics, users can list and upload their articles, conference papers and books, follow other individuals and topic areas and be followed in turn, and engage in discussions with colleagues. LinkedIn provides opportunities to link not only to academic colleagues but also those outside, and to join special interest groups.

Curation and sharing platforms such as Delicious, Google+, SlideShare, Pinterest, Scoop.it, Pearltrees, Bundlr, Paper.li and Storify, as well as referencing tools such as Mendeley, CiteULike and Zotero, allow academics to easily gather and present information and, importantly, to then make the information public and share it with others online. On SlideShare, PowerPoint or Prezi presentations may be uploaded to the internet and the referencing tools allow you to gather

lists of references on specific topics and then share these with others. Several of these tools, including Pinterest, Bundlr and Storify, allow users to insert their own comments or analysis on the material that they have gathered. These media can also be used as teaching tools, providing new ways of engaging with students both through classroom teaching and in student assignments, where students can use the tools themselves to collect, curate and present information.

Social media are also being increasingly used as part of academic conferences. For example, academics often 'live tweet' about the content of the presentations they attend, providing a 'back-channel' of communication that can be shared with both those participating and those who cannot attend. These tweets can then be presented and preserved in platforms such as Storify as a record of the conference to which anyone can have access, and conference attendees also sometimes blog about the proceedings.

As noted above, the judicious use of social media allows academics to exercise better control and manage the content of their online professional persona (sometimes referred to as 'e-profile') in a context in which search engines are constantly collating information about them. Even apparently trivial practices such as bestowing titles and key words on one's articles, books or chapters and the words chosen for abstracts can be very important in how a scholar's work is accessible to others, now that most academic outputs are digitised. It has been argued that, given that the words used in a title are assigned particular importance by search engine algorithms, a strategy for maximising visibility should be adopted. If the title contains key words that are likely to be entered into search engines by those looking for research on those topics, it is far more likely to rank highly on the search engines' returns (Dunleavy 2014). Many journals now advise their authors on how to maximise visibility of their articles by ensuring that they choose their titles, abstracts and key words judiciously for search engine optimisation.

It has become evident that using social and other digital media can have positive effects on academics' impact, both in the higher education domain and outside it. Academic blog posts are now commonly cited as academic publications in other scholarly writing (I do this frequently myself, including throughout this book). Some sociology blogs, such as Sociological Images, have become very successful, with a readership of millions, thus successfully achieving a high level of public awareness of sociological research (Wade and Sharp 2013). While the vast majority of sociological blogs do not enjoy anywhere near this level of reach, they are still able to have an impact as accessible public discussions of sociological research and analysis. It has

been demonstrated that using tools such as blogs and Twitter to discuss and publicise research outcomes has a measurable positive effect on resultant academic citations (Eysenbach 2011). One academic traced the effects of tweeting and blogging about papers she had placed on an institutional repository. She noted a clear and major increase in the number of times papers were viewed and downloaded, even for papers that were not recent (Terras 2012).

Using social media can also be viewed as part of facilitating access to academic research as part of open-access initiatives. Over the past few years a high level of attention has been devoted to open-education and open-access issues. Discussion has focused on how university-based researchers, who are often funded by the public to undertake research, can release their findings to members of the general public, the vast majority of whom do not have free access to scholarly journals and books (Kitchin *et al.* 2013; Weller 2013). Using social media outlets can also provide a way of facilitating the communication of research findings to the public as well as to other researchers. Researchers are therefore beginning to include these as part of research funding applications as a means of demonstrating public engagement and impact (Kitchin *et al.* 2013).

RESEARCH ON THE DIGITISED ACADEMIC

As all of this suggests, academic practices and identities are increasingly becoming shaped by the affordances and demands of digitisation. As noted in Chapter 2, the use of social media may be viewed as part of the heterogeneous practices that individuals may adopt in their project of configuring and presenting their identities. This is the case for academics as much as for any other individuals. Academic blogging and other social media use may be viewed as techniques of the professional self, allowing users to actively construct and maintain a public identity for themselves (Kirkup 2010).

While becoming a digitised academic offers many possibilities and benefits, the possible negative dimensions also need acknowledgement. In adopting a critical reflexive approach to all this additional production of content via social media and other digital outlets, we need to ask questions:

- What happens when academic research goes open and is presented in less formal formats?
- What are the implications and effects of new ways of measuring academic output and impact via digital technologies?

- Will academics, many of whom already report feeling overworked, underappreciated and stressed, find themselves under further pressure to engage as digital academics?
- How will MOOCs and other attempts to render education more accessible via online technologies affect pedagogies, funding, workloads and employment levels in the higher education sector?
- How will the conventions of academic publishing respond to open-access initiatives?

Sociologists need to stand back and take a reflexive perspective on these developments in academic life: not necessarily solely to condemn them, but also to acknowledge their contribution to the making up of contemporary academic selves and to the pleasures as well as the privations of academic work. Here the implications of digital public sociology for the private lives and subjectivities of academics require attention.

My own more recent survey of academics who use social media as part of their work found that not surprisingly, given the publicising of the survey using social media networks and especially Twitter, 90 per cent of my respondents said that they used Twitter for professional purposes, with 60 per cent using LinkedIn, 49 per cent Academia.edu, 42 per cent Facebook, 33 per cent ResearchGate, 32 per cent a personal blog, 25 per cent YouTube, 21 per cent Google+ and 20 per cent online referencing tools, such as Mendeley or Zotero. Other social media tools, such as multi-authored blogs (16 per cent), Wikipedia as an author/editor (7 per cent), Pinterest (9 per cent), SlideShare (13 per cent), Instagram (3 per cent), Tumblr (5 per cent), Flickr (5 per cent), Storify (9 per cent), curation tools (7 per cent), Google Scholar (1 per cent) and Quora (1 per cent), attracted fewer responses. When asked which of these social media they found 'most useful' for their academic work, Twitter again featured very strongly (83 per cent), followed by a very long margin by Academia.edu (23 per cent), a personal blog (16 per cent), Facebook (14 per cent), LinkedIn (14 per cent), online referencing tools (11 per cent), YouTube (10 per cent), a multi-authored blog (7 per cent), Google+ (5 per cent), SlideShare (5 per cent) and curation tools (4 per cent). Other tools listed – Wikipedia (as author/editor), Pinterest, Instagram, Tumblr, Flickr and Quora – attracted fewer than 2 per cent of responses.

While the many academics who responded to my survey use only a small number of digital media tools for a limited number of purposes, several reported employing a wider range. One example is a female academic from the UK who is an early career researcher. This is what she had to say about her use of social media:

[I use] Twitter – useful to follow people doing similar work, connect at conferences, enables me to discover articles, resources, organisations, ongoing projects. I use Twitter to tell others about ongoing work or resources and to have conversations, throw ideas around etc. I find interesting presentations on SlideShare, gives me ideas about content and is a way to follow work of people in a variety of fields. I blog as part of my work on a WordPress platform – it is an official department blog where multiple team members contribute. I find blogging great for slightly longer pieces about projects or activities (which I can then tweet links to) and I also follow quite a few blogs to keep up to date with work in other institutions or work of individuals. I use a Facebook group with students to keep in touch, they respond quicker to questions posted there rather than direct email.

As this account suggests, at least some academics are engaging in social media tools in sophisticated and complex ways and perceive many advantages of this use. In my survey, when asked what they saw as the benefits of using social media as an academic, many people mentioned the connections or networks they had established with other academics and also those outside academia. Several made reference to the wide scope of these connections, which allowed them to interact with people across the globe and from diverse communities. It was common for the respondents to also note that their social media use enabled them to make connections with people or groups that they otherwise may never have come across. Their professional networks, therefore, were expanded via social media in sometimes unpredictable and serendipitous ways. Some respondents observed that not only were their social media networks broad, they were also horizontal and democratic, enabling more junior academics and postgraduate students to more easily interact with senior academics. As a female early career academic from the UK wrote:

I like Twitter especially because it allows me to follow a lot of people doing similar (or even better: not so similar) research as I do and keep track of what they're working on/publication/struggles they're having. What's particularly great is that these people come from all levels of research (other students to senior academics) and all over the world.

The respondents said that they also valued the speed and immediacy of social media, enabling them to keep up to date with recent publications and event announcements and to chat with others in their

networks in real time about issues of mutual interest. Several mentioned using social media in their teaching, as they engage their students and offer a way in which online students in particular can easily connect with academic staff and each other. Many respondents mentioned the opportunities for promoting their own research and discussing their ideas in early form with colleagues. Some identified being able to access research participants using social media. As noted by an American female early career academic:

I am actually tracking an international movement and so following key players on Twitter has been useful in terms of getting leads, reaching new informants, etc. I also have a network of colleagues on Facebook who suggest citations, theoretical frameworks, etc.

Surprisingly little research has focused on how academic practices become habituated and routine, part of tacit knowledges, using any kind of technology, digital or otherwise. One recent study sought to explore this aspect of academic work, drawing on interviews with and observations of scholars using a range of technologies as part of their work (Löfgren 2014). This research found that writing practices have changed with the advent of computerised word processing that enables edits to be easily and quickly made to an academic piece of writing, and accessing journal articles no longer requires hunting down hard copies of journals and then photocopying them, with journals now online. Note-taking has become digitised for many scholars, as have searching for information and systems of filing. Scholars develop customised routines of using search engines, making decisions about what information is important and following hyperlinks that are often difficult to articulate because they have become so habituated and unconscious, involving 'gut feelings' (Löfgren 2014).

As has been found in other research addressing the negotiation of work/home boundaries for knowledge workers in digital society (Gregg 2011; Humphry 2011), traditional models of space and time and work and leisure are challenged by the use of digital technologies. For academics and other knowledge workers, mobile devices such as smartphones, laptops and tablet computers allow the constant switching between work and personal activities, even in bed at night or upon first waking (Löfgren 2014). For researchers who focus on social practices, such as anthropologists, sociologists and those in media, communication and cultural studies, it is difficult not to continually observe social life. Digital media facilitate and intensify such observations. Digital devices are used for both personal and work-related purposes and their mobility and continuous connection

to the internet result in work being potentially present at any time of the day.

Most available scholarship on the use of social media for academic purposes focuses on blogging. It has been observed by several writers that in the early years of academic blogging, there was often suspicion of the practice on the part of other academics. People who maintained blogs were in some cases discriminated against when seeking tenure or promotion or otherwise viewed with disdain for being self-aggrandising or wasting time (Gregg 2006; Kirkup 2010; Maitzen 2012). Although negative views of academic blogging have certainly not disappeared, they appear to be slowly changing as universities seek to demonstrate that they are engaging with the public and conforming to open-access mandates and policies.

Academic blogging has been described as ‘conversational scholarship’, a means by which academics can attempt to loosen their formal style of writing as part of communicating to a wider audience (Gregg 2006). It has been argued that the practice forces academics to think about their research and writing in new ways, bearing in mind the multiplicity of potential audiences and the ways readers can respond to the material presented (Kitchin 2014; Kitchin *et al.* 2013). Some bloggers use their writing as a way of developing ideas and seeking engagement with others before they formalise their ideas into a more traditional academic piece (Adema 2013; Carrigan 2013; Daniels 2013a; Estes 2012; Gregg 2006; Maitzen 2012). Daniels (2013a) has described a trajectory by which she has tweeted about an issue during a sociology conference, followed this up with a series of longer blog posts and then collected these posts together, expanded upon her argument and produced an academic journal article. I have also often experienced this process of beginning with a tweet or a blog post and then producing a much more detailed piece of academic writing from these initial thoughts; indeed, parts of this book began in exactly this fashion. Those who use social media in this way have been described as ‘open-source academics’ (Carrigan 2013).

Public digital scholarship practices such as blogging are also sometimes represented as overtly political and resistant acts. It is argued that these types of practices allow for scholars to experiment with digital publishing and engagement at the same time as resisting the dictates of the scholarly publishing industry and producing new forms of knowledge dissemination (Adema 2013; Gregg 2006, 2009). The content itself of blog posts, Twitter comments and other social media communications may be directly political, with these tools providing a forum for academics to challenge government policies and programmes (Kitchin 2014; Kitchin *et al.* 2013; Wade and Sharp 2013). They can

also provide an opportunity for academics to share their frustrations about higher education procedures and policies and their own experiences as academic workers (Adema 2013; Gregg 2006, 2009; Mewburn and Thomson 2013). In my survey, several postgraduate students and early career researchers wrote that social media connections often gave them emotional as well as academic support, which they found particularly important at their stage of academic career.

THE ACADEMIC GIFT ECONOMY AND NEW FORMS OF PUBLISHING

Several scholars discussing academic blogging have asserted that using this medium often serves the purpose of sharing information and providing advice as part of a gift economy of producing material to share freely with others. From this perspective, scholarship and knowledge are not viewed as a marketable commodity but rather as a social good (Adema 2013; Gregg 2006; Hall 2013a, 2013c; Mewburn and Thomson 2013). Here, the general sharing ethos and participatory democracy that are viewed as characteristic of social media engagement more generally are interpreted in a more specialist academic context.

Academic blogs and other forms of writing on digital platforms are also beginning to reinvent scholarly publishing modes. Blog posts are now often cited in more traditional academic forums, some scholarly journals are incorporating blogs, multimedia or open-access repositories as part of their online presence, and academic presses are experimenting with new digital modes of publication, including shorter online book formats with shorter-than-usual turnaround times between acceptance of the manuscript and publication. Scholarly publishing is developing as hybrid and multiple, drawing both on legacy forms of publishing and on novel modes introduced by digital formats and platforms.

Some academics have taken the concept of 'open scholarship' even further, bringing the concept of the academic gift economy together with the ideals of new approaches to academic publishing. Cultural and media theorist Gary Hall, for example, has developed the concept of the 'open book' on his website (Hall 2013b) and in other writings (Hall 2013c). Hall is part of a movement in 'new cultural studies' that is interested in the performative aspects of scholarship in cultural studies (Hall and Birchall 2006) and in challenging concepts of academic publishing (Hall 2013c). Hall has published material from his book *Media Gifts* on his website of the same title. He describes it as 'the working title of an open, distributed, multi-medium, multi-platform,

multi-location, multiple identity book' (Hall 2013b). Here, Hall is pushing the concept of academic writing as part of a gift economy as far as he can. He has experimented with the concept of 'pirated' academic texts by inviting readers to 'steal' or 'pirate' versions of his work as a deliberate attempt to call into question concepts of intellectual property, content creation, authorship and copyright in scholarly writing and publishing.

Hall is also the co-editor of a series of scholarly open publications on Open Humanities Press, including an open-access journal, *Culture Machine*, and two experimental edited book series, Living Books about Life (to which I have contributed a volume – Lupton 2013b) and Liquid Books. These book series, constructed using a wiki platform, are attempts to produce open-access digital books that are 'living' or 'liquid' in the sense that they may be added to at any time after their original publication date, not only by the original volume editors but by any other contributor in a model similar to the Wikipedia format. As these books are digital, it is also possible to include audio-visual material, links to websites and so on as part of the books' contents. These books' 'free-content' approach means that the material contained within can be altered, added to, remixed, reformatted and edited by others as part of a challenge to the concept of the traditional authored or edited scholarly book.

These projects are part of Hall's and his collaborators' experiments with the concept of what Hall calls 'media gifts', or 'using digital media to actualise or creatively perform critical and cultural theory' (Hall 2013a). He views these activities as gifts because they are freely available rather than protected as intellectual property, and as performative because they are directed not at representing or documenting the world but at interacting or acting with it, adopting creative and inventive forms of analysis and critique. Another example of Hall's media gifts project is 'Liquid Theory TV', a collaborative project with Clare Birchall and Pete Woodbridge aimed at developing a series of internet-hosted television programmes for the discussion of intellectual ideas (Hall 2013a).

Hall (2013c) envisages a future scholarly publishing environment in which academics publish their work across a range of formats and platforms, from the more traditional journal, book chapter or monograph published by traditional scholarly presses to the diverse array of forms made available by self-publishing and open-access platforms now available on the internet, including multi-media formats, animation, graphics, photography, film, music and so on. From this perspective, he argues, the concept of 'publication' is challenged and extended. There is no longer an end-point to a publication, as its online form

can be continually reworked, revised, mashed up and otherwise transformed continually. This brings us to the idea of the circulation of digital material on the internet and how such material may be constantly reinvented in ways in which the original author may never have intended or expected.

ACADEMIC METRIC ASSEMBLAGES AND AUDIT CULTURE

One important dimension of the increasing digitisation of academic work is the way in which higher education has become subject to quantified monitoring and measuring. Academics are now, whether voluntarily or unwillingly, engaging in presentations of professional selves that incorporate these kinds of measurements and ranking. They possess constantly changing academic data doubles that incorporate digital quantitative data that may be gathered on their professional activities without their specific knowledge or consent (Burrows 2012; Kelly and Burrows 2011; Smith and Jeffery 2013).

Measurement and quantification are not novel practices in the higher education workplace. Even before the advent of digital technologies academics had been counting elements of their work for a long time as part of their professional practice and presentation of the self. The 'publish or perish' maxim refers to the imperative for a successful academic to constantly produce materials such as books, book chapters and peer-reviewed journal articles in order to maintain their reputation and place in the academic hierarchy. Academic curricula vitae invariably involve lists of these outputs under the appropriate headings, as do university webpages for academics. They are required for applications for promotions, new positions and research funding.

Nonetheless, the detail involved and the use of continuous digitised measurements for monitoring and quality assessment purposes is a new phenomenon, as is the opportunity to track some academic metrics in real time. There is now a multitude of ways in which academic performance is monitored, measured and assessed. The performance of sociologists and other academics and the departments and universities which they inhabit are now constantly compared against norms and standards: teaching assessments are carried out; graduate destinations and satisfaction ratings are recorded; research assessment exercises are undertaken; university, department and discipline league tables are published; quality of journals is ranked; academics' citation numbers are counted; and so on. Many of these

quantification and quality assessments take place using digital technologies.

Members of such academic open-access digital platforms as Academia.edu and ResearchGate are informed of metrics such as how many people are following them, how often their profile has been viewed, how often their papers have been viewed or downloaded, and, in the case of Academia.edu, who has used search engines to search for them, what key words were used and in what country the searcher is located. LinkedIn tells academic members what new jobs the people they follow have moved to, and makes suggestions for members about which of the jobs advertised on the site they might be suitable for. Academics who blog, use Facebook or Twitter can easily see how many people visit their site or follow them.

Many academic journals now publish figures showing their lists of the most highly cited and highly read articles in their journals, as well as viewing and download statistics for each article individually. Some journals now run their own blogs or tweet links to their newly published articles and monitor and display metrics such as how often articles are shared via social media. The *Journal of Medical Internet Research*, for example, shows ‘tweetations’, or number of tweets an article published in the journal has attracted, while the PLoS suite of journals lists the number of Facebook or Twitter shares an article has attracted next to its title. Individual journals publish their impact factors and their ranking in relation to other journals in their field. The citation to academics’ publication metrics can now be easily viewed by anyone on Google Scholar.

In response to these new ways of measuring and assessing the impact of scholarly publications, an innovative approach to impact entitled ‘altmetrics’ (short for ‘alternative metrics’) has been developed. Altmetrics tools can be used to aggregate various uses of academics’ work, including monitoring not only traditional forms of citation (in other academic journals, books or chapters) but also the extent to which the work is viewed or referred to in online media texts, such as blogs, tweets and online reference managers such as Mendeley, CiteULike or Zotero (Galligan and Dyas-Correia 2013; Liu and Adie 2013). Altmetrics views and citations are much more quickly gathered and computed than traditional academic citations (in academic journals and books). If universities begin to accept altmetrics as a valid way of measuring academic impact and influence, then these data will also contribute to assessments of academics’ work.

An increasingly managerial approach in higher education has contributed to and encouraged the proliferation of practices of monitoring, measuring and ranking of the performance of individuals,

departments, faculties and universities, in what Holmwood (2010) refers to as 'governance by audit'. Some sociologists and other critical commentators view this growth of the audit culture in academia as a significant problem, viewing it as a repressive form of micromanagement and encouraging the inappropriate fostering of a competitive ethos among academics and between universities. It has been contended that the digitisation of academic output as part of the audit culture has had the effect of producing academics as 'metric assemblages' (Burrows 2012) who are encouraged to demonstrate certain kinds of attributes to achieve recognition and status (Barbour and Marshall 2012; Holmwood 2011; Kelly and Burrows 2011).

Some critics propose that these processes have resulted in academic work being given a new kind of value – one that can be quantified – to the exclusion of other ways of assessing the impact and quality of this work. Burrows (2012: 359), for example, has written on the ways in which metrics such as the 'h-index' and 'impact factor', constructed via digital citation indices, contribute to 'a complex data assemblage that confronts the individual academic'. While the results of some of this auditing of academic performance take place at an internal level that is not accessible to the public, many others are publicly available via online sites in ways outlined above. These metrics have become integral to the ways in which academics, academic units and universities receive funding and are ranked against others, and, in the case of individual academics, to their prospects for employment and promotion. They are thus a part of the ways in which other academics judge colleagues' worth and increasingly the judgement of their value – their 'quality' – by their institutions or departments or funding bodies. As such, these metrics can play an enormously important role in the career trajectory and prospects of the contemporary academic. Academics may find it well-nigh impossible to 'opt out' of such measurement and assessment of their value.

The academic metric assemblage may even be viewed as part of a growing trend towards the 'gamification' of the self, including in the workplace setting. Gamification is a term derived from computer science and behavioural economics, denoting the use of gaming strategies and an appeal to fun and the competitive urge in areas that traditionally have been considered non-game environments. In the workplace, gamification is viewed as a tool for increasing employee productivity and efficiency. The concept has become popular in corporate and business contexts, especially advertising and marketing, and is moving into other domains as a strategy for using measuring and monitoring to motivate people and encourage behavioural change (Jagoda 2013). More than 50 American government organisations, as

well as the US army, navy and air force, use online games to crowd-source ideas from the general population, as do many corporations (McCormick 2013). The provision of such statistics in ways that provide the opportunity to easily measure oneself or one's department or university against others promotes a gamification mentality, in which there are winners and losers. Comparing one's Google Scholar citation or Twitter follower metrics against others, and the process of using altmetrics itself, may be considered a form of gamification of academic performance, as may the lists of top universities that appear regularly (in which the 'winners' are those universities that achieve the highest rankings, while the 'losers' are those languishing at the bottom).

Some academics are now concerned that in the quest to achieve community engagement and impact, universities will begin to pressure academics to use social media tools, albeit under restrictive guidelines developed by the university and in the interests of anodyne public relations rather than to challenge ideas or engage in political activism (Mewburn and Thomson 2013). In a workplace in which many academics are already feeling overworked and under continuing stress to produce research publications as well as attract students, such demands may be viewed as unreasonable. It has been contended by some observers that the constant measuring and quantifying of academic work has led to significant changes in the ways in which academics view their activities, resulting, in many cases, in feelings of despair, anxiety, depression, stress and exhaustion, a sense that they are never quite 'good enough' (Burrows 2012; Gill 2010). This suggestion has been supported by a 2013 survey of British workers in higher education, which found that they reported higher levels of stress than members of the general population. Almost three-quarters of the respondents agreed that they found their job stressful and the majority noted that they often neglected their personal needs because of the demands of their work. Academics in teaching and research positions reported the highest levels of stress (Kinman and Wray 2013).

My survey of academics' use of social media found that while many respondents reported that using these tools had many benefits (including, for some, higher efficiency and better organisation of their work), use also contributed to time pressures. Several remarked about their concern that universities may be adding digital public engagement to the already long list of obligations demanded of their academic staff. As a male early career academic from Canada wrote: 'My concern is that it is time consuming and it is yet another PR job downloaded into faculty already stretched beyond reason'. A European male early career researcher commented that social media 'shouldn't be considered an obligation. It may contribute to the "the publish or perish"

tyranny'. Several others talked about the 'time-drain' of using social media or of the importance of not becoming 'addicted' to using them to the detriment of other work.

However, it is important to emphasise here that although the sociological response to the audit culture and the metricised academic has largely been negative, there are alternative ways of viewing these new technologies of professional practice and identities. As I outlined above, there are undeniable positive dimensions and benefits for academics of participating in digital public engagement. Becoming a metricised assemblage is not necessarily a negative transformation. For many academics, collecting data on their professional selves can engender feelings of achievement, satisfaction and pride in their accomplishments. One might also consider metric assemblages as ways for some academics to resist marginalisation. Citation counts, for example, that offer a quantitative way to support academics' claims of their research impact thus provide a 'bargaining chip' for those who may be traditionally discriminated against in what is still very much an 'old boys' network' in the higher ranks of academia. Traditional academic networks of power still rest on notions of patronage and discriminate against women, those from minority racial or ethnic groups, those who might be considered 'too old' or 'too young' for a position or for a promotion and those who have had a career break for reasons such as caring for others. For such groups, indices such as citation counts and h-indices may prove vital to supporting their claims to academic achievement and influence as a form of resistance to covert systems of patronage. As this suggests, these digitised metric devices should not simply be considered repressive of academics' autonomy or freedom: quite the opposite, they may offer a means to counter discrimination by virtue of their very power as apparently neutral 'numbers'.

OPENNESS AND THE CIRCULATION OF KNOWLEDGES

Many universities worldwide have begun to privilege the concepts of openness and engagement as parts of their operations. Open learning strategies such as MOOCs and initiatives promoting open access to research publications and data have become key to discussions of the future of higher education and research. As outlined above, academics are now frequently encouraged to deposit their publications in open-access forums, consider developing online courses and take steps to promote engagement of their ideas with other members of the community.

Academics who use digital media tools as part of their professional identities need to think carefully about how best to manage their private and public personae when doing so: how formal their self-presentation is, to what extent they make personal comments about themselves or others, the nature of images of themselves that they upload, to what extent they allow – or respond to – comments from others (Barbour and Marshall 2012). Many academics who responded to my online survey on social media use raised this issue about the blurring of boundaries between professional and private lives on social media. Respondents observed that it can be difficult to maintain these boundaries. This concerned some people because they thought that their academic persona may be undermined by personal content on social media: ‘Some caution is required – I feel as there is the potential for some academics to disclose too much of their professional and personal lives’ (female early career academic, UK). In negotiating this issue, many people mentioned using some platforms for professional purposes only and maintaining others for private or personal use. As one female early career academic from Australia/New Zealand put it: ‘I use Facebook, Flickr, Pinterest and a personal blog for personal rather than academic purposes. [I] don’t want to let my professional identity enter those spaces because I like having work/life separation to at least some extent’.

Another issue identified by respondents in my online survey was the lack of credibility that using social media for academic purposes was given by other academics, who viewed such practices as frivolous or time-wasting: ‘Some senior scientists at my university still consider social media as useless or a waste of time. It’s not always easy to justify a social media presence and activity’ (European female postgraduate student). A further potential pitfall of using social media is the extent to which academics become part of their students’ social networks and vice versa. Academics need to consider carefully the politics of following or ‘friending’ students and allowing them to reciprocate in the context of a relationship that is essentially an unequal one, particularly if the academics depart from strictly professional interactions in online forums (American Association of University Professors 2013). This issue again relates to the presentation of the professional academic self on social media, and the extent to which the content academics create and share and the people with whom they interact are related to their academic work and networks or are about their private lives and opinions.

The freedom of expression that forums such as blogs and social media sites offer academics can also be the cause of their downfall. It has been alleged, for example, that an American political scientist, Juan

Cole, was found unacceptable for a job position in 2006 at a prestigious American university because of anti-war sentiments he had expressed on his personal blog (Barbour and Marshall 2012). Several other cases exist involving the censure or disciplining of academics for statements that they made on social media sites of which their university disapproved (American Association of University Professors 2013). More recently, the Twitter comment expressed in 2013 by another American academic, evolutionary psychologist Geoffrey Miller, received a high level of social media attention and opprobrium when he asserted that he would not accept 'obese PhD applicants' as post-graduate students because their body size was evidence of their lack of 'willpower to stop eating carbs'. Although he later claimed that the tweet was part of a research project, Miller was denounced as a 'fat-shaming professor' and the case came under the examination of his university's Institutional Review Board (Ingeno 2013). Academics have also been the targets of libel actions instigated by people offended by comments they have made on social media (American Association of University Professors 2013). In response to these issues, some universities are beginning to institute restrictive guidelines that limit the freedom of academics to engage in social media as part of their professional practice.

The phenomenon of what is often termed 'trolling' or 'cyber bullying' – or the use of online media to engage in harassment and verbal abuse of other users – has received a high level of attention both in academic research and the popular media. The vast proportion of this discussion, however, has focused on children or adolescents. There is much less research about or wider discussion of the use of digital media to engage in the harassment of or malicious commentary about adults in the context of the workplace, including in higher education. I have observed that female academics who engage in fat activism using online forums or traditional media outlets are frequently targeted by vituperative comments about their appearance, lack of self-discipline and the like. (Ironically, these comments often serve only to demonstrate further the contentions of these academics concerning fat stigma and discrimination.) Sexual harassment has also been experienced by some female academics who have engaged in debates in public forums or who have used social media to communicate their research findings. Some female academics have described their experiences of their appearance and their sexual attractiveness being remarked upon following their participation in social media outlets or in the traditional mass media. In some cases, contributions from anonymous commentators have detailed sexual fantasies about the women, while in others the women's appearance

has been aggressively criticised (Beard 2013; Mitchell 2013). Non-white academics have also been subjected to racist comments, and female black academics have experienced both sexism and racism (Cottom McMillan 2012).

Those academics who express their opinions on controversial issues, who identify as gay or who challenge powerful institutions or commercial interests are also often the targets of comments questioning their professional integrity, as well as hate messages and even death threats (American Association of University Professors 2013; Chapman 2012; Cottom McMillan 2012; Kitchin 2014; Kitchin *et al.* 2013; Wade and Sharp 2013). Such abusive and overly racist, misogynistic or homophobic comments, which are often on public display and can be accessed via search engines, may be very confronting and disturbing for their targets, particularly if sexual violence or other violent acts against the targets are suggested. This is a wider problem of the affordances of online technologies: anyone who engages online is open to abusive comments that cannot easily be removed from internet archives (see further discussion of these issues in Chapters 6 and 7).

This was a concern that was expressed by several respondents in my survey, who identified their worry about being open to attack by using social media. Such attacks may descend into outright aggression, hate speech or harassment. Thus, for example, an Asian female mid-career academic noted: 'It can be a nasty unmediated space. If something goes wrong, unlikely upper management of Uni will support you. Trolling. Ick place if your work is non-normative: e.g. feminist, queer'. For a male early career academic from Australia/New Zealand, 'Visibility is an issue; there is always a concern about trolling and/or tweets posted appearing out of context in mainstream media'. A British female mid-career academic commented: 'I've had problems with trolls that have been quite disturbing'.

Early career researchers may be more vulnerable to trenchant criticism of their views at a time when they are still establishing their careers and seeking employment. More than established academics, who have less to lose, such junior academics are caught in a double-bind. Using social media such as blogs can be an important way for junior academics to establish a foothold in their field, get their name and research known, establish valuable networks with colleagues, and demonstrate to potential employers that they are engaging with the public in approved ways. On the other hand, however, some early career academics, particularly if they also come from marginalised social groups or are working in less prestigious universities, may find their opinions open to attack to a greater extent compared with more senior and socially privileged academics (Gregg 2009).

Significant concern about jeopardising their academic career or future job prospects was evident in the comments written by respondents who were early career researchers or postgraduate students, and, to a lesser extent, some more senior academics in my online survey. Several mentioned this concern as one of the issues they worried or were cautious about when using social media. For example, a British male mid-career academic wrote that he was worried that ‘sometimes forthright expression of views could cause issues for employers and affect my reputation. Use has to carefully balance professionalism and discretion with academic freedom and freedom of speech’. A British female postgraduate student noted that being too open in the content she shares on social media may make her vulnerable: ‘My Twitter mixes personal with academic online activity. I worry that my (left) politics and my openness about being queer may disadvantage me in getting jobs’. For others, the possibility that they may lose their jobs because of remarks they made on social media influenced their engagement on these sites. As an American female postgraduate student put it:

[I worry] that my university will fire me due to some public post, even though on ‘public’ social media I am very careful/self-censored (like Twitter) and on my more ‘private’ channels I use a pseudonym (like Tumblr). But I’m still nervous. All universities seem to be making some very questionable decisions and actions against their faculty.

Some writers have commented on the vulnerability that social media engagement such as blogging may engender in scholars who are used to formal academic writing styles and traditional procedures of publishing, in which one’s writing is vetted by one’s peers before it reaches an audience, and people outside academia do not have the opportunity to comment on one’s research (Estes 2012; Gregg 2006; Kirkup 2010; Kitchin *et al.* 2013; Maitzen 2012). As Gregg (2006: 154) points out,

Blogs reveal the mind of the critic as impressionable and open to persuasion, for the writer is rarely able to sustain the confidence and assurance of a fixed position. Such a function contrasts with conventional modes of academic performance premised on expertise and mastery.

This concern was evident in the responses written by some respondents in my survey. One European female postgraduate student wrote

that she was concerned about ‘coming across as dumb!’, while a female mid-career academic from Australia/New Zealand mentioned the risk of ‘putting a half-baked idea on the public record’. A male post-graduate student from the UK wrote: ‘I occasionally worry that having many “works in progress” sitting around on the internet may provoke a negative reaction if people judge them by the same standards as, say, journal articles’.

Posting one’s work on online media may also be considered a risky practice because of the loss of control that eventuates. New digital technologies offer great potential for sharing and disseminating these knowledges far more widely and rapidly than ever before, at the same time as allowing scope for greater transformation of these knowledges in ways which the original authors may not anticipate or approve. Academics need to be aware of the multitude of ways in which the content created by one author or group of authors may be reused and transmitted via different modes of publishing (retweeted or excerpted on other people’s blogs; tweeted in tiny ‘grabs’; commented upon; and so on). Using new media technologies, the product of sociologists’ and other academics’ labour may be reappropriated and transformed in ways that are unprecedented and may pose a challenge to traditional concepts of academic research and publication (Beer 2013b). Their comments can be deliberately misquoted, placed out of context and otherwise used in ways that would not be approved of by the original authors (Kitchin *et al.* 2013).

These processes of reuse and transformation have always been the subject of sociological research published in more traditional academic forums. Journal articles, books or reports are taken up and reappropriated by those who cite them in their own work, or by journalists reporting on their findings, in ways that may be unpredictable and which are completely out of the control of the original author. Sociologists have often been unhappy about the way their research has been reported in the traditional news media, for example, by being overly simplified and reduced to sound bites and controversial headlines. The difference in the new digital media era is the scale of such circulations and potential transformations of sociological knowledges that have escaped the academy.

As part of the digital knowledge economy of circulation and recursion, once digital data are generated they regenerate other data and are linked to each other. Prosumers continually create new or modified versions of data in a never-ending cycle, including creating new meta-data through classification practices such as tagging related to the data (Beer and Burrows 2013). Algorithms and practices of classification play important roles in structuring and shaping the ways in which

online academic content is used and discovered. They serve to identify some research as relevant and ignore others, while users' practices in tagging of others' contents serve as another way of making research more or less visible to others and making some connections between topics and writers while excluding others that are equally valid. The use of predictive algorithms of the types that are employed by Amazon and Google Go may begin to benefit academics by making recommendations of their work to others who are interested in the topics about which they write (Beer 2012a).

To some extent, some journal websites themselves have begun to operate in this way – by providing lists of related articles available in the journal when one is reading an article on a particular topic, or by displaying the articles that have cited the article one is perusing and providing hyperlinks that give ready access to these articles. Google Scholar now also provides a useful automatic customised alert service to users of articles that have been identified as related to topics on which the users have published. The growing scholarly community on Twitter can also play a role in sharing or retweeting links to articles and blog posts by other researchers working in common areas of interest and by using hashtags to organise content. The practice of tagging to produce metadata, therefore, plays a role in the ordering, organising and classification of academic knowledge in online forums. The value of the ideas and the quality of the writing are not necessarily the most important (or the only) features of whether or not a particular piece of work is widely circulated and read.

An example of this process from my own experience of social media use is when I publish blog posts. I tweet the link to the blog post when it is published, which is then retweeted by some of my followers (and perhaps by their followers to their own followers, and so on). I may receive some comments in my blog's comments section, and sometimes people re-blog the post on their own blogs, add it to a curated digital collection on a platform like Scoop.it or Bundlr, or write about it on their own blogs, providing a hyperlink back to the original post. They may give the material tags that may be different from those that I used for my original post. Sometimes I come across references to my blog posts in unexpected places. I have found my posts referenced in academic journal articles and, as I remarked earlier in this chapter, I sometimes draw on them myself to write traditional academic material. I may also link to my own previously published blog posts in new blog posts. Some of this use is under my control (when I use my own material for my purposes); most of it is not.

The possibilities of plagiarism have also been raised by some academics as a risk of engaging in digital public scholarship. Some

academics who blog have noticed that their content has been used by others, sometimes verbatim, without any form of attribution to its original source. This experience has led them to reconsider the benefits of blogging (see, for example, an account by Williams 2013). This issue was also brought up by some of the academics who responded to my survey. As a British female early career academic mused: ‘how much can/should you share of your research via social media before it’s published, and who, if anyone, cites pre-article material (and how)?’

It is not known, however, whether blogs are more open to plagiarism than are other forms of academic publication. Given that blog posts carry the name of the author as well as the date of publication, both of which can be easily verified and cited by anyone wanting to refer to this material, there is no justification for such material to be plagiarised, apart from the fact that it is more accessible to the public than is academic writing that is published in journals that require a subscription or payment of an article fee to access. Indeed, many major style guides now provide guidelines for how to cite blog posts and tweets in academic writing. More difficult to control is the sharing of one’s scholarly content via other forms of social media. Some academics are concerned that if their conference papers are live-tweeted at conferences, audio- or videotaped, blogged about, or otherwise shared on social media by others their new and original ideas may be misrepresented or stolen before they have a chance to fully develop them. The same argument has been made about teaching resources in terms of preserving intellectual property rights and the right of academics to privacy in relation to comments they may make in classes or emails to students (American Association of University Professors 2013).

Beer (2012a, 2013b) argues that this increasing potential of publishing in a variety of forums beyond the traditional academic journal and book may also lead to a proliferation of sociological material being available, much of which may struggle to find an audience. While high-profile academics may receive even more attention by using new digital platforms of expression, maintaining a digital presence to bolster their credentials, others may be ignored and fail to receive adequate acknowledgement of their work. Beer observes that this has happened to the music industry in the wake of digitisation. Large numbers of musicians are publishing their work online and making it freely available, but are failing to achieve a desired level of impact or to receive adequate remuneration for their work. According to Beer, if digital outlets for publication and dissemination of sociological research become valued in the university, it will be those academics who are skilled at marketing themselves and using digital

tools who will benefit, while those who are unwilling or unable to employ these technologies will be disadvantaged.

A debate has also developed in response to the proliferation of online courses, which has caused many commentators to question the pedagogical value of these courses and their implications for employment levels and academic workloads. Some critics view online courses as yet another opportunity for governments to withdraw funding for face-to-face teaching in favour of what are viewed as less expensive forms of instruction via online technologies (Smith and Jeffery 2013). From this critical perspective, if there is a push to encourage academics to learn about and use social media, open-education technologies and open-access publication forums solely as parts of their universities' imperatives for public engagement and impact, the digitised academic may be positioned as yet another facet of the neoliberal ethos of the contemporary university (Burrows 2012; Gill 2010; Holmwood 2010).

Open-access initiatives have also been subjected to critique. The basic tenet of open access is clearly a sensible one: it is difficult to argue against the idea that researchers' insights should be rendered accessible outside the walls of the academy. However, it has been noted by some that these initiatives, while clearly providing opportunities for researchers to publish their work in ways to which members of the public can gain access, have begun to be monetised by some publishers to the detriment of some academics. There are now three methods of open access:

- 'green' – publishing without charge in such places as university e-repositories or sites such as one's personal website, Academia.edu and ResearchGate;
- 'gold' – paying academic journals an article-processing fee upon acceptance of the article for it to be rendered open access by the journal; and
- 'platinum' – in which open-access journals publish an article free of charge.

Critics have questioned how researchers from traditionally under-funded disciplines such as the humanities and social sciences will find the money to pay article-processing fees if they wish to publish in a journal that has adopted the 'gold' open-access approach.

The apparent co-option of traditional academic publishers of open-access initiatives for commercial gain has attracted much critique and disquiet. Many academics in science, medicine and technology have embraced open-access publishing and there are several well-established open-access journals in their fields. However, some academics in the

humanities and social sciences have felt pushed into rendering their material open access by funding bodies or their own institutions, and they are now concerned that this will affect their chances of publishing in the more established publication forums that have higher reputations (LSE Public Policy Group 2013; Weller 2013).

So too, the notion that publishing in digital formats is somehow easier, less expensive, more permanent and less a product of human labour than traditional forms of scholarly publication has been challenged (Drucker 2014). As I contended in Chapter 1, digital data are material artefacts and their production and storage consume material resources. Digitised publications are subject to deterioration and loss of access if they are not carefully maintained and the platforms on which they reside constantly upgraded. Costs are associated with preserving digital archives and providing the energy resources to support servers. If a publication exists only in a digital format and the platform upon which it is archived is removed, then it simply disappears. Digital academic texts still need careful reviewing, editing and proofing, their format needs to be attractive and readable, and they need to be distributed and publicised, all of which requires the labour of the author or others in the production process (Drucker 2014).

In this chapter, I have adopted a reflexive sociological stance on the use of social and other digital media as parts of digital sociology, outlining a number of considerations and complexities related to 'digitising' oneself as an academic. As I have shown, using social media is a very effective way of facilitating openness and engagement. However, there are some pitfalls and risks associated with rendering one's ideas 'open' to the public. Academics who engage in digital public engagement may be subjected to public criticism of their ideas, unfounded or legitimate, as part of receiving wider attention. This criticism disproportionately affects specific social groups within higher education. Further, while using these media for academic work is always a performance of professional selfhood, it matters whether this performance is mandated by employers or springs from a genuine desire or interest on the part of the academic in engaging as a digital public scholar. As such, there may be said to be a politics of digital engagement, in which some academics, particularly those who are members of marginalised social groups or who are junior academics seeking tenure or those in short-term employment contracts, may need to be very cautious about the types of opinions they express in open digital forums. Quite simply, engaging as a digitised public scholar may be too confronting for some academics.

A critical sociology of big data

In recent years, there has been extensive discussion of and publicity about the possibilities for social research, commercial enterprise and efficient government offered by the massive digital data sets – big data – that are now collected via individuals' online activities. In the popular media and in data science, business, global development, policing and security, politics, healthcare, education and agriculture, much is made of the potential offered by these ever-expanding data sets. Big data are viewed as offering greater precision and predictive powers to improve efficiency, safety, wealth generation or resource management. The capacity of digital technologies to harvest, mine, store and analyse data is represented as superior to other forms of knowledge, offering greater opportunities than ever before to delve into human behaviours. From a critical sociological perspective, however, there is much more to say about big data as sociocultural artefacts.

Following an overview of the ways in which big data discourses and practices have achieved dominance in many social spheres, I discuss how digital data assemblages and algorithms possess power and authority, the metaphors used to describe big data and what these reveal about our anxieties and concerns about this phenomenon, big data hubris and rotted data, and the ethical issues relating to big data.

THE BIG DATA PHENOMENON

Data that are digitally generated or stored via digital means have been in existence since the early years of computing. What the 'big data' term refers to is the major expansion in the contemporary era of the quantities of digital data that are generated as the products of users' transactions with and content generation via digital media technologies, as well as digital surveillance technologies such as CCTV cameras, RFID chips, traffic monitors and sensors monitoring the natural environment. Digital data objects are not only constantly generated but they are also highly detailed, able to pinpoint many users' activities with great precision. Mobile devices such as smartphones collect data on who the user calls, what websites and platforms they browse and search terms they use and also details on the location and body movements of their users through their embedded GPS receivers, compasses, gyroscopes and accelerometers. These data are considered 'bigger' than other forms of data because of their ever-increasing volume, constant state of generation, the variety of sites from which they are produced, the capacity to search within and compare the data sets, and their potential to link to each other to create new and more detailed data sets. These features of digital data, it is argued, require new ways of storing, processing and analysing the data (boyd and Crawford 2012; Dumbill 2013).

The term 'big data' is appearing with ever-greater frequency in the popular media, government reports and business-related blogs. I conducted a Google Trends graph of the frequency of searches for the term 'big data' from January 2004 to March 2014 (appropriately enough using a big data tool to research big data). This showed that the frequency of searches remained low until the end of 2010. From 2011, however, the term was searched for increasingly frequently, and has risen steadily, reaching its peak (at the time of writing) in March 2014. The Google Trends analysis also demonstrated that the regional interest in big data, as indicated by Google searches, was by far the greatest in Asia, with India demonstrating the most relative interest, followed by Singapore, South Korea, Taiwan and Hong Kong.

As individuals, corporations and government agencies gather more data and become aware of its apparent value, a breathless rhetoric has emerged around the concept of big data. It is assumed that the more data are gathered and analysed, the better. Such an approach is evident in the first book to be published about the potential of big data for a popular readership, entitled *Big Data: A Revolution That Will Transform How We Live, Work and Think* (Mayer-Schonberger and Cukier 2013). The book's dramatic title is indicative of the authors' view that big data represents a revolutionary phenomenon. *Big Data for Dummies*

(Hurwitz *et al.* 2013) is also now available to instruct lay readers in the uses and potential of big data. A report with somewhat more gravitas by the British House of Commons Public Administration Select Committee (2014) represents digital data sets as containing ‘unused knowledge that otherwise goes to waste, which can be used to empower citizens, to improve public services, and to benefit the economy and society as a whole’. The US federal government has also supported open digital data initiatives. The Data.gov website has been established as a platform for centralising government data and providing access to these data, with over 85,000 searchable data sets made available.

Online users’ activities and choices become converted into precious data commodities that can be sold on to third parties or used by the corporations that collect the data for their own purposes. A growing industry has developed that is directed at harvesting – or scraping – the web for data, and the profession of ‘data brokering’ has emerged, which involves the accessing and selling on of data for profit. A kind of digital vitality has been generated, in which information and data have taken on value in themselves, contributing to the digital knowledge economy discussed in Chapter 2. As one marketer was quoted as remarking: ‘From a marketer’s perspective, this new class of data is a goldmine. Just think what we can do with minute-by-minute tracking of body movements, physical reaction to external stimulus (like ads!), weight and body changes and geolocation’ (Anonymous 2013).

According to the editor of the new data science journal *Big Data*, a shared assumption in public discourse on big data is ‘the notion that we might compute our way to better decisions’ (Dumbill 2013: 1). The authors of a report by the McKinsey Global Institute, the research arm of a large global management company, put it in these terms: big data ‘will become a key basis of competition, underpinning new waves of productivity growth, innovation and consumer surplus ... Leaders in every sector will have to grapple with the implications of big data, not just a few data-oriented managers’ (Manyika *et al.* 2011: n.p.). The authors go on to contend that big data can make information ‘transparent and usable at much higher frequency’, can provide ‘more accurate and detailed performance information’ for organisations who collect and analyse these data, to ‘help make better management decisions’, to allow ‘ever-narrower segmentation of customers’ for more targeted marketing efforts, to ‘substantially improve decision-making’ and to ‘improve the next generation of products and services’ (Manyika *et al.* 2011: n.p.). Practitioners of data science are now frequently portrayed in news reports and blogs as the newest hot profession, and their scarcity is bemoaned. Indeed, according to the *Harvard Business Review*, data science is ‘the sexiest job of the 21st century’ (Davenport and Patil 2013).

While presumption has been a feature of capitalist economies for some time, the new digital media technologies have provided the conditions for an expansion of these activities and the surveillance of consumption habits in real time (Ritzer 2014). The data they procure are used to construct profiles of consumer habits and to market to consumers in ever more detailed and personalised ways. As data can now be merged from multiple databases, their precision and predictive power have become enhanced. Marketing companies now seek to combine various approaches to eliciting and analysing consumer sentiment with statistics about their purchasing habits, and large digital data sets are viewed as contributing major insights to the understanding of consumer behaviour and direct marketing efforts in what is sometimes referred to as 'data fusion'. They view 'clickstream analysis' data (recordings of web users' activities) as providing more accurate and less expensive information about consumer habits and preferences (Breur 2011).

Social media and digital information companies such as Facebook, Microsoft and Google, as well as major retailing companies like Amazon, Target and Walmart, have led the way in realising the ways in which the data that users voluntarily contribute about themselves may be used to in turn target the users for product development and advertising that is tailored and customised. These companies are currently building huge digital data storage centres (Lesk 2013). One of the largest companies engaged in database marketing, Axiom, claims to have digital data records on hundreds of millions of Americans taken from a wide array of data sets. It is able to compile digital profiles based on these data sets that can identify such features as a person's age, gender, ethnicity or race, number of children, education level, place of residence, type of car they drive and so on. Axiom sells these data profiles to its customers, which include large banks, credit card issuers, telecom/media companies and insurance companies (Marwick 2014).

Many retailers now have customer loyalty schemes, in which customers are issued with cards that are swiped at the checkout when they are paying for their purchases. Data about the purchases are then archived by the supermarket and used for marketing purposes or sold on to their own clients. Customers are enticed to join up by winning discounts or products once they have accumulated enough points. If retailers are able to connect enough databases, they are able to market their products in ever more detailed and customised ways to consumers. It has been estimated that the American retailing giant Walmart has gathered online consumer data on more than 60 per cent of American adults and it shares its digital database with over 50 third-party partners. Walmart not only collects data on what its customers purchase but also

tracks their movements around its stores using in-store wi-fi technology (Center for Media Justice, ColorOfChange, Sum of Us 2013). Target, another major American retailer, uses combined customer purchases to estimate not only if a female customer is pregnant, but even what her due date may be, by analysing patterns of purchasing. If a woman begins purchasing unscented lotion or lotion advertised to help alleviate stretch marks, cotton balls, hand sanitiser and pregnancy vitamins, she is deemed to be pregnant and accordingly sent baby-related vouchers by the company. Once Target realised that customers may become 'creeped out' by how much it knew about them, it began to send pregnant women baby vouchers combined with other non-pregnancy-related products to allay their suspicions (Duhigg 2012).

In Australia, the Woolworths supermarket chain also owns an insurance company and petrol stations and has a 50 per cent share in a data analytics company. Using the combined databases drawn from their customer loyalty programme and insurance company and employing the skills provided by their data analytics company, Woolworths were able to demonstrate that they could target consumers for insurance packages based on their supermarket purchasing habits. They found that customers of their supermarkets who purchased higher quantities of milk and red meat were better car insurance risks than those who purchased high quantities of pasta and rice, filled their cars with petrol at night and drank spirits. Based on the information in these datasets the two groups of customers were then targeted for offering different insurance packages involving different premium costs (Wallace and Whyte 2013).

The other major Australian supermarket chain, Coles, released a detailed description of its privacy policy for its customer loyalty and online shopping schemes in March 2014. The updated policy revealed how many other companies with which it shared customers' personal data (30 companies owned by the corporation that also owns Coles) and that these data were sold to third parties in at least 23 other countries. The new privacy policy also revealed that personal information Coles collected on customers, including name, contact and household details, transaction history and buying habits, can be used for conducting risk assessments for credit and insurance, products also sold by the corporation (Thomson 2014).

As more objects become digitised and 'smart', attached to sensors and connected to the internet, some devices have been developed that are able to closely monitor and measure human behaviour, either for commercial or administrative purposes. As mentioned above, retailers such as Walmart monitor the movements of shoppers in their stores using wi-fi. A growing number of developers of health self-tracking apps and platforms are selling the data they produce to third parties.

Users download the apps for free, but the data they generate are the products that are sold by the app developers (Dredge 2013; McCowen 2013). Another example is the black box recorder that can be attached to a car engine and transmit regular reports on driver behaviour, including driving times, locations, speed, braking and cornering forces. As part of the 'telematic insurance' phenomenon, these data are sent wirelessly to insurance companies for their use in determining how risky drivers are considered to be and therefore whether they should be offered insurance and at what level of premium (McCowen 2013). Through the use of these types of technologies, assessments of risk become ever more personalised and fine-grained.

Sensor-based technologies have also been used to generate digital data on phenomena in the organic world, such as animals, soil, waterways and plants. Workers in the agricultural sector have identified the potential of big data derived from databases of climate, crop yields, soil analyses and livestock behaviours to develop 'precision agriculture' or 'smart farming'. Farmers are increasingly using sensor-based devices, RFID tagging of livestock and big data to improve their productivity. Many tractors and combine harvesters are equipped with digital technologies that collect data on geo-location, crops and soil. The developers of 'prescription planting' technologies use aggregated data from farmers and meteorological data to create algorithms that direct users how to most efficiently use their resources to improve their yields. The giant seed company Monsanto had led the way in developing technologies using big data, including its acquisition of Climate Corp, a weather data-mining company. Its FieldScripts application suite uses agricultural and climate data in conjunction with its own data on the genetic properties of its seeds to make recommendations to farmers about how they should best plant their seeds (Bunge 2014).

Australia's peak scientific research body, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), recently published a report on 'smart farming'. This report referred to the potential of objects equipped with sensor-based technologies to contribute data to maximise the productivity of Australian agriculture by creating an Internet of Things, sharing data with each other, such as pasture vegetation, soil moisture, livestock movements and farm equipment. A key feature of 'smart farming', the report's authors contend, is the ability to use cloud computing to aggregate these data from numerous farms to provide big data analytics. These analytics can predict such features as pasture growth and the early detection of subclinical diseases in livestock and enhance monitoring of crop yield, pasture quality, feed allocation systems and animal reproductive performance, weight, growth rates and health (Griffith *et al.* 2013).

The potential for humanitarian uses of big data has also been identified. The World Economic Forum (2011) has represented digital data as creating new opportunities for wealth creation and alleviating social disadvantage and ill-health. Personal data are described as ‘the new oil’ and ‘a valuable resource of the 21st century’ in its report on ‘personal data as the new asset class’ (World Economic Forum 2011: 5). According to a United Nations report (Letouze 2012), open access to ‘real-time’ digital data offers major opportunities for global development. The United Nations has launched its Global Pulse initiative, which is directed at using big data to track and monitor the impacts of global and local socioeconomic crises and to mitigate the risks of these. Google now offers several tools that draw on data from Google searches to provide indications of outbreaks of diseases such as influenza and dengue fever (Google Flu Trends and Google Dengue Trends), locations of crises and natural disasters such as floods and bushfires (Google Public Alerts and Google Crisis Map) and assistance in locating people who may have been dislocated in times of crisis or natural disasters (Google Person Finder).

The lure of big data has had a major impact upon healthcare policy. Many public health units, hospitals and other healthcare facilities are putting into place data management systems in an attempt to better deal with and plan for demands on their services. There is now much focus on and discussion concerning the power of the vast data archives gathered by digital technologies both to inform patients about their own bodies and to provide information to healthcare providers about the health states of populations and the use of healthcare. Numerous reports and journal articles have been published on the predicted benefits that generating and using big data sets will bring for medicine and public health, including improving healthcare delivery as well as disease monitoring and prevention (e.g. Barrett *et al.* 2013; Hay *et al.* 2013; Murdoch and Detsky 2013; Swan 2013). Several countries are attempting to transfer patient records into electronic form and are investigating the ways in which these data may be mined for insights into patterns of health, illness and medical treatment to improve the quality of healthcare (Garrety *et al.* 2014). The English National Health Service (NHS), for example, launched the care.data initiative in 2014, directed at digitising medical records of patients in its system, both from general practitioners and hospitals, and combining them into a massive database, with the motto ‘Better information means better care’. The data from the care.data database was planned not only for research into healthcare services but also to serve a commercial function, with the NHS selling the data to private enterprises such as health insurance companies.

In the domain of school education there is increasing interest in using digitised data drawn from many data sets and combining them to provide increasingly detailed data profiles of students. 'Learning analytics' are used to create 'learning profiles' for individual students that diagnose their strengths and weaknesses and ways of learning. Across groups of students (segmented by gender, age, socioeconomic status and ethnicity/race), predictive analytics are employed in the attempt to identify features of performance that can then be used to improve learning (Grant 2013). This is also taking place at the level of higher education in some countries. Some American colleges, for example, are using predictive analytics combining data from students' grades, number of hours they are enrolled during each semester, number of hours they are working outside university and the level of financial assistance from their families as well as other factors to determine which new students are most likely to encounter problems once enrolled (Ungerleider 2013).

Policing and security agencies are also tapping into big data to identify security threats and behaviour patterns, patterns in crime and potential suspects or terrorists and as part of 'predictive policing' make predictions about who might commit criminal or terrorist acts and where. The American Federal Bureau of Investigation enters details of date, time, type and location of recent crimes into databases and combines this information with historical crime data to produce algorithmically generated 'crime hotspots' at which greater surveillance and other policing resources are directed. Law enforcement and security agencies also attempt to identify suspicious groups or individuals who are targeted for surveillance, further investigation, search or detention (Crawford and Schultz 2014). As was evident from the documents released by Edward Snowden, the American and other anglophone governments have been engaging in extensive surveillance activities of their own citizens by accessing digital data collected by commercial enterprises. Given the extent of these surveillance data-gathering activities, it is not surprising that the NSA is building a massive data centre for its own storage purposes (Lesk 2013).

DIGITAL DATA ASSEMBLAGES AND ALGORITHMIC AUTHORITY

In information or data science, data are generally represented as if they are the raw materials for information and algorithms as the neutral agents for processing these pieces of information. They are represented as the scientifically produced, *a priori* basis for developing 'information' when structured or arranged in a particular context (moving from 'raw

data' to analysed data), which in turn is used to construct 'knowledge', which may involve meaning, cultural beliefs and value judgements (Räsänen and Nyce 2013). As I contended in Chapter 2, sociologists and other scholars interested in media and communication have developed a different perspective on the big data phenomenon and on the algorithms that are used to collect, classify and process big data. They emphasise that big data are not as objective, complete and neutral as they are portrayed in mainstream representations. The production and use of big data are political, social and cultural processes.

From this perspective, numbers are sociotechnical devices that are inseparable from the practices that seek to enumerate the materials they measure (Uprichard 2013; Verran 2012). They are 'semiotically agential', used for particular rhetorical and discursive purposes: 'the workings of numbers are deeply embedded in and constitutive of the real – they lubricate its happening' (Verran 2012: 112). In other words, numbers can play a part in constituting phenomena, bringing them into being, making them as well as making sense of them. Numbers are not neutral and objective, although they are widely believed to be so, particularly in relation to qualitative sources of knowledge. They have an inextricable relationship to what is considered to be valuable, used both to produce value and to measure value, and also standing for what is considered valuable to quantify in the first place (West 2014).

The digital data objects that are rendered into numbers by digital technologies are both the products of sociotechnical devices and such devices themselves, possessing their own agency and power. There is no such thing as 'raw' data – indeed, according to the memorable title of one book on this subject, 'raw data' is an oxymoron (Gitelman 2013). There are conventions and practices of seeking out, recording, archiving and categorising data that are themselves configured via specific beliefs, judgements, values and cultural assumptions that 'cook' the data from the very beginning so that they are never in a 'raw' state (Baym 2013; boyd and Crawford 2012; Gitelman and Jackson 2013; Räsänen and Nyce 2013). Rather than pre-existing items of information, digital data are co-produced or co-authored by those who make the software and devices that elicit and archive them, the coders who generate the algorithms in the software and those who use these technologies. Those individuals or institutions who archive data have an important role to play in how the data are ordered and classified, and, therefore, in the ways in which they are accessed and retrieved by potential users (Beer 2013a).

At each step in the process of generating digital data, human decision-making, judgement, interpretation and action are involved. Some phenomena are selected to be collected as 'data' while others are

not; some of these data are considered important to analyse while others are not; some are rendered visible while others remain invisible (Andrejevic 2013; boyd and Crawford 2012; Vis 2013). Problems and practices are produced via algorithms, as are solutions to problems (Beer 2009, 2013a; Cheney-Lippold 2011; Lash 2007; Rogers 2013). Once the data are produced, interpretations are made about how they should be classified, what they mean and how they should best be represented. These interpretations again rely on subjective decision-making: 'we tell stories about the data and essentially these are the stories we wish to tell' (Vis 2013).

The algorithms that shape the ways in which digital data are collected and classified are the result of human action and decision-making, but they possess their own agential power. Algorithms do not simply describe data; they also make predictions and play a part in the configuring of new data. For example, search engines possess what Rogers (2013: 97) refers to as 'algorithmic authority' and act as 'socio-epistemological machines': they influence what sources are considered important and relevant. Algorithms play an influential role in ranking search terms in search engines, ensuring that some voices are given precedence over others. From this perspective, the results that come from search engine queries are viewed not solely as 'information' but as social data that are indicative of power relations. Google's Page Rank system has enormous influence in determining which webpages appear when a search term is used, and therefore which tend to be viewed more often, which in turn affects the algorithms dictating page ranking.

It has been asserted by some scholars that traditional concepts of knowledge have become challenged by big data. In the global digital knowledge economy, knowledge that is quantifiable, distributable and searchable via online technologies is represented as superior (Andrejevic 2013; Smith 2013). At the same time, information has become limitless and more difficult to define. The logic of the predictive and analytic power of big data is that all information about everyone is important, because it cannot be known in advance what data may become vital to use. Hence the incessant need to generate and store data. Data mining is therefore speculative as well as comprehensive (Andrejevic 2013).

So, too, new ways of conceptualising people and their behaviours have been generated by big data discourses and practices. Indeed, it has been contended that our 'data selves' as they are configured by the data we and others collect on ourselves represent human subjects as archives of data: 'digitised humans' or 'data-generating machines' (McFedries 2013). For some commentators, this is having the effect not only of turning people into data but also encouraging them to

view themselves as data assemblages above other ways of defining identity and selfhood: 'We are becoming data ... So we need to be able to understand ourselves as data too' (Watson 2013). Not only are people represented as data-generating objects in these discourses, by virtue of the commercially valuable data that consumers generate they are portrayed simultaneously as commodities. It has now become a common saying in relation to the digital data economy that 'you are the product'.

Algorithms are constitutive of new types of selfhood: they create 'algorithmic identities' (Cheney-Lippold 2011). The digital data that are collected on populations are a specific means of constructing certain types of assemblages of individuals or populations from a variety of sources. Algorithms join together various data fragments. Digital data are both drawn from the actions and interactions of individuals and also shape them, either by external agencies using the numbers to influence or act upon individuals or by individuals themselves who use the data to change their behaviour in response. A continual interactive loop is therefore established between data and behaviour (Ruppert 2011; Smith 2013). Using digital databases, individuals and social groups or populations are rendered into multiple aggregations that can be manipulated and changed in various ways depending on what aspects are focused on or searched for. Behaviours and dispositions are interpreted and evaluated with the use of the measuring devices, complex algorithms and opportunities for display afforded by these technologies, allowing for finer detail to be produced on individuals, groups and populations. The metrics derived from digital databases make visible aspects of individuals and groups that are not otherwise perceptible, because they are able to join up a vast range of details derived from diverse sources. Organisations use algorithms to confer types of identities upon users (employing categories such as gender, race, location, income status and so on) and in doing so redefine what these categories come to mean (Cheney-Lippold 2011; Ruppert 2012).

Furthermore, as outlined earlier in this chapter, the analysis of big data is playing an increasingly integral role in identifying certain behaviours, activities or outcomes as appropriate or 'normal' and others as deviating from the norm. The rhetorical power that is bestowed upon big data has meant that they are viewed as arbiters of drawing distinctions between acceptable and unacceptable practices and behaviours: in effect, shaping definitions of 'normality'. Here again, algorithmic authority has political and economic consequences. Big digital data have begun to shape and define concepts of 'dangerous', 'safe', 'unhealthy', 'risky', 'under-achieving', 'productive' and so on, thus producing and reproducing new forms of value. Via such data

assemblages, norms are constructed using vast aggregated masses of data against which individuals are compared. Individuals or social groups are identified as ‘problems’ as part of this process of normalisation, and the solutions for ameliorating these problems are often themselves digital devices or technologies. Thus, for example, the solution for patients who lack healthcare facilities is often touted as providing them with digital self-monitoring and self-care devices; students who are diagnosed as under-achievers are prescribed digital learning packages; individuals who are deemed a risk to society are required to wear RFID devices so that their movements may be digitally tracked.

Algorithms have become increasingly important in both generating and accessing knowledge. As discussed in Chapter 2, one important element introduced by Google is its customisation of the experience of internet use. It is different for each user now that searches and hyperlinks are customised for each individual based on the archiving and algorithmic manipulation of their previous searches. As a result, Google search engine results are ‘co-authored by the engine and the user’; or, in other words, ‘the results you receive are partly of your own making’ (Rogers 2013: 9). This means that the returns from the same search term may be different for every user, as the search engine uses its algorithms to determine the most appropriate results for each individual based on previous search histories. The authority of the algorithm that operates via such technologies means that users’ capacity to search the web and the types of information they find are delimited by their previous interactions with Google.

It has also been contended that as a consequence of predictive analytics, digital technology users may end up living in a ‘filter bubble’ or an ‘echo chamber’ (Lesk 2013). If Amazon is continually recommending books to people based on past search or purchasing habits, if Google Search customises search terms for each individual enquirer, if Facebook and Twitter target direct marketing to users or suggest friends or followers based on their previous searches, likes, comments and follower/friendship groups, then they are simply reinforcing established opinions, preferences and viewpoints, with little to challenge them. The Google autocomplete function, which suggests the format of search terms before they are completely typed in by the user, depends on predictive algorithms that are based on not only your own but other users’ previous searches. Thus, users and the software comprise a digital assemblage of content creation and recreation, of co-authorship and mutual decision-making about what content is relevant (Rogers 2013).

Cheney-Lippold (2011) adopts a Foucauldian perspective to characterise algorithmic authority as a kind of ‘soft power’ operating in the

domain of biopolitics and biopower – the politics and power relations concerned with the regulation, monitoring and management of human populations. This theoretical position, as expressed in the participatory surveillance perspective (Chapter 2), emphasises the indirect and voluntary nature of accepting the disciplinary directives offered by algorithmic authority. Various possibilities are offered, from among which users are invited to select as part of ‘tailoring [life’s] conditions of possibility’ (Cheney-Lippold 2011: 169). The digital subject is made intelligible via the various forms of digital data produced about it using algorithms, as are the conditions of possibility that are made available. This is a form of power but one that configures and invites choice (albeit by also structuring what choices are generated) based on the user’s previous and predicted actions, beliefs and preferences. It should be emphasised, however, that algorithmic identities are not always linked only to soft biopower but also to coercive and exclusionary modes of power (‘hard biopower’), as when predictive analytics are used to identify and target potential criminals or terrorists or certain categories of individuals are denied access to social services or insurance. Such strategies participate in a ban-optic approach to surveillance by identifying groups or individuals who are considered risky or threatening in some way and attempting to control, contain them or exclude them from specific spaces or social support.

When concepts of identity are structured via the impregnable logic and soft power of the algorithm, traditional forms of resistance to biopower are difficult to sustain (Cheney-Lippold 2011). The ‘black boxes’ that are the software and coding protocols that organise and order these technologies are invisible to the user. We do not know how algorithms are working as part of the surveillance of our internet activities or movements in space. All we are aware of are the results of algorithmic calculation: when we are excluded from certain choices and offered others. As a result, this form of power is difficult to identify or resist. We may disagree with how the algorithm defines it, but opportunities to challenge or change this definition are few, particularly in a context in which computer coding and data manipulation are considered politically neutral, authoritative and always accurate.

BIG DATA ANXIETIES

While big data have been lauded in many forums, there is also evidence of disquiet in some popular representations. The ways in which big digital data are described rhetorically reveal much about their contemporary social and cultural meanings. As Thomas (2013) writes in her

book *Technobiophilia: Nature and Cyberspace*, organic metaphors drawn from the natural world have been continually used to describe computer technologies since their emergence. Such natural terms as the web, the cloud, bug, virus, root, mouse and spider have all been employed in attempting to conceptualise and describe these technologies. These have sometimes resulted in rather mixed metaphors, such as ‘surfing the web’. Thomas argues that because of the ambivalence we hold towards these technologies, we attempt to render them more ‘natural’, and therefore less threatening and alienating. This approach to naturalising computer technologies may adopt the view of nature that sees it as nurturing and good. However, nature is not always benign: it may sometimes be wild, chaotic and threatening, and these meanings of nature may also be bestowed upon digital technologies.

This ambivalence is clearly evident in the metaphorical ways in which big data are described, both in popular culture and in the academic literature. By far the most commonly employed metaphors to discuss big data are those related to water: streams, flows, leaks, rivers, oceans, seas, waves, fire hoses and even floods, deluges and tsunamis of data are commonly described. Thus, for example, in an academic article, Adkins and Lury (2011: 6) represent digital data in the following terms: ‘Neither inert in character nor contained or containable in any straightforward sense, data increasingly feeds back on itself in informational systems with unexpected results: it moves, flows, leaks, overflows and circulates beyond the systems and events in which it originates’. In a blog post about how data philanthropy can operate, again the notion of the excess and fluidity of data is evident: ‘We are now swimming in an ocean of digital data, most of which didn’t exist even a few years ago’ (Kirkpatrick 2011).

These rather vivid descriptions of big data as a large, fluid, uncontrollable entity possessing great physical power emphasise the fast nature of digital data object movements, as well as their unpredictability and the difficulty of control and containment. It draws upon a current move in social theory towards conceptualising social phenomena in general as liquidities, fluxes and flows, circulating within and between social entities (Sutherland 2013). The metaphor is evident, for example, in the title of Lyon and Bauman’s book *Liquid Surveillance* (2013). Writers on digital technologies also commonly employ these concepts when discussing the circulation and flow of digital data. These metaphors build on older metaphors that represented the internet as a ‘super highway’, or information as passing along the internet via a series of conduits, tunnels and passageways. Information here is viewed as substances that can pass easily and quickly along defined channels (Markham 2013). Some commentators have suggested, indeed, that

'cybercultures are cultures of flow', given the circulation of meaning, data, communities and identities around and through the conduits of the internet. This suggests that cybercultures, communities and digital information have no limitations or boundaries and cannot easily be controlled (Breslow and Mousoutzanis 2012: xii).

Digital data objects, thus, are frequently described and conceptualised not as static pieces of information, but as participating in a dynamic economy in which they move and circulate. This discourse is an attempt to convey the idea that many types of digital data, particularly those generated and collected by social media platforms and online news outlets, constantly move around various forums rather than sit in archives. In the process they may mutate as they are reused in a multitude of ways, configuring new social meanings and practices. Digital data objects are described as recursive, doubling back on each other or spreading out and moving back again. Indeed, it has been contended that a performativity of circulation has been generated, as well as an economy of likes/clicks/retweets, in which the value of data is generated by how often they have been reused, approved of and circulated (Beer 2013a; Beer and Burrows 2013). The liquidity, permeability and mobility of digital data, therefore, are often presented as central to their ontology and as contributing to their novelty and potential as valuable phenomena.

I would argue, however, that this liquidity metaphor is underpinned by an anxiety about the ubiquity and apparent uncontained nature of digital technologies and the data they produce. It suggests an economy of digital data and surveillance in which data are collected constantly and move from site to site in ways that cannot easily themselves be monitored, measured or regulated. Both academic and popular cultural descriptions of big data have frequently referred to the 'fire hose' of data issuing from a social media site such as Twitter and the 'data deluge' or 'tsunami' that as internet users we both contribute to and which threatens to 'swamp' or 'drown us'. Such phraseology evokes the notion of an overwhelming volume of data that must somehow be dealt with, managed and turned to good use. We are told that 'the amount of data in our world is exploding', as researchers at the McKinsey Global Institute put it in a report on the potential of big data (Manyika *et al.* 2011). Instead of 'surfing the net' – a term that was once frequently used to denote moving from website to website easily and playfully, riding over the top of digital information and stopping when we feel like it – we now must cope with huge waves of information or data that threaten to engulf us. The apparent liquidity of data, its tendency to flow freely, can also constitute its threatening aspect, its potential to create chaos and loss of control.

Other metaphors that are sometimes employed to describe the by-product data that are generated include data ‘trails’, ‘breadcrumbs’, ‘exhausts’, ‘smoke signals’ and ‘shadows’. All these tend to suggest the notion of data as objects that are left behind as tiny elements of another activity or entity (‘trails’, ‘breadcrumbs’, ‘exhausts’), or as the ethereal derivatives of the phenomena from which they are viewed to originate (‘smoke signals’, ‘shadows’). Digital data are also often referred to as living things, as having a kind of organic vitality in their ability to move from site to site, morph into different forms and possess a ‘social life’ (Beer and Burrows 2013). The ‘rhizome’ metaphor is sometimes employed to describe how digital data flow from place to place or from node to node, again employing a concept that suggests that they are part of a living organism such as a plant (Breslow and Mousoutzanis 2012). The rhizomatic metaphor also suggests a high level of complexity and a network of interconnected tubes and nodes. Another metaphor that represents the digital data system as a living entity, even a human body, is that which refers to a change from the ‘digital exoskeleton’ that supported businesses and government agencies by providing information to a ‘digital nervous system’ that is an inherent part of any organisation. The ‘digital nervous system’ metaphor is used by Dumbill (2013: 2) to denote both the importance of digital systems to organisations and their reactivity and even unpredictability: ‘in a very real sense, algorithms can respond to and affect their environments’.

Such a metaphorical linking of digital technologies with living creatures, including human bodies, has long been evident. I have previously written about the ways in which popular cultural representations of the threats of computer viruses in the 1990s depicted personal computers as human entities becoming ill from viral infection. This metaphor suggested the presence of a malevolent alien invader within the computer causing malfunction (Lupton 1994). While the term ‘virus’ has become taken-for-granted in its use in relation to digital technologies, its use underpins our tendency to want to conceptualise computers as living entities like ourselves. I suggested in this earlier analysis that discourses of computer viruses suggest our ambivalence about computer technologies: our desire to incorporate them into everyday life unproblematically and to strip them of their alienating meanings as complex machines, but also our very awareness of our dependence on them and their technological complexity that many of us do not understand.

Viruses as organic entities do not possess nervous systems, intelligence or the capacity for independent life, but are parasitic, living in the body of the organic creature they inhabit. Digital systems and the data they produce, when referred to as part of a ‘digital nervous

system', are endowed with far more capacity for independence and authority. There is the suggestion in this metaphor that somehow digital data-generating technologies are beginning to know more about us in their capacity to gather and aggregate information about us than we might like. While the computer virus afflicts and infects our machines, the digital nervous system quietly gathers information about us. This information, when it contributes to vast, ever-moving streams or floods of digital data, then potentially moves beyond our control.

The blockages and resistances, the solidities that may impede the fluid circulation of digital data objects, tend to be left out of such discussions (Fuchs and Dyer-Witheford 2013; Lash 2007; Sutherland 2013). One of the most highly valued attributes of digital technologies is their seamlessness, their lack of 'friction' when used. Yet many technologies fail to achieve this ideal. The ideology of free streams of flowing communication tends to obscure the politics and power relations behind digital and other information technologies, the ways in which a discourse of liberation due to free-flowing data hides the neoliberal principles underpinning it. As I will discuss in further detail in Chapter 6, the continuing social disadvantage and lack of access to economic resources (including the latest digital devices and data download facilities) that many people experience belie the discourse of digital data and universal, globalised access to and sharing of these data (Fuchs and Dyer-Witheford 2013; Sutherland 2013).

The Snowden files alerted many people to the reality that much of their personal digital data is easily accessible to government and other security agencies. The documents he made public have revealed that apps are one among many types of digital technologies that government security organisations have targeted as part of their data collection (Ball 2014). People have only just begun to realise how personal digital data can be harvested and employed by such security agencies and by commercial enterprises or even other citizens themselves using open-source tools to access data such as Facebook Graph Search.

The predictive analytics that some platforms offer which recommend products or websites based on users' previous internet use provide an online experience that some people find disturbing in terms of what digital technologies 'know' about oneself. New predictive apps, such as Google Now, billed as 'intelligent personal assistants', are able to make predictions based on past actions, search habits, location data and data archived in the Gmail account of the user. Before a user even thinks to make a query, Google Now attempts to predict what the user needs to know and informs users accordingly. Thus, for example, the app is able to use the information that the user may be

about to catch a plane and will automatically send a message to tell the user that the flight is delayed, what the weather will be like at the destination and recommendations for the best hotels to stay in. The app can also tell friends and family about the user's location (if authorised by the user). For several commentators in popular media, these predictive functions of Google Now are viewed as 'creepy' because Google seems to know too much about the user due to monitoring and recording data about users' interactions and diary entries. For example, in one hyperbolic headline in a blog post for the *Forbes* magazine website, it was claimed that Google Now's 'insights into its users' were 'terrifying, spine-tingling, bone chilling' (Hill 2012).

BIG DATA HUBRIS AND ROTTED DATA

The term 'big data hubris' has been employed to describe 'the implicit assumption that big data are a substitute for, rather than a supplement to, traditional data collection and analysis' (Lazer *et al.* 2014: 1203). I would extend this definition to include the grandiose claims that are often made that big data offer nothing less than a new and better form of knowledge. More critical commentators have begun to draw attention to the limitations and ethical dimensions of big data. It has been argued that while big data do offer large quantities of data in unprecedented volume, questions need to be posed about their usefulness. Some of the shortcomings of using big data as research objects were outlined in Chapter 3, including their validity and their claims to representativeness. As I noted in that chapter, sociologists and other social scientists have expressed concern that they do not have the skills or resources to deal with huge digital data sets. But even expert data analysts have commented on the difficulty and complexity of using available data analysis tools that were not designed to deal with such large and constantly growing data sets (Madden 2012).

The neatness and orderliness of big data sets are compelling, and part of their cultural power and resonance, but are mirages. Big data sets, while large in size, are not necessarily 'clean', valid or reliable (Lazer *et al.* 2014). The problem of 'dirty data', or data that are incomplete or incorrect, becomes even greater when the data sets are enormous. Such data are useless until they are 'cleaned', or rendered into usable forms for analysis (boyd and Crawford 2012; Waterman and Hendler 2013). Ensuring that data are 'clean' and usable, and employing experts who are able to manipulate the data, can be very expensive.

In addition to discussing the metaphors of data as 'raw' and 'cooked' (referred to earlier in this chapter), Boellstorff (2013) draws further on

the work of the anthropologist Claude Lévi-Strauss to introduce the concept of 'rotted' data. This metaphor highlights the ways in which digital data are transformed in ways in which their original creators may not have intended or imagined. It also acknowledges the materiality of data and the ways in which data storage, for example, may result in the deterioration or loss of data. The concept of 'rotted' data draws attention to the impurity of data, thereby contravening dominant concepts of digital data as clean, objective and pure. The ways in which digital data are produced, transferred and stored are not failsafe. The relationships between hyperlinks on the web are not always seamless and fluid. If the metaphor of the 'web' or the 'internet' tends to suggest an interlinking of threads or ropes, then the language of the 'broken web' or 'blocked sites' demonstrates that these interlinks can fail to connect with each other, become tangled and therefore useless. The web may be 'broken' at various points due to websites going down or not being updated, links not working and sites being censored by governments (Rogers 2013: 127).

The underlying assumptions that configure the collection and interpretation of big data also require emphasis in critical analyses of the phenomenon. As Baym (2013) notes, 'In a time when data appear to be so self-evident and big data seem to hold such promise of truth, it has never been more essential to remind ourselves what data are not seen, and what cannot be measured.' The decisions that are made relating to big data, such as which are important, how phenomena should best be categorised to render them into data, serve to obscure ambiguities, contradictions and conflicts (Baym 2013; boyd and Crawford 2012; Gitelman and Jackson 2013; Uprichard 2013; Verran 2012; Vis 2013).

One example of how digital data can be corrupted is that of the Google Flu Trends and Google Dengue Trends websites. Google created Flu Trends in 2008 to demonstrate the value of using its search terms to monitor outbreaks of infectious diseases such as influenza. The Dengue Trends website was created in 2011 with a similar objective. Both use daily tallies of search terms related to these illnesses to estimate how many people are infected over a particular time period, thus – in theory – providing information that may demonstrate influenza or dengue fever outbreaks before public health surveillance systems are able to identify them, and particularly season start and peak data. When comparing their data against official public health surveillance figures from the US Centers for Disease Control and Prevention, Google analysts found that in the United States' 2012/13 influenza season their predictions significantly overestimated the incidence of that disease. The reason they suggested for this lack of

accuracy was that there was heightened media coverage of the influenza epidemic during this time which in turn generated a high rate of Google searches for the disease by people who may have been worried about the epidemic and wanted to find out more about it, but did not themselves have the illness. Their algorithms had to be adjusted to allow for such spikes (Copeland *et al.* 2013). Nevertheless, it has been contended that Google Flu Trends remains highly imprecise in its estimates of influenza, and not more useful than traditional projection models in identifying current prevalence of the disease (Lazer *et al.* 2014).

In addition to these difficulties, it has been pointed out that Google's search algorithm model itself influences – and indeed works to configure – the data that it produces on influenza in Google Flu Trends. Google's algorithms have been established to provide users with information quickly. Search returns are based on other users' searches as well as the individual's previous searches. If many people are using a specific search term at the time at which a user decides to search for the same term, then the relative magnitude of certain searches will be increased. Thus users' searches for 'influenza'/'flu' (and indeed for any search term) are influenced by all these factors and are not valid indicators of the disease's prevalence (Lazer *et al.* 2014). Phrased differently, 'search behavior is not just exogenously determined, but is also endogenously cultivated by the service provider' (Lazer *et al.* 2014: 1204). This is a clear example of the algorithmic authority of software such as search engines and the role they play in the production of knowledge.

The superficiality of big data has also attracted criticism from some social researchers, who have contended that the growing use of big data to attempt to make sense of social behaviours and identities serves to leave out the multitude of complexities, contradictions, interconnections and therefore the meaning of these phenomena. Despite their status as constituting superior knowledges, big data do not offer many insights into why people act the way they do (boyd and Crawford 2012; Uprichard 2013). Big data are sometimes compared with 'small', 'deep', 'thick' or 'wide' data. These latter terms are a response to the 'bigness' of digital data in emphasising that massive quantities of data are not always better. 'Small data' is a term that is often used to refer to personalised information that individuals collect about themselves or their environment for their own purposes. 'Deep data' refers to information that is detailed, in-depth and often drawn from qualitative rather than quantitative sources. The term 'wide data' has been used to describe various forms of gathering information and then using them together to provide greater insights. The term 'thick data' highlights

the contextuality of data, or that data can only ever be understood in the specific contexts in which they are generated and employed (Boellstorff 2013).

BIG DATA ETHICS

There are also many significant ethical and political implications of big data. The terms ‘good data’ and ‘bad data’ are now sometimes used to describe the implications of big data use by corporations and government agencies (Lesk 2013). ‘Good data’ provide benefits for commercial enterprises and government agencies, contribute to important research (such as that on medical topics) and assist security and safety measures without disadvantaging consumers and citizens or infringing on their privacy or civil liberties (when they become viewed as ‘bad data’). Discussions of data ‘deluges’ and ‘tsunamis’ – or, less dramatically, the dynamic, multiplying and interrelated nature of digital data – underpin concerns about privacy and data security issues. It has been estimated that data about a typical American are collected in more than 20 different ways, and that this is twice as many compared with 15 years ago due to the introduction of digital surveillance methods (Angwin and Valentino-Devries 2012). Private details, such as police officers’ home addresses, whether someone has been a victim of a rape or has a genetic disease, cancer or HIV/AIDS, have been sold on from databases by third-party data brokers. Although many digital data sets remove personal details – such as names and addresses – the joining-up of a number of data sets that include the details of the same people can work to de-anonymise data (Crawford 2014).

Many app developers store their data on the computing cloud, and not all name identifiers are removed from the data uploaded by individuals. Several companies that have developed self-tracking technologies are now selling their devices and data to employers as part of workplace ‘wellness programmes’ and also to health insurance companies seeking to identify patterns in health-related behaviours in their clients (McCarthy 2013). Some health insurance companies offer users the technology to upload their health and medical data to platforms that have been established by these companies. The data that are collected on their own biometrics by people who self-track are viewed as opportunities to monitor individuals as part of reducing healthcare costs both by private enterprises and government agencies. Health insurance companies and employers in the US have already begun to use self-tracking devices and online websites involving the disclosure

of health information and even such topics as whether or not clients are separated or divorced, their financial status, whether they feel under stress at work and the nature of their relationships with co-workers as a means of ‘incentivising’ people to engage in behaviours deemed to be healthy. Those people who refuse to participate may be required to pay a hefty surcharge to their health insurance company (Dredge 2013; Shahani 2012; Singer 2013). Questions remain about the future linking of users’ health-related data to their health insurance policies in such platforms, and what might happen in the future if these companies purchase control over health app data by buying the apps and their data (Dredge 2013).

Until very recently, many mobile app users viewed the information stored on their apps to be private, not realising the extent to which the apps’ developers used these data for their own purposes, including selling the data on to third parties (Urban *et al.* 2012). App and platform developers have not always taken appropriate steps to safeguard the often very personal data that are collected, including data on sexual practices and partners and reproductive functions that are collected by some apps (Lupton 2014b). For example, a recent study of privacy policies on mobile health and fitness-related apps found that many lacked any kind of privacy policy, few took steps to encrypt the data they collect and many sent the data collected to a third party not disclosed by the developer on its website (Ackerman 2013).

The secret information exposed in Edward Snowden’s leaked documents has made it ever more apparent that the security of private information in both commercial and government databases is much less than many people have realised. Government databases have been subject to several other privacy breaches and concerns about who is allowed access to these data. National initiatives to combine patient medical records into giant databases, for example, have been subject to controversy. Garrety *et al.* (2014) argue that such initiatives are inevitably controversial because they challenge the social, moral and medico-legal orders governing the production, ownership, use of and responsibility for medical records. When policy-makers seek to push them through without acknowledging these assumptions and this meaning, key stakeholders are alienated and resistant. The different groups involved often have contrasting interests and agendas which contribute to resistances to the introduction of the digitisation of medical records.

The NHS care.data initiative described earlier in this chapter attracted a high level of negative publicity when it was revealed that the data would be sold to commercial companies. Critics questioned whether this use of the data was the major purpose for constructing

the database and wondered how well the security and anonymity of the data would be protected. They also identified the lack of information given to patients concerning their right to opt out of the system and the difficulty in doing so (Anonymous 2014). Research undertaken by the Wellcome Trust involving interviews with Britons about the use of their personal data found that many interviewees expressed the idea that while sharing data about individuals within the NHS could benefit the individual (so that different healthcare providers could access the same set of medical records), the sensitive and often intensely personal nature of such data required a high level of data security. Most interviewees contended that these data should not be shared with entities outside the NHS, and especially not private health insurers, employers and pharmaceutical companies (Wellcome Trust 2013).

The notion that users have lost control of their data is becoming evident in popular forums and news coverage of these issues. For example, some people engaging in voluntary self-tracking using digital devices are beginning to question how their data are being used and to call for better access so that they can use and manipulate these data for their own purposes (Lupton 2013c; Watson 2013). The open data movement also focuses on promoting open access to large databases held by government agencies (see more on this in Chapter 7). Yet, as contended in Chapter 3, many big data sets, and especially those archived by commercial internet companies, are becoming increasingly shut off from free access due to recognition by these companies of their economic value. Governments are also beginning to consider the economic benefits of privatising the data they collect on their citizens, thus moving these data from open-access to pay-for-use status. The British government, for example, has sold its postcode and address data sets as part of the privatisation of the Royal Mail service. This sale was subject to trenchant critique by the House of Commons' Public Administration Committee (2014). In their report advising on the use of big data collected by the government, the members of this committee revealed that they were strong supporters of open public data. They contended that the Royal Mail data set should have been maintained as a national public asset, as should all public sector data.

More seriously, big data can have direct effects on people's freedoms and citizen rights. Crawford and Schultz (2014) have identified what they call the 'predictive privacy harms' that may be the result of predictive analytics. Because big data analytics often draw on metadata rather than the content of data, they are able to operate outside current legal privacy protections (Polonetsky and Tene 2013). Predictive privacy harm may involve bias or discrimination against individuals or groups

who are identified by big data predictive analytics and the cross-referencing of data sets. People are rarely aware of how their metadata may be interpreted through the use of disparate and previously discrete data sets to reveal their identity, habits and preferences and even their health status and produce information about them that may have an impact on their employment and/or access to state benefits or insurance (Crawford and Schultz 2014). Concerns have been raised about the use of digital data to engage in racial and other profiling that may lead to discrimination and to over-criminalisation and other restrictions. It has been argued that the big data era has resulted in a major policy challenge in determining the right way to use big data to improve health, wellbeing, security and law enforcement while also ensuring that these uses of data do not infringe on people's rights to privacy, fairness, equality and freedom of speech (Crawford and Schultz 2014; Laplante 2013; Polonetsky and Tene 2013).

Journalist Julia Angwin (2014) wrote in *Time* magazine's online site about her discoveries when she reviewed her Google searches over the past few years and realised how much they revealed about her current and future interests and habits. She described these details as 'more intimate than a diary. It was a window into my thoughts each day – in their messiest, rawest form – as I jumped from serious work topics to shopping for my kids'. Angwin wrote of her concerns that such personal details might be sold on to third parties, perhaps denying her access to credit in the future by aggregating all the data Google had gathered on her. She was aware that Google has been subjected to legal action for abusing users' data privacy and also that their data archives have been accessed by US security agents. Angwin subsequently decided to migrate from Google and use other platforms that did not retain users' data.

This chapter has detailed the many and diverse uses to which big data have been applied in recent times and the multitude of claims that have been made about the use of big data across a range of commercial, government, humanitarian and personal endeavours. As I have demonstrated, like other digital data objects, big data sets are systems of knowledge that are implicated in power relations. Big data are both the product of social and cultural processes and themselves act to configure elements of society and culture. They have their own politics, vitality and social life.

The diversity of digital technology use

There has been much discussion of the so-called ‘digital divide’, or the lack of access to digital technologies that some social groups experience. While this term is subject to some contention, it is clear that some social groups and those living in certain geographical regions use digital technologies less frequently than others. It is important to acknowledge that the utopian discourses of democratic participation, community-building, sharing and presumption that often circulate in mainstream accounts of the possibilities offered by digital technologies often fail to recognise the political aspects of these technologies. This chapter addresses these issues, examining the use of digital technologies in different areas of the globe and how socioeconomic, cultural and political factors shape, promote or delimit the use of these technologies. It moves from reviewing the findings of large-scale surveys involving large numbers of respondents from specific countries or cross-nationally to in-depth qualitative investigations that are able to provide the detailed context for differences in internet use.

THE BIG PICTURE

A number of large-scale research reports have been published recently by both academic and corporate researchers on the attitudes to and use of digital technologies in various geographical locations. In this

section I discuss some of the findings from these reports, some of which draw on vast collections of data globally, which provide some important quantitative information about the 'big picture'. Their findings reveal continuing differences between countries in access to the internet and attitudes to digital technologies in various social groups within nations.

According to an estimate presented in a report published by the International Telecommunication Union (2013), by the end of 2013 there would be almost as many mobile phone subscriptions as people on the planet. It was also estimated that almost 100 per cent of people globally can now access a mobile phone signal. However, not everyone owns a mobile phone or has access to the internet, and clear disparities are evident when comparing wealthy with middle-income and developing countries. As the report notes, by the end of 2013 although an estimated 2.7 billion people were using the internet, this left even more (4.4 billion) who were not online. Across the globe there had been a strong growth in household internet access over the previous three years, particularly in developing countries, to the point that it has been estimated that over 40 per cent of households had access (International Telecommunication Union 2013: 1). However, when this figure is compared for developed versus developing countries, while almost 80 per cent of people living in developed countries had household internet access at the end of 2013, this compared with only 28 per cent in the developing regions. Those living in Africa have the least access (6.7 per cent), followed by Asia (32.7 per cent). The main reasons for this disparity are the cost of obtaining internet access and the availability of internet infrastructure, particularly in rural areas (International Telecommunication Union 2013: 7–9).

Our Mobile Planet is a report commissioned by Google about the ownership and use of smartphones in 47 countries globally (although no findings are provided on any African countries). On the Our Mobile Planet website, extensive details are provided about the results of the global survey that was undertaken by research firms for Google using an online questionnaire in three waves: in 2011, 2012 and 2013. The focus of the survey is commercial: Google was interested in the penetration of smartphone use in the countries surveyed and how users employed their phones, particularly in relation to commercial information seeking and purchasing decisions.

The findings of *Our Mobile Planet*, as shown on the website, indicate that smartphone ownership has risen significantly in every country included in the study in the past two years. However, there is a clear difference when regional areas are compared. Wealthy Middle Eastern countries have the highest rate of smartphone ownership: 74 per cent

of residents of the United Arab Emirates and 73 per cent in Saudi Arabia own them. These countries are closely followed by middle-income Asian countries such as South Korea (73 per cent), Singapore (72 per cent) and Hong Kong (63 per cent) and the anglophone countries (65 per cent in Australia, 62 per cent in the UK, 56 per cent in both the US and Canada and 54 per cent in New Zealand). In China 47 per cent of the population own smartphones. Interestingly, the Google data show that the Japanese are not yet high adopters of the smartphone, with only 25 per cent of people in that country owning this device. However, this statistic is somewhat misleading, as it does not reflect the fact that the Japanese were leaders in mobile phone technology and a high number have been using the Japanese version of internet-enabled mobile phones (called 'feature phones') for many years.

The Google data demonstrate that Eastern European, Southern European and Central and South American countries do not have high rates of smartphone ownership (in Argentina, 31 per cent own smartphones, while in Brazil it is 26 per cent and in Mexico 37 per cent). Poor South and South-East Asian countries have very low smartphone ownership (20 per cent in Vietnam and 13 per cent in India, for example). While it is not surprising that less wealthy countries do not have a high rate of smartphone ownership, the interesting difference is between wealthy countries. According to Google's data, the residents of European countries (52 per cent in the Netherlands, 45 per cent in Finland, 42 per cent in France and 40 per cent in Germany, for example) are somewhat less enthusiastic about smartphone ownership than are those living in some anglophone nations. Central European nations also do not have high smartphone ownership (Greece 33 per cent, Poland 35 per cent, Hungary 34 per cent).

Other data have been retrieved from the Alexa company, which aggregates data from millions of internet users, and rendered into visual form on a global map by the Information Geographies team (Mark Graham and Stefano De Sabbata) at the Oxford Internet Institute. Their map (Oxford Internet Institute 2013) shows the reach and spread of Google and Facebook. The map shows that Google is the most visited website in most of Europe, North America and Oceania (including Australia and New Zealand). Facebook is the most visited site in the Middle East, North Africa and most of the countries in the Spanish-speaking Americas, but Google/YouTube (Youtube is owned by Google) are the second-most visited sites in these countries. The countries where Google is the most visited website account for half of the entire population with access to the internet. In Asia, however, local competitors dominate. Baidu is the most used search engine in China and South Korea, while the Japanese version of

Yahoo! and Yahoo! Taiwan dominate in those countries respectively and the search engine Yandex is the most visited site in Russia.

Another survey-based study covering several countries was commissioned by Intel. It identified attitudes to and use of digital technologies in Brazil, China, France, India, Indonesia, Italy, Japan and the USA (IntelPR 2013). The Intel Innovation Barometer found that most of the respondents said that digital technologies made their lives easier and enhanced their relationships with family and friends. More than one-third of the respondents agreed with the idea that the technologies they use should learn about their behaviours and preferences as they use them, as this makes technology use more efficient.

The Intel report also identified some interesting differences between social groups. According to Intel, the group they describe as 'millennials' (young people aged 18 to 24) were somewhat ambivalent about digital technologies. They recognised the value of technologies in their lives and were willing to allow their devices to track their preferences and to share their data with others, advocating for a more 'personal experience' in using them. But members of this group were also concerned about users becoming over-reliant on their technologies and that using technologies made people 'less human'. In comparison, women aged 45 or older, as well as those living in the developing countries included in the survey, were the most positive about digital technologies. These respondents viewed digital technologies as contributing to a country's wellbeing in such areas as employment, transport, education and healthcare. They tended to agree, therefore, that people should use technology more often. Higher-income respondents were more likely to own and regularly use digital devices, be willing to share their personal data anonymously to support important research such as that related to health, and to allow monitoring of their work habits in the interests of greater personal efficiency.

Two other recent reports focused more specifically on internet use in the US and the UK. The US-based Pew Research Center, which describes itself as a nonpartisan fact tank, conducts regular surveys of Americans' use of the internet as part of its Internet & American Life Project. It recently undertook a major survey to mark the twenty-fifth anniversary of the invention of the World Wide Web by Sir Tim Berners-Lee (Pew Research Center 2014). The findings detailed in this report underline the major changes that have taken place over this quarter of a century in the US in relation to digital devices and online access. Pew's research in 1995 found that more than half of Americans had never heard of the internet while a further 20 per cent only vaguely understood the concept and only 14 per cent said that they could access it. Its latest research found that 87 per cent of Americans

reported that they use the internet, with almost all of those living in a high-income household, in the 18 to 29 years age group and with a university degree doing so. Sixty-eight per cent of Americans connect to the internet using mobile devices, and 58 per cent own smartphones. This Pew report also noted that education levels, household income and age continue to be major factors in influencing computer use: far more university-educated, wealthier and younger people use computer technologies compared to other groups. These differentials have remained stable since Pew's 1990 research.

This survey also asked respondents about their overall judgement of the internet. The researchers found that 90 per cent of the respondents who used the internet said that it was a positive experience for them and 76 per cent thought it was a good thing for society, while 53 per cent of users said that they would find it very difficult to give up using the internet, both for work-related purposes and as part of personal relationships with family and friends. Indeed 67 per cent of internet users reported that the technology had strengthened their personal ties. Only 25 per cent reported negative experiences with other users, such as being treated unkindly or being attacked verbally online.

In a previous report (Zickuhr 2013), Pew focused on the 15 per cent of Americans who do not use the internet (this had reduced to 13 per cent by the time of the 2014 survey). When asked why, these respondents gave the following answers: 35 per cent said that the internet was not relevant to them, 32 per cent said that they thought it was not easy to use or that they were worried about privacy issues, 19 per cent referred to the expense of connecting to the internet and 7 per cent said that they lacked access. The survey found that non-use of the internet was strongly correlated with age, income, ethnicity and educational attainment: 44 per cent of Americans aged 65 and older did not use the internet, and nor did 41 per cent of those respondents with a lower educational attainment, 24 per cent of Hispanics and 24 per cent of those with low income levels. These responses suggest that lack of access is not the main reason why Americans choose not to use the internet, but rather that they do not see what internet access can offer them.

Other Pew Research Center findings have demonstrated that in the US people's health status and whether or not they have a disability are also highly influential factors in their online use. Americans with chronic health conditions use the internet less often than those who do not have these conditions, even when other variables such as age, ethnicity, income and education levels are controlled for (Fox and Duggan 2013). Americans with disabilities are far less likely to go online compared with others (54 per cent compared with 81 per cent) and less likely to own a smartphone, desktop or laptop computer (Fox and Boyles 2012).

Yet another report by Pew (Duggan and Smith 2013) found that 73 per cent of the American adults they surveyed who use the internet are on social network sites. Nearly all of these (71 per cent) used Facebook. Those aged 18 to 29 were the most likely to use Facebook: 84 per cent compared to 45 per cent of internet users aged 65 and above. Over all age groups, women (76 per cent) were more likely to use Facebook than men (66 per cent). Of adults online, 18 per cent were Twitter users, split equally between men and women, although African Americans (29 per cent) and younger Americans (31 per cent of those aged 18 to 29 compared to only 5 per cent of those aged 65 and over) were far more likely to be on Twitter than other ethnic and age groups. The survey found that 17 per cent of online adults used Instagram and 21 per cent used Pinterest, with far more women (33 per cent) than men (9 per cent) using the latter platform. Not surprisingly the professional networking site LinkedIn, with 22 per cent of online adults using it, attracted far more users with university degrees, who were employed, with a higher income and older.

The Oxford Internet Institute, based at the University of Oxford, undertakes an extensive survey of internet use in the UK every two years. Its latest report (Dutton and Blank 2013) demonstrated that the use of the internet had risen to 78 per cent of the population aged 14 years and over. The researchers identified five broad ‘cultures’ of internet use. These included the following:

- ‘e-mersives’ (12 per cent of internet users), or those who feel comfortable being online, use it as an escape and for feeling part of a community, and have a high rate of use;
- ‘techno-pragmatists’ (17 per cent of users), who use the internet to save time and make their lives easier;
- ‘cyber-savvies’ (19 per cent of users), who demonstrated ambivalent feelings about the internet, both enjoying and finding enjoyable aspects of their use but also expressing concern about privacy and time-use issues;
- ‘cyber-moderates’ (37 per cent of users), who express mixed attitudes but are more moderate in their views than the ‘cyber-savvy’ group; and
- ‘adigitals’ (14 per cent of users), who find the internet difficult or frustrating to use.

The report identifies 18 per cent of respondents who said that they had no interest in using the internet. As in the Pew Research Center survey, these uninterested people were more likely to belong to the

older age group and include people with disabilities and those holding lower educational qualifications.

DIGITAL SOCIAL INEQUALITIES

The kinds of broad-scale research described above are necessary in developing an understanding of how digital technologies are used in different social and cultural contexts. While these data can identify differences, they cannot explain them: for this we need to turn to more detailed research based on ethnographic and other forms of qualitative methods.

The term ‘digital divide’ has become commonly used in discussions of the diversity of digital technology use among different social, cultural and geographical groups. However, some researchers have identified what they view as a simplistic perspective in the use of this term. For example, Halford and Savage (2010) have critiqued the concept of the digital divide for the tendency of those who use it to separate ‘the social’ from ‘the technological’. They contend that understandings of both social inequity and access to digital media technologies need to acknowledge their interlinking and their dynamic nature. Each acts to constitute the other, but this is a fluid, unstable process. Halford and Savage propose instead the concept of ‘digital social inequality’ to denote the interconnectedness of social disadvantage and lack of access to digital technologies. They argue further that rather than understanding access to and use of digital technologies as a unidirectional process (social disadvantage leading to lack of access), it may be more productive to understand the relationship in terms of mutual configuration (or what they term ‘co-constitution’) between social structural factors and digital technology use.

To refer to a single ‘digital divide’ also fails to acknowledge the complexities of access to and use of digital technologies. Having access to a high enough income to pay for devices and internet access, and living in a region in which internet access is readily available, are clear factors influencing people’s use of digital technologies. A somewhat less obvious factor is the specific practices in which they engage when access is available (Hargittai and Hinnant 2008; Robinson 2009). Four dimensions of access barriers to digital technologies have been identified. These include the following:

- lack of elementary digital experience caused by low interest, anxiety about using the technologies or design elements of the technologies that discourage use;

- lack of access to the technologies, such as not owning a digital device or not having a connection to the internet;
 - lack of digital skills due to low levels of use or unfamiliarity with new versions of technologies; and
 - lack of significant usage opportunities due to time constraints and competition over access in the domestic or workplace setting.
- (van Dijk and Hacker 2003)

Even when people have a similar level of access to and interest in using digital technologies, differential skills and practices are evident. People with lower levels of income and education use digital technologies differently from those with higher levels. The latter group are able to use digital technologies to reinforce their cultural and economic capital and social status, thus maintaining their advantages (Halford and Savage 2010). Research has shown that people of lower education level may spend more time online in their free time than those of higher education levels, but do so in different ways. They engage in social interaction and gaming more often, for example, rather than using digital technologies for education, seeking information or work-related reasons (van Deursen and van Dijk 2014), or what has been referred to as ‘capital enhancing activities’ (Hargittai and Hinnant 2008: 602).

Digital technologies are not neutral objects: they are invested with meanings relating to such aspects as gender, social class, race/ethnicity and age. It can be difficult to resist or overcome these meanings even when people have an overt political agenda in attempting to do so. This was evident from Dunbar-Hester’s (2010) study of media activists based in Philadelphia who were attempting to broaden access to communication technologies and the skills related to using technologies. Their project was to ‘demystify’ media technologies by engaging in pedagogical activities with traditionally excluded groups in relation to community radio and community wi-fi technologies. As Dunbar-Hester observes, social identities may be open to change but are not endlessly fluid. They are structured by and through encounters with technologies, including their discursive and material dimensions. The media activists in her study found that despite their best efforts to encourage people who traditionally were excluded from access to or engagement with digital and other communication technologies (individuals who did not conform to the white male social identity), they were confronted by the continuing persistence of gendered and racial stereotypes in relation to communication technologies.

Some people, as the Oxford Internet Institute report referred to above observed, simply do not see the relevance of digital technologies

to their lives. This is particularly the case for the elderly, who often report lacking interest in using these technologies (Hakkarainen 2012; Olphert and Damodaran 2013). Few in-depth studies have sought to investigate the issues related to this lack of interest. However, one Finnish project (Hakkarainen 2012) investigated written accounts by people aged 60 years and over explaining why they refuse to use the internet. The researchers found that for these older people, the computer was understood as a tool or sophisticated gadget, but they viewed it as one that they did not perceive as useful to their everyday lives. They compared the computer with other tools that they were accustomed to using (such as their hands, pens, pencils or their own brains) and said that it was unable to offer more than these tools could. The notion of the computer as offering access to a virtual world where one could interact socially with others or access information was absent from these Finns' notions. They also represented computers and the internet negatively as promoting addictive behaviours that caused users to deprive themselves of other life experiences. These people also often represented computers and the internet as dangerous, posing a threat to such valued aspects of their lives as time reserves, security, simple living, traditional skills and face-to-face human contact.

Popular portrayals of internet users in developed countries tend to represent young people as 'digital natives', who use digital technologies, particularly mobile phones and social media, avidly, often and with expertise. This stereotype fails to recognise the substantial proportion of young people who do not engage actively with these technologies. A nationwide study of young adult Americans aged 18 to 23 found that those who did not use social media tended to have caregiving responsibilities (for their own children or other family members), experienced economic and employment instability and fractured educational histories, relied upon their families for economic assistance and focused on finding and keeping jobs rather than developing a career. Few of these non-adopters lacked access to a computer. However, they were in shared living conditions with other family members, which may have limited their opportunities to use social media. Several of the study participants lacked confidence about using computers and were socially isolated with few friends, or in difficult family relationship circumstances. The researchers concluded that lack of social media use for these young adults was both an outcome and a contributor to their disadvantaged positions and lack of close social ties (Bobkowski and Smith 2013).

The affordances of specific platforms and the nature of other users also have a significant impact on how and why people use them.

As older people migrate to social media sites such as Facebook, younger people (especially their children or grandchildren) tend to leave. Facebook announced in November 2013 that the site was seeing a decrease in the number of teenagers using it daily. Young people are beginning to use mobile phone messaging apps such as WhatsApp, Pinger and WeChat as alternatives to more mainstream social media sites. WhatsApp in November 2013 had more active users than Twitter worldwide. These new apps afford greater privacy, as they allow users to engage with each other and share images in a forum that is not public, only including others that they specifically wish to communicate with. Young people also appreciate that these messages and images are not archived permanently on the web, as they are when other social media sites are used (Olson 2013).

The materiality of the design of both software and hardware are features that are frequently neglected in accounts of digital social inequalities. These aspects are particularly relevant to people with disabilities. As noted above, surveys in the UK and US have revealed that fewer people with disabilities use digital technologies compared with those without disabilities. To what extent this difference is influenced by disabilities themselves or by people with disabilities' greater likelihood to experience economic disadvantage is not clear, however.

On the positive side, people with disabilities who do use digital technologies often report finding these technologies offer a way of communicating and expressing themselves, of achieving greater participation in social relationships (Ellis and Goggin 2014; Ginsburg 2012; Lupton and Seymour 2003; Newell and Goggin 2003; Seymour and Lupton 2004). As commented by one of the participants in the study Wendy Seymour and I conducted (Lupton and Seymour 2003), she felt 'comforted', 'safe', 'more relaxed' and 'at peace with myself' and 'normal' when communicating with others online. The people with whom she interacted could not see the facial and body tics that were part of her Tourette's syndrome. This interviewee therefore could feel free to participate without feeling self-conscious about these involuntary movements. Another interviewee with mobility difficulties found communicating on the internet an opportunity to escape social isolation as well as retreat from social interactions when she felt tired, in pain or unwell.

Ginsburg (2012) gives the example of an American woman with autism who does not communicate verbally but uses YouTube very effectively to demonstrate how she sees the world and express her experiences. Ginsburg also found that people with disabilities often enjoy using the virtual world of Second Life to interact with others and therefore alleviate the social isolation that they previously experi-

enced. She further remarks on the expansion of online support and activist networks, blogs related to the experiences of having a disability and social media groups for people with disabilities. Similarly, as Ellis and Goggin (2014) point out, Twitter is popular with people with visual impairments because sound-based technologies can be used to turn tweets into audible messages. Some smartphones and tablet computers include these technologies in ways that are easy for people with visual and mobility impairments to use. Ellis and Goggin (2014) also single out support groups (now often mediated via Facebook), Second Life, YouTube and personal blogs (including audio and video blogs) as having an important role to play as providing platforms by which people with disabilities can present themselves in ways that counter stigmatising and limiting representations in other popular culture portrayals.

More negatively, however, the design of digital devices can result in people with disabilities experiencing difficulties using them (Ellis and Goggin 2014; Lupton and Seymour 2003; Newell and Goggin 2003; Seymour and Lupton 2004). Many social media platforms are difficult for people with disabilities to use and they are thus excluded from yet another arena of social life. Just as with the other physical environments with which people with disabilities interact, the design of digital technologies may serve to configure disability in their neglect of accessibility for a wide range of users and bodily capacities. For example, my interview study with Seymour found that some people with mental impairments commented that they found it difficult to keep up with a high pace of interaction in real-time online discussions, as did those with physical disabilities who found it difficult or painful to type on computer keyboards (Lupton and Seymour 2003; Seymour and Lupton 2004).

GENDERED TECHNOLOGIES

An extensive literature exists on the gendered aspects of digital technologies and their use. In the 1980s and 1990s, scholars adopting a 'cyberfeminist' perspective on digital technologies sought to construct a critique of the gendered aspects of their design and use. I referred in Chapter 2 to the important work of Donna Haraway in theorising digital technologies. One of Haraway's major contributions was to articulate a feminist approach to computer technologies that recognised difference and diversity and included the role of material agents in understanding the human-computer relationship. Haraway's concept of the cyborg brought the body and its permutations, differences and

ambiguities – its performative configurations – into focus as an object for political critique and action. She argued for a view of the subject/body that is inevitably split and contradictory, providing for ambivalence and ambiguity. Haraway (1985) saw this approach as important both for feminist and technoscientific critique. What Haraway was trying to argue in her metaphor of the cyborg is that human bodies are not essentialised, they cannot easily be categorised as one thing or another in a binary definition. She brought together Marxist with technoscience and feminist theory in what she viewed as a socialist feminist politics.

Cyberfeminists building on Haraway's work foresaw a technologically mediated world in which gender (and other bodily related attributes) would no longer constrain choice and action. Like many other writers on cyborgs and cyberculture, some cyberfeminists saw cyberspace as a virtual space of freedom and transcendence from the body, including gendered identities (Brophy 2010; Daniels 2009b; Luckman 1999; Wajcman 2004). Given the apparent anonymity of the internet, where other users could not detect one's gender, age, race and other bodily features of identity, some cyberfeminists were positive about the opportunity to freely engage in the use of computer technologies without dealing with assumptions about their capabilities based on their gender. Using computer technologies was positioned as a way of taking back technology from men. There was much discussion in the 1990s of a utopian future in which the 'wetware' of the fleshly body could be left behind in cyberspace as part of entering virtual reality and online gaming communities. Some women chose to use male names when engaging in these activities as part of their attempts to experiment with different gender identities (Luckman 1999).

One way to understand the interplay of gender and technology use is to highlight the performative and constraining nature of both as well as their inextricable meanings. Gender and digital technologies 'are both discourses and apparatuses that enable/limit what we can do online. Each apparatus is an articulation of body-medium' (Brophy 2010: 942). As such, a digital technology user's agency is shaped both by the design and meaning of the device she is using and the agencies of other users and the meanings they give to the technologies. These technologies reproduce pre-existing gender norms (and norms and stereotypes concerning age, race and ethnicity) and also reinforce them. Thus, as some cyberfeminists contended, such practices as women using male names when engaging online simply reinforced the notion that cyberspace was a place of masculine privilege and entitlement, and thus failed to challenge existing power relations and

inequalities. These scholars focused on directing attention at the masculinised nature of discourses on cyberspace and attempted new ways of thinking about computer technologies that resisted these discourses (Luckman 1999). These included creative artworks that re-imagined cybercultures in blatantly feminised and sexualised ways to highlight the fleshly nature of these technologies (Paasonen 2011). As a result, the cyborg as reimagined by some cyberfeminists was a highly sexually charged figure, filled with erotic pleasure in its transgression of body boundaries, its fluidity and what was viewed as the emotional and sensual fusion of human organism and technology (Luckman 1999).

As many feminist scholars have contended, gender norms tend to influence the ways in which women and men use digital technologies and which technologies they prefer to use. Technological design, in turn, supports assumptions and norms about gender (Paasonen 2011; Wajcman 2004). The connection of the internet with the military and the discourses of cyberpunks, cyberspace and hackers that dominated discussion of computer technologies in the 1980s and 1990s invariably represented the cyber-world as a masculine environment (Lupton 1995; Wajcman 2004). Early computer technologies were represented as requiring arcane technical and mathematical skills for coding, programming and setting up the technologies for use, which in turn were portrayed as male rather than female practices. Men tend to be taught technical skills related to electronics while women are still often excluded from this type of education and hence a gendered difference in skills and confidence in using such technologies begins early (Dunbar-Hester 2010).

Many studies undertaken since personal computers became available for purchase have demonstrated that women tend to be less inclined to learn computer science and demonstrate greater levels of technophobia and lower levels of computer proficiency and self-assessed confidence in using computers than men. The archetypal computer user/expert has traditionally been an anglophone, white (or occasionally Asian), middle-class young man. The figure of the 'hacker' tends to be represented as a white male who is very clever and technologically skilled but often has malicious or criminal intent. The archetypal computer 'nerd' or 'geek' is another type of white male: again highly intelligent and accomplished in matters of computer science, but physically unattractive, socially awkward and friendless (Kendall 2011; Lupton 1995). These archetypes may act to exclude others from positioning themselves as expert at computer technologies or even wanting to demonstrate interest in acquiring skills, given that they are persistently negative in their representation of 'nerds' and

‘geeks’ (Dunbar-Hester 2010; Kendall 2011). They position not only women as antithetical to the image of the accomplished computer user but also racial groups other than white, and men who prefer to view themselves as socially accomplished and popular rather than nerds (Kendall 2011).

With the advent of social media and mobile devices, to a large extent computer technologies have lost their mystique of the arcane and technical. As part of their widespread use and entry into most locations of everyday life, and particularly with smartphones and tablets, digital technologies have become domesticated and taken-for-granted. The everyday computer user, therefore, may now be viewed as crossing gender and racial or ethnic boundaries (and, as I noted above, even grandparents use Facebook). Using readily available and easy-to-use devices and software, however, is different from possessing knowledge about the technical aspects of digital technologies. Men still dominate over women in having this kind of expertise. Women studying computer science and working in the field remain in the minority (Cozza 2011).

In terms of domestic use, research suggests that at least in the developed countries of the cultural North, women and men, regardless of their race or ethnicity, now access the internet in equal numbers. The latest Pew findings demonstrate that there is now very little difference in computer use by women compared to men, rural compared to city residents or between the major racial groups in the US (Pew Research Center 2014). The International Telecommunication Union’s (2013: 12) report found that globally women tend to use the internet more for educational use than do men, that men access the internet more than women in commercial internet facilities, and that men tend to be online more frequently than women. The report noted that there remains a gender disparity, with 11 per cent more men than women using the internet worldwide. This difference is particularly striking in developing countries, where 16 per cent more men are online, while there is only a 2 per cent gap between men and women in developed countries. The authors relate this difference to gender disparities in education level and income. This finding is supported by a study of data sets of computer use in 12 Latin American and 13 African countries, which found that once the variables of employment, education and income levels were controlled for, women were more active users of digital technologies than men in those countries (Martin 2011). This research demonstrates that in some cultural contexts, education and income levels may be more influential in structuring access to digital technologies than are gender and race/ethnicity.

Nonetheless, gender differences in internet use persist in developed countries, where education levels tend to be equal for women and

men. A team of researchers who looked at British female and male students' internet use first in 2002 and then again ten years later found that at both time periods a significant gender difference was evident, which was even more marked in the 2012 research. In the 2012 study, male students demonstrated a greater breadth of internet use. They used it more for games and entertainment purposes, such as downloading and playing music and videos and accessing adult content sites, than did the women who were surveyed. The female students used the internet more for communication, including email, internet phone calls and social media sites, compared to the male students surveyed (Joiner *et al.* 2012). Gender differences are evident from childhood, as demonstrated by research on Portuguese children's uses of digital technologies. The boys in the study were more likely to play online games or game apps involving cars, football and fighting, while the girls enjoyed games related to dressing up, dolls, make-up and hair-styles and were more likely than the boys to use social media networking sites (de Almeida *et al.* 2014).

A study on home internet use that drew on interview data with men and women who were part of couples living together in both Australia and Germany similarly found that men tended to be online more often, and to use the internet for recreational purposes, such as playing online games, and to seek time on their own away from domestic or childcare duties. In contrast the women who were interviewed, particularly those with children, viewed going online as part of their domestic duties. They used the internet to engage in online shopping for groceries or clothing or paying bills, for example, or to keep in touch with family members. They therefore tended to view the internet as another household appliance with practical value in managing family-related responsibilities (Ahrens 2013).

Some women may find themselves forced to use digital technologies as part of workplace demands or to maintain family ties or both. Research on the use of various types of digital media by Filipino women working in foreign countries as domestic workers showed that, despite their initial reluctance to use these technologies, they were forced to do so to keep in touch with the children they had left behind in the Philippines. The internet allowed these women to conform to their own and others' expectations about the importance of mothers keeping in touch with their children, particularly when they lived in a different country. Their use of digital media and devices thus drew upon traditional concepts of femininity related to 'the good mother' (Madianou and Miller 2012). Like the Australian and German women in the research discussed above, digital technologies for these women were modes of performing the relational, care-giving and

domestic tasks required of them by norms of motherhood and domestic duties. Such use may be conceptualised as affective labour, a specific form of the broader unpaid labour of prosumption upon which the internet empires and data brokers rely for their profits (Jarrett 2014). For the Filipino workers, their use of digital media serves to allow them to engage in paid labour and in the affective unpaid work of motherhood simultaneously.

There is very little specific research comparing gender difference in the use of social media platforms. As noted earlier, statistics are available from the US and the UK that demonstrate that women and men in those countries use some social media sites differently. Gender performances also structure the types of content that women and men upload to social media. A study of young Canadian women's use of Facebook (Bailey *et al.* 2013) found that the images they tend to upload of themselves conformed to normative expectations about the desirable (sexually attractive, fun-loving, heterosexual, popular) young woman. Young women have to deal and negotiate with gender stereotypes constraining their use of this social media site. When interviewed about the material about themselves they uploaded to Facebook, the study participants were aware of the importance of treading a fine line between representing themselves as popular and attractive without appearing to be superficial or 'slutty'. They noted that young women, compared with young men, were much more likely to be harshly judged or ridiculed by others if they misjudged the ways they represented themselves on Facebook. The researchers suggest, therefore, that rather than challenging gender norms and allowing users greater freedom of self-expression, social media sites such as Facebook work to limit the ways in which young women can represent themselves in a context of intense surveillance and judgement from others. Another Facebook research study focused on how gender norms and expectations were performed on that platform by identifying stereotypes in the profile images uploaded by a selection of male and female users. It was found that the men tended to present themselves – through their images – as active, dominant and independent. Women, in contrast, uploaded photos that portrayed them as attractive and dependent (Rose *et al.* 2012).

There is often a lack of acknowledgement in cyberfeminist writings of the diversity of women's use of digital technologies, including the intersections of gender with race, ethnicity, social class and geographical location. Just as discourses on computer technologies have often assumed a white, middle-class, male user, some cyberfeminist writings position the female technology user as almost exclusively white and middle class and located in wealthy countries. The lived, embodied

relationship to and use of digital technologies for disadvantaged women, those who live in rural or remote regions, or those who experience discrimination based on their race, ethnicity or sexual preference, often differ significantly from those of privileged women living in urban regions in the cultural North (Daniels 2009b). These assumptions fail to recognise the role that women in developing countries play in working in digital industries such as microchip factories and call centres (Philip *et al.* 2012). They also do not acknowledge the lack of access that many women in these contexts have to computers and internet connections (Daniels 2009b; Gajjala 2003), and that more men than women have access to education that teaches them the English they require to use many internet sites (Bell 2006a).

Despite these constraints, women in developing countries or living under repressive political regimes have employed digital technologies as part of their efforts to improve their social and economic conditions and to engage in political activism, including on a global level (Daniels 2009b; Newsom and Lengel 2012). Social media outlets may allow for women living in cultures where their political participation and ability to demonstrate in public spaces may be limited to express their views and opinions. During the Arab Spring citizen uprisings, for example, feminist activists and activist organisations in Tunisia and Egypt used online networking technologies extensively in their attempts to incite political change (Newsom and Lengel 2012).

ETHNOGRAPHIES OF DIGITAL TECHNOLOGY USE

As noted above, many discussions of digital technology use tend to assume a certain social group and cultural context: that inhabited by the privileged citizens of the global North. Philip *et al.* (2012) use the term 'postcolonial computing' to outline a critical perspective that seeks to draw attention to the lack of acknowledgement of the extensive diversity of cultural, social and geographical contexts in which digital technologies are used. They argue for a focus on the productive possibilities for researchers of emphasising difference and how it operates and expresses itself across cultural boundaries. Difference here is not conceptualised as inherent, but rather as a product of specific contexts. Designers, manufacturers, planners, the digital objects that they shape and the diverse users of these objects are part of an assemblage that is subject to transformation and reconfiguration as different actors enter and leave. Categories such as female, Asian, European and human are not fixed and do not exist independently of technology, but rather are the products of complex entanglements of

power, politics, institutions and technologies. This is a similar argument to that made by some of the cyberfeminists discussed above, who have emphasised the mutual constitution of the categories of gender and technology.

Digital anthropologists have led the way in highlighting the multitudes of different ways in which the internet is used in specific geographical and cultural contexts. By engaging in ethnographic fieldwork, digital anthropologists are able to generate rich, highly contextualised data (the ‘thick data’ referred to in the previous chapter) about the incorporation of digital technologies into everyday life and the meanings that are assigned to these devices. Bell (2006a, 2006b), for example, conducted fieldwork in more than 50 households in four South Asian countries (India, Malaysia, Singapore and Indonesia). She spent time with the families in their houses, observing how they engaged with digital technologies and participating in these activities, as well as using interviews, taking photographs and making technology inventories. She undertook observations in key public spaces, such as shopping areas, and noted key artefacts and icons relevant to the research. Finally Bell sought the help of key area specialists to help her contextualise her data and provide alternative perspectives.

This fieldwork was undertaken before the advent of Web 2.0 technologies. As noted in Chapter 3, the emergence of ubiquitous digital media and social media networks has stimulated media researchers to “‘rethink” ethnography and ethnographic practice’ and to recognise their diversity (Horst *et al.* 2012: 87). Digital anthropologists have developed new ways of engaging in ethnographic research in their attempt to study in detail the cultural and social dimensions of the ways in which people engage with online technologies. For example, Postill and Pink (2012) spent time in Barcelona observing the use of social media by activist groups there. They investigated the content of the social media texts produced by the groups on Facebook, Twitter, blogs and YouTube and also participated on these sites, as well as interviewing members of the groups, attending events and researching online news sites related to the groups’ activities and interests. As these researchers observe, the social media field site or research site is dispersed among a number of online platforms as well as offline sites. Their knowledge of these groups’ activities was generated not only from what they did or produced online, but also from face-to-face interactions with the group members.

Outside the anglophone countries, there are major differences between the cultural contexts in which people are able (or not) to access digital technologies and the protocols of use. Such features as infrastructure and education levels, as well as cultural notions of which

people should be given access to digital technologies, are influential in structuring digital use among and between social groups. In illustrating this point, Goggin and McLelland (2009: 3) compare examples of the experiences of two adolescent girls in very different cultural contexts: a Japanese girl in Tokyo and a Palestinian girl in the Occupied Territories. The former young woman is highly digitally literate and part of a culture which has embraced digital technologies for decades. She has access to all the latest technologies and years of experience using them. The latter is illiterate even in her own language, and is attempting to access the internet for the first time. Even if this young Palestinian girl is provided with the technologies, she lacks the required literacy to be able to make use of them.

The 'internet', therefore, is not a universal phenomenon across regions and cultures: it has different histories and configurations in different countries. Not only are assumptions and beliefs concerning digital use shifting between cultural contexts, so are the material infrastructures that support access to the internet: download speeds; the type of access (broadband or otherwise) that is available; the presence and reliability of electricity supplies; the cost of software packages and devices; government regulations concerning internet access of citizens; and so on. In several Asian countries, for example, personal computers first began to be used in the (middle-class) home rather than in the workplace. As a result computers were initially given meaning as domestic devices that were part of home life rather than work life, particularly with the purpose of assisting children with their education. Furthermore, their early use was inextricably interbound with accessing the internet, and this was their primary function (Bell 2006a).

Goggin and McLelland (2009) provide further examples to underline the cultural and historical diversity of the use of digital technologies across geographical regions. They note that while personal computers were not as commonly used in Japan as in anglophone countries, locally made phones that could connect to the internet were taken up years earlier in that country. South Koreans also used mobile internet-enabled phones earlier and had access to broadband well before countries such as the US because of the high population density and topography of their country that allowed for wide coverage to be provided (see also Bell and Dourish 2007, 2011; Dourish and Bell 2007). Similarly, as Bell and Dourish (2007) note, the geographical features of the small, highly urban island nation of Singapore, in conjunction with a relatively well-off and highly technologically literate population and government with a tradition of a high level of regulation of its citizens' everyday life, have allowed it to lead the way in adopting ubiquitous computing technologies. As

Google's *Our Mobile Planet* survey of global smartphone use showed, Singaporeans and South Koreans, together with residents of the United Arab Emirates and Saudi Arabia, lead the world in smartphone ownership. In Singapore and South Korea, however, with this development of a technologically connected 'intelligent island' has come a high level of government control, regulation and surveillance of citizens' internet use and access, including regulation and censorship of websites (see more on this issue in Chapter 7).

Digital anthropologists have also demonstrated the ways in which digital devices and platforms may be invested with meanings that resist or change those intended by their developers. Bell (2006b, 2011) gives the example of the use of paper replicas of digital technologies such as iPhones and iPads used in Chinese communities as offerings of love, piety and respect to dead ancestors. These replicas stand as symbols of wealth and Western culture, but are also viewed more spiritually as devices for the dead to communicate with each other as they were used to in the world of the living. Here these technologies have taken on a symbolic form wholly unimagined and unintended by their developers. With Dourish, Bell (Dourish and Bell 2007) also comments on the specific design of a mobile phone aimed at Muslims, which enables them to locate Mecca, read the Koran or hear it read to them, hear the call to prayer from Mecca live and be notified of prayer times. This device has taken on an overtly spiritual meaning as a supportive means for users to practise their faith.

Christie and Verran (2013) use the term 'postcolonial digital lives' to describe the ways in which members of the Yolngu Aboriginal communities with which they worked use digital technologies as part of their cultural archiving practices. The digital lives enacted via these practices are resistant to colonising impulses that attempt to separate people and place. Their Yolngu co-researchers did not view constructing digital databases as appropriate for their purposes. Such databases represented the reproduction of Western ordering and taxonomic practices that did not fit with Yolngu concepts of preserving cultural artefacts, stories and traditions and interacting with them in dynamic ways. The method that was culturally appropriate required a fluid data structure in which the only *a priori* distinctions were those between file types (texts, audio files, movies and images).

Such anthropological research and the insights it provides go well beyond concepts of the digital divide or digital social inequalities to acknowledge that digital technologies are themselves invested with cultural assumptions drawn from the Western tradition. However, they may also be reinvested with alternative or resistant meanings that are culturally appropriate and meaningful to the people using them.

DISCRIMINATION ON DIGITAL SITES

It is important to acknowledge that despite the opportunities that social media and other websites afford for the promotion of forms of participatory democracy and freedom of expression, they may also reproduce and exacerbate discrimination and attempts to silence the members of social minority groups. The ‘openness’ of the internet and the growth of social media platforms that allow individuals and organisations to broadcast their opinions have resulted in greater opportunities to attack, discriminate against and marginalise already disadvantaged social groups. It has been argued that increasing use of online platforms by marginalised groups may in turn lead to more visibility and greater opportunity for others to attack them in these open forums (Ellis and Goggin 2014; Soriano 2014), a point I made about academic online engagement (Chapter 4).

It is all too evident that continuing sexism, racism, homophobia and other forms of discrimination and hate speech exist on the web. Online sites provide forums for the expression, reproduction and support of stigmatising and discriminatory statements that are aimed at social divisiveness rather than cohesiveness. Members of social minority groups tend to be subjected to far more hate speech, trolling, flaming, threats of violence and other forms of online harassment than are those who are part of the hegemonic social group – white, able-bodied, middle-class men living in the cultural North (Daniels 2013b; Humphreys and Vered 2014).

Racist and misogynist abuse and threats of violence are common on online sites. Social media platforms provide an opportunity for racist, homophobic and misogynist groups to attract members and engage in hate speech. Online forums such as news sites frequently attract racist hate speech, to the point that some news organisations no longer allow anonymous comments because of the vitriol that was expressed in them by people using pseudonyms. They also commonly use bots to search for racial epithets and profanity before approving comments to appear on their sites. Some online news sites have simply closed their comments sections because of the time and expense involved in moderating comments for racist and other offensive language and opinions (Hughes and Daniels 2013). Some websites established by white supremacist and other overtly racist organisations feature racist jokes as part of their rhetoric (Weaver 2011). Facebook groups such as ‘Kill a Jew Day’ and ‘I Hate Homosexuals’ and neo-Nazi websites have allowed people a forum for their opinions and to foment violence against their targets (Citron and Norton 2011).

Several of these types of racist propaganda websites are ‘cloaked’, meaning that they are published by individuals or groups who conceal or obfuscate authorship or pretend to have another agenda to attract views and achieve legitimacy. Such websites at first glance appear legitimate, but further examination reveals their racist propaganda agendas (Daniels 2009a; Hughey and Daniels 2013). One such website is entitled ‘Martin Luther King: A True Historical Examination’. The website appears to be a tribute to King, but the website includes material and links to other websites that demonstrate its true agenda: to discredit him. Partly because they are cloaked, these websites often appear towards the top of search engine results for individuals such as King, bolstering their claims to veracity and credibility (Daniels 2009a).

Racist behaviour often takes place on what is referred to as the ‘deep web’, ‘invisible web’ or ‘dark web’. The ‘surface web’ is that which any user can access using the usual search engines and browsers. In contrast, the ‘deep web’ is structured so that it uses encrypted and private networks and therefore is hidden and difficult to access. It is many times larger than the surface web and requires special browsers for access. The deep web is used for criminal or malicious purposes, such as drug and arms dealing, the hiring of assassins, disseminating child pornography or ‘snuff’ films (real footage of people being killed) as well as inciting racism or terrorism.

Some types of digital shaming and vigilantism (discussed further in Chapter 7) are also overtly racist, as in the website 419eater.com, which encourages participants to engage in ‘scam baiting’ of people who often originate from non-Western countries (frequently blacks from African countries such as Nigeria). This involves answering scam emails and attempting to engage the scammer in time-wasting or humiliating activities, such as posing for photographs holding signs in English that they do not understand but which humiliate them or otherwise position them in abject ways or even getting tattooed as directed by the scam baiter who promises them money if they do so.

Mobile apps also perpetuate racism, sexism and other forms of social discrimination and stigmatisation. There are several apps available that list racist jokes or use racist stereotypes as part of games, for example. A list of ‘the 10 most racist smartphone apps ever created’ refers to Mariachi Hero Grande, a game developed by Norwegians that featured a Mexican wearing a dirty poncho whose goal is to squash cockroaches while shooting tequila bottles; Jew or Not Jew, a French app aimed at providing details of Jewish celebrities; and Illegal Immigration: A Game, an alleged game that uses prejudiced subtext in discussing true or false ‘facts’ about immigrants to the US (Bracetti

2012). Other apps that were at first included by Google on its app store but then banned following complaints invited users to convert a photo of themselves into a different ethnic or racial group by adding such features as slanted eyes, a Fu Manchu moustache and yellow skin to 'make me Asian'. This game also used racial stereotypes to supposedly transform white faces into blacks, Native Americans and a victim of the Auschwitz concentration camp.

Overt discrimination and hate speech against women is also common on the internet. It is not only female academics who have been subjected to sexual harassment and threats of violence and rape (Chapter 4). Many other women who engage in digital public engagement, such as feminist activists, bloggers or journalists, have experienced highly misogynist comments, stalking and threats of violence, often couched in extremely explicit and aggressive terms. Women are disproportionately targeted by hate speech and abuse online when compared to male users of digital media (Citron 2009). One well-known case is that of English student Caroline Criado-Perez, who led a campaign to petition the British government to put more women on that country's banknotes. In mid-2013 she was subjected to many rape, violence and death threats on Twitter. In response to several online petitions, Twitter eventually developed a button allowing people to report abusive or violent messages on that platform.

The Google autocomplete function has been identified as having significant political and ethical implications. For example, an advertising campaign developed for the UN Women organisation identified the digitised discrimination against women evidenced in autocomplete Google searches (UN Women 2013). When the campaign's developers performed a search using the terms 'Women should', 'Women shouldn't' and 'Women need', Google auto-completed them with such phrases as 'Women need to be disciplined' and 'Women shouldn't have rights'. When I performed my own Google search in November 2013 using 'Women should . . .', the autocomplete on my computer came up with 'not play sports', 'be silent', 'stay at home' and 'not be educated'. As another experiment I did a search using the words 'Muslims should . ..'. The autocomplete came up with 'leave Australia', 'go home', 'be banned', 'be killed' and 'leave the UK'. When I entered the words 'Gay people should . . .' the top suggestions provided by autocomplete included 'die', 'not be allowed to adopt' and 'be shot'. These autocomplete suggestions reveal the most often searched-for terms by other users, and hence the entrenched discrimination against women, some religious and ethnic or racial groups and gay people among many anglophone digital users. It could also be argued that by continuing to allow autocomplete to display these

terms, this discrimination is perpetuated whenever the words are entered by reinforcing the views that are displayed. The autocomplete algorithms, therefore, are not simply acting to draw on search data; they are also actors in the construction and reproduction of social attitudes.

Racist, misogynistic, homophobic and other forms of threats and harassment are often trivialised and are not adequately dealt with by the law. However, they can have significant emotional effects on their victims and restrict opportunities for marginalised groups to participate freely in digital public engagement, including earning an income from such participation (Citron 2009; Citron and Norton 2011).

This chapter has addressed the multiple ways in which people engage with digital technologies across a range of socioeconomic and cultural contexts. The examples provided demonstrate that even when digital technologies have global reach, local ‘technoscapes’ or ‘cultures of use’ shape the ways in which they are used (Goggin and McLelland 2009: 4). Geographical location is important in determining physical access to technologies, but so too are the norms, practices and expectations that characterise societies within those locations. As I have argued, digital social inequalities are expressed and reproduced in a range of ways, including cultures of use as well as lack of access. Social inequalities and marginalisation may also be perpetuated and exacerbated online. Some of these topics are discussed further in the next chapter, in which I turn my attention to aspects of digital politics as they are expressed in relation to digital dataveillance, digital activism, the open data movement and citizen participation.

Digital politics and citizen digital public engagement

There is a growing literature on the use of digital media, particularly social media platforms, as means of facilitating and inciting social activism and political protest and on the open data movement and sousveillance strategies as examples of the production and use of digital data for political purposes on the part of citizens. This chapter begins with an overview of the politics of digital veillance, an issue that has become increasingly important in the age of big data and revelations about how governments are conducting covert dataveillance of their citizens. The chapter goes on to address the politics of privacy and to review the uses of digital media technologies for citizen political initiatives. A critical perspective is adopted on the claims that are often made about the unique power of social media to influence social change and achieve greater openness and access to digital data. The discussion will also draw attention to the ways in which the apparent ‘truths’ produced via such activities as citizen journalism may be falsified for political purposes or sheer perverseness, how misinformation may be disseminated, and how activism via social media may sometimes descend into vigilantism and forms of social marginalisation and discrimination.

THE POLITICS OF DIGITAL WATCHING

In Chapter 2 I outlined the various forms of watching (veillance) that are applicable to digital technologies. I pointed out that surveillance may be voluntary and involuntary, overt and hidden, benign or coercive, restrictive of personal freedoms or productive of liberty. As outlined in Chapter 2, it has been recognised that we are now living in a post-panoptic world, where the panoptic model of surveillance has been complemented or superseded by new forms of power relations cohering around observation and monitoring. Panoptic surveillance was a feature of 'solid modernity', confined as it was to specific locations and times. Traditional panoptic data were static, recorded in one place and gathering dust in that location. They moved in one direction only: from the surveilled to the surveillants. The information that is gathered via contemporary digital veillance techniques is different. In liquid modernity (Lyon and Bauman 2013) surveillance is everywhere and is agile and fast-moving.

There is no denying that coercive and social exclusionary modes of surveillance may be facilitated by digital technologies, particularly in institutions such as prisons, in the screening of immigrants and asylum-seekers using digital profiling and as part of security measures, such as the identification of potential criminals or terrorist suspects and the use of CCTV in public spaces (Bossewitch and Sinnreich 2013; Hintjens 2013; Mann and Ferenbok 2013). This is surveillance as a mode of authoritarian power to which those who are monitored do not always give their explicit agreement (or, indeed, are asked to do so), and those who monitor others do not acquiesce to a similar level of transparency of their own actions.

Many activities of everyday life involve digital surveillance to which one has not directly agreed and which may be covert. The data that are collected via some technologies are not generally made available to those who are monitored, even though the data are about them. These surveillance strategies are proliferating, often without the knowledge or consent of those who are being watched. For example, in the US the licence plates and location of cars in some areas are routinely photographed by police officers, private companies and CCTV cameras at intersections. The resultant data are used for identifying criminals but also in routine surveillance by police, even of citizens about whom they have no suspicions, and for commercial purposes (such as for use by car repossession companies) (Angwin and Valentino-Devries 2012). Some companies have begun to gather data from people moving in public spaces using the wireless signals that automatically issue from smartphones searching for wi-fi networks. The

smartphone owners do not have to be using their phones for these data to be accessed and are unaware that their movements are being tracked (Crawford 2014).

It is known that intelligence and law enforcement agencies have been monitoring the content and metadata of content on social media platforms for several years, as well as using customised social media platforms to share data among themselves (Werbin 2011). However, it was not until Snowden's revelations concerning the extent of government agencies' surveillance of digital users that many citizens became aware of how their personal data may have come under the scrutiny of such agencies. The popular media have warned for some time that commercial entities such as Google and Facebook as well as government agencies are spying on citizens through their accumulation of data about them, and may end up knowing too much about individuals through the increasingly detailed information produced from aggregating various data sets (Wallace and Whyte 2013). The Snowden documents demonstrated the extent to which even democratic Western governments have secretly accessed digital media sites in their attempts to monitor the activities of individuals engaged in political activism.

Not only have the NSA and other Western intelligence agencies used digital media data for surveillance, they have also sought to employ social media platforms to discredit political activists and movements such as WikiLeaks and Anonymous. 'The Five Eyes Alliance' is a security cooperative comprised of intelligence agencies in the USA, the UK, Australia, Canada and New Zealand. Its activities go well beyond engaging in surveillance of internet material to actively intervening in digital content to create false information. Snowden's documents have shown that the British spy agency GCHQ's Joint Threat Intelligence Group engages in such practices as contributing false material to internet platforms about its targets to discredit them and destroy their reputations and manipulating online discussions to generate outcomes that fit its agenda. This includes falsely attributing online material to someone else, changing the target's online photos, writing blogs pretending to be a victim of the individual or group it is attempting to discredit and posting negative information on online forums. One GCHQ document that outlines these tactics refers to the 'four Ds' that are part of its 'online covert operation': deny, disrupt, degrade, deceive (Greenwald 2014). The GCHQ also secretly monitored visitors to a WikiLeaks site and by tapping into fibre-optic cables was able to collect the IP addresses of visitors in real time, as well as identifying the search terms that they used to find the website (Greenwald and Gallagher 2014).

Ban-optic surveillance is a major feature of contemporary digital surveillance. Several writers have noted how this mode of surveillance is central to the establishment and maintenance of borders: between 'normal' and 'deviant', 'pure' and 'contaminated', 'healthy' and 'sick', 'legal' and 'illegal' and so on. It involves a kind of social sorting, in which certain social groups are identified as posing various levels of dangerousness or threat and their movements or actions allowed or limited as a result (Ajana 2013; Muller 2008). Ban-optic surveillance therefore conforms to a political rationality that deems border and boundary control as vitally important to the governance of populations. The technologies used to produce data for the purposes of exclusion often employ biometric data such as fingerprints and facial images to check against online databases as part of measures designed to control risk as part of 'risk profiling'. These have been described as 'first-generation biometrics'. 'Second-generation biometrics' involve the monitoring of people's behaviours with the aims of identifying and measuring suspicious or hostile intentions (Sutrop and Laas-Mikko 2012). As this social sorting becomes increasingly mobilised via second-generation biometrics, the individuals who are subject to this monitoring are less aware that they are being monitored, due to the invisible nature of many of these technologies (Sutrop and Laas-Mikko 2012).

As the latest form of surveillance in a long history of the close monitoring of such groups, digital surveillance technologies offer even more detail of such practices as individuals' expenditure of social security payments. As another example, immigrant groups in countries such as the US are subjected to forms of biometric surveillance (such as fingerprint scanning) to prove their identity and residence status to which other groups do not have to submit. When people lack social power as well as digital literacy or access, they are less able to resist governmental digital surveillance. They have fewer options to withdraw from digital surveillance than do more privileged social groups because their income, access to social services or right to work may depend on submitting to these demands. Concerns about such monitoring and regulation have led to a focus on what has been termed 'digital human rights' (Eubanks 2014).

It is very difficult to anticipate how the digital data that are generated now may be used in the future with new developments in data mining and algorithmic processing (Andrejevic 2013). As discussed in Chapter 5, there is growing evidence that previously anonymised data from various sources can be used together to trace the originator of the data, hence destroying anonymity. 'Digital fingerprinting' techniques allow for the linking of diverse data sets gathered from different digital devices about an individual to identify them, if not necessarily

by name then by their habits, preferences and practices (Andrejevic 2013). Even if data remain anonymous, they can have significant implications for individuals' rights and freedoms. Whether or not an individual's data are included in big data sets, other people's data are used to make decisions for them, often limiting their choices (Andrejevic 2013). Once it has been demonstrated, for example, that people of a certain body weight or alcohol intake, or those who drive their cars in certain ways, are more likely to be at risk of disease or a car accident, then they become liable to pay higher insurance premiums. If individuals from a particular gender, age and ethnicity are identified as security risks, then all people who fit this specific profile become targeted as potential criminals or terrorists.

Practices of tagging and other forms of content categorisation of such material in producing data subjects are open to errors and misinterpretations that can have severe repercussions for the individuals that they target. As Werbin (2011: 1260) points out, 'social media does not forget. Not only is its memory persistent and difficult to correct, but it is also parsed and distributed and thus open to recombinant logics and endless accumulations and endless forms across indefinite platforms'. Inaccuracies and errors can therefore persist indefinitely, not only masking the ways in which these errors are produced, but multiplying their effects. This has led to individuals being identified on 'no fly' and other security watch lists and prevented from entering other countries, for example, even if these categorisations were made in error (Bossewitch and Sinnreich 2013; Werbin 2011).

THE POLITICS OF PRIVACY

The distinction between public and private has become challenged and transformed via digital media practices. Indeed it has been contended that via the use of online confessional practices, as well as the accumulation of masses of data that are generated about digital technology users' everyday habits, activities and preferences, the concept of privacy has changed. Increasingly, as data from many other users are aggregated and interpreted using algorithms, one's own data has an impact on others by predicting their tastes and preferences (boyd 2012). The concept of 'networked privacy' developed by danah boyd (2012) acknowledges this complexity. As she points out, it is difficult to make a case for privacy as an individual issue in the age of social media networks and sousveillance. Many people who upload images or comments to social media sites include other people in the material, either deliberately or inadvertently. As boyd (2012: 348)

observes, 'I can't even count the number of photos that were taken by strangers with me in the background at the Taj Mahal'.

Many users have come to realise that the information about themselves and their friends and family members that they choose to share on social media platforms may be accessible to others, depending on the privacy policy of the platform and the ways in which users have operated privacy settings. Information that is shared on Facebook, for example, is far easier to limit to Facebook friends if privacy settings restrict access than are data that users upload to platforms such as Twitter, YouTube or Instagram, which have few, if any, settings that can be used to limit access to personal content. Even within Facebook, however, users must accept that their data may be accessed by those that they have chosen as friends. They may be included in photos that are uploaded by their friends even if they do not wish others to view the photo, for example.

Open-source data harvesting tools are now available that allow people to search for their friends' data. Using a tool such as Facebook Graph Search, people who have joined that social media platform can mine the data uploaded by their friends and search for patterns. Such elements as 'photos of my friends in New York' or 'restaurants my friends like' can be identified using this tool. In certain professions, such as academia, others can use search engines to find out many details about one's employment history and accomplishments (just one example is Google Scholar, which lists academics' publications as well as how often and where they have been cited by others). Such personal data as online photographs or videos of people, their social media profiles and online comments can easily be accessed by others by using search engines.

Furthermore, not only are individuals' personal data shared in social networks, they may now be used to make predictions about others' actions, interests, preferences or even health states (Andrejevic 2013; boyd 2012). When people's small data are aggregated with others to produce big data, the resultant data sets are used for predictive analytics (Chapter 5). As part of algorithmic veillance and the production of algorithmic identities, people become represented as configurations of others in the social media networks with which they engage and the websites people characterised as 'like them' visit. There is little, if any, opportunity to opt out of participation in these data assemblages that are configured about oneself.

A significant tension exists in discourses about online privacy. Research suggests that people hold ambivalent and sometimes paradoxical ideas about privacy in digital society. Many people value the use of dataveillance for security purposes and for improving economic and social wellbeing. It is common for digital media users to state that

they are not concerned about being monitored by others online because they have nothing to hide (Best 2010). On the other hand, however, there is evidence of unease about the continuous, ubiquitous and pervasive nature of digital surveillance. It has become recognised that there are limits to the extent to which privacy can be protected, at least in terms of individuals being able to exert control over access to digital data about themselves or enjoy the ‘right to be forgotten’ (Rosen 2012; Rosenzweig 2012). Some commentators have contended that notions of privacy, indeed, need to be rethought in the digital era. Rosenzweig (2012) has described previous concepts as ‘antique privacy’ and asserts that these need challenging and reassessment in the contemporary world of ubiquitous dataveillance. He argues that in weighing up rights and freedoms, the means, ends and consequences of any dataveillance program should be individually assessed.

Recent surveys of Americans by the Pew Research Center (Rainie and Madden 2013) have found that the majority still value the notion of personal privacy but also value the protection against criminals or terrorists that breaches of their own privacy may offer. Digital technology users for the most part are aware of the trade-off between protecting their personal data from others’ scrutiny or commercial use, and gaining benefits from using digital media platforms that collect these data as a condition of use. This research demonstrates that the context in which personal data are collected is important to people’s assessments of whether their privacy should be intruded upon. The Americans surveyed by Rainie and Madden were more concerned about others knowing the content of their emails than their internet searches, and were more likely to experience or witness breaches of privacy in their own social media networks than to be aware of government surveillance of their personal data.

Another study using qualitative interviews with Britons (Wellcome Trust 2013) investigated public attitudes to personal data and the linking of these data. The research found that many interviewees demonstrated a positive perspective on the use of big data for national security and the prevention and detection of crime, improving government services, the allocation of resources and planning, identifying social and population trends, convenience and time-saving when doing shopping and other online transactions, identifying dishonest practices and making vital medical information available in an emergency. However, the interviewees also expressed a number of concerns about the use of their data, including the potential for the data to be lost, stolen, hacked or leaked and shared without consent, the invasion of privacy when used for surveillance, unsolicited marketing and advertising, the difficulty of correcting inaccurate data on oneself and

the use of the data to discriminate against people. Those interviewees of low socioeconomic status were more likely to feel powerless about dealing with potential personal data breaches, identity theft or the use of their data to discriminate against them.

DIGITAL ACTIVISM

The use of social media and other digital technologies for social activist purposes has been investigated by researchers from a variety of disciplines within the social sciences, including not only sociology but also anthropology, media and communication studies and cultural studies. Manuel Castells is one of the most well-known writers on the use of social media for activism. In one of his most recent accounts of networked societies, Castells (2012) turns his attention to the ways in which contemporary social movements and activism are facilitated using digital social networks. He views these newer forms of networks as operating to pose a significant challenge to the operation of established power by forming new public spaces, or the networked space that is configured between the digital and the urban space.

Several cultural studies and media and communication academics have written about such aspects as the use of digital media for political activism, the creation of political media content by users on online forums and other forms of public participation. Researchers of online activism have focused in particular on the use of social media such as Twitter, YouTube, Facebook and blogs in the Arab Spring protests and the activities of the Occupy Wall Street movement, both occurring in 2011 (Bruns *et al.* 2013; Gleason 2013; Howard and Hussain 2011; Murthy 2013). Indeed, Tufekci and Freelon (2013: 843) contend that digital media technologies are now so influential in political activism that 'it no longer makes sense to ask if digital technologies will exercise influence; rather, we can and should be looking at how and, also crucially, through which mechanisms'.

The WikiLeaks movement and the activities of the Anonymous activist hacker alliance have also gained some attention for their interventions into making previously secret government documents available on the internet, in the case of the former, and in engaging in hacking activities seeking to challenge government power, as Anonymous seeks to do (Cammaerts 2013; Curran and Gibson 2013; Postill 2013; M. Sauter 2013). Several digital anthropologists have explored the ways in which subjugated groups have used social and other digital media as part of their efforts to achieve justice and recognition. John Postill, for example, has written a number of accounts of

the use of internet activism and social protest in countries such as Malaysia (Postill 2008) and Spain (Postill and Pink 2012).

Some research has also been conducted on the use of online platforms for feminist activism and consciousness-raising. This research suggests that digital media can be important in mobilising support for protests and allowing previously silenced women, including those from racial or ethnic or sexual identity minorities or located in the global South, to be given a voice (Friedman 2007; Merithew 2004; Rapp *et al.* 2010). A recent example of digital feminist activism from Australia is the 'Destroy the Joint' campaign. Twitter and Facebook were used by Australian feminists to protest against the comments in 2013 of a well-known conservative radio commentator, Alan Jones, on his radio programme that women leaders and politicians such as the then-Prime Minister Julia Gillard were 'destroying the joint' – that is, that they were allegedly having a detrimental effect on Australia. After adopting the hashtag '#destroythejoint', feminist activists quickly used Twitter to draw attention to Jones's sexist comments, often by using ironic comments about how they planned to 'destroy the joint', and gathered many supporters and retweeters of their comments. Jones's further negative comments in a speech at a political function about Gillard, labelling her a liar, also drew these social media activists' attention and criticism. Commercial advertisers responded to the negative publicity engendered by the 'Destroy the Joint' campaign by withdrawing their funding from Jones's radio programme. He was forced to make a public apology for the comments he made in his speech about Gillard.

I noted in the previous chapter that many people with disabilities have found support from online communities. Members of other socially marginalised groups have also found the internet to be a source of support and political mobilisation. People who identify as queer or transgender have used online technologies for these purposes, sometimes finding the internet the only safe space for expressing their sexual identity. Lesbian, gay, bisexual and transsexual activists have frequently employed digital media outlets to muster support and engage in political activism, attempting to challenge heteronormative stereotypes and challenge discrimination (Fraser 2010; Soriano 2014). Via such activities, an online 'queer community' has developed as well as many political groups and support networks (Soriano 2014). There are numerous Tumblr sites, for example, devoted to celebrating and expressing queer identities and inviting participation from other queer-identified users, with titles such as 'Radically Queer', 'I Knew I Was Queer When ...', 'Queer Resistance' and 'What I Love about Being Queer', as well as a number of others devoted to gay, lesbian, transsexual or transgender identities.

People who self-identify as fat have also taken up online activism in their efforts to challenge and resist fat stigma. They blog about fat pride, engage in information-sharing and activism using Facebook pages, Tumblr and Twitter feeds and post images that represent fat bodies as normal, healthy and attractive. The image curation site Pinterest, for example, features many pages established by fat acceptance supporters and fat activists that display images of fat bodies that have been selected for their positive representations of this body type. They include images of fat celebrities looking glamorous, vintage images of attractive fat bodies, erotic portrayals of curvy bodies, artistic representations, fat acceptance posters and products such as badges and t-shirts and photographs of ordinary people wishing to express their confidence in their bodies. The term ‘fatosphere’ has been used to denote these efforts (Meleo-Erwin 2011).

There is a multitude of health-related digital media sites directed at information provision and sharing and patient support for specific diseases and conditions. Some of the members of these online groups and organisations also attempt to engage in political activism to achieve more positive representations of people with specific illnesses or conditions, agitate for greater access to medical care or healthcare policy changes, or challenge medical orthodoxies (Meleo-Erwin 2011). Disability activists have begun to use social media to draw attention to such issues as government cuts to services. One example is the 2012 British ‘We Are Spartacus’ campaign. Organised around a Twitter hashtag, this campaign began with a small number of activists tweeting about a report that outlined the British government’s disability living allowance reform. The report itself was written with the help of social media contributions from people with illnesses and disabilities describing their experiences and the effects the proposed cuts to their disability living allowance would have on their lives. The campaign was vastly helped by the participation of the celebrity Stephen Fry, who has millions of Twitter followers, as well as influential politicians who also tweeted about the report and other well-known British public figures. The British mainstream news media picked up on the story once it became clear that the topic was trending on Twitter, and the resulting publicity exerted pressure on the politicians involved (Butler 2012).

OPEN DATA AND DATA PROTECTION INITIATIVES

As discussed in Chapter 5, it has been contended that individuals’ and organisations’ digital data may come to be viewed as marketable commodities to the extent that they may be viewed as a form of

valuable property and therefore should be protected and stored in ways that secure it from outside use unless permission is given. There is, therefore, a debate between those who argue that individuals and organisations should protect their rights to their own data, and those who claim that these data should be viewed as a public asset and shared as such (Kirkpatrick 2011). Indeed, a new form of philanthropy has been identified – ‘data philanthropy’ – in which individuals and corporations are encouraged to ‘donate’ their data for the benefit of all (Kirkpatrick 2011). This has been championed, for example, by the humanitarian organisation Global Pulse.

So valuable are digital data objects now considered that reference is frequently made to individuals’ ‘data assets’ and consideration given to what should happen to these following a person’s death. It has been argued by some commentators that digital users should establish a personal computing cloud repository in which all their data interactions may be stored that they can then use, trade or sell as they wish and that ‘do not track’ browser settings may become common ways of preventing corporate platforms from mining users’ personal data. Some commentators have contended that people need to be more conscious of their metadata, or what others can discover about them online, and become more aware of what data are collected about them and how they can be used (Horning 2013; Watson 2013).

There is a move towards liberating data from the archives used by platform and website developers so that they can be accessed by individuals for purposes other than commercial ones. The data assemblage here becomes a commodity that users may use themselves rather than allowing it to be monetised by platform developers (Vaughn 2013). If it is accepted that ‘you are your data’, the argument continues that one’s own data should be owned and available for use by oneself (Watson 2013). This valorisation of digital data does not centre solely on economic imperatives, but incorporates others related to how data may be used to improve individuals’ lives. This perspective is articulated in a multitude of forums in relation to many other aspects of individuals’ lives, including healthcare, employment and education. When people are able to collect ‘small data’, as in the case of people using digital self-tracking devices or engaging in citizen science or citizen journalism practices, they are contributing to ‘home-made big data’ that may be used for broader research or political as well as personal purposes. Indeed, this is one of the stated aims of the Quantified Self movement, as expressed on its website: to produce data on oneself to meet one’s own objectives that can also be aggregated with others’ data to create broader insights into human behaviours. Providing open data sources to the public is also represented as

a way for citizens to engage in their own research using big data (Halavais 2013).

Digital strategies of attempting to take control of dataveillance have begun to emerge. These include using programs that can reveal how people's online activities are being monitored and who is gaining access to personal data. Browsers and search engines can also be used as alternatives to those offered by the internet empires that do not track users' queries, as are online services that encrypt messages and phones that do not identify users' geo-locations. Ad-blocking tools that both prevent ads from appearing on devices' screens and stop advertisers collecting data about users are becoming popular browser extensions. Programs are available that can provide users with a snapshot of what information they are sharing in social media sites and online services such as Google. They inform users when their privacy settings are weak and send alerts when sites make changes to their privacy policies. Other tools can show users which companies have access to information such as their credit-card details, phone number and email addresses or remove an individual's public profile and personal information from sites that gather data about people from the internet. Some people clear the cookies that companies use to track users' browsing behaviours or set their devices to disable, block or turn off cookies (Dwoskin 2014).

On a more politically activist level, some critics and activists have begun to call for people to engage in resistant acts to counter others collecting data on their activities for commercial or surveillance purposes. They assert that digital data should be made available to citizens to use for the benefit of themselves or their communities. Several social media scholars view it as important to personally participate in public debates about digital media as part of their own political activism (see, for example, Ford *et al.* 2013; Fuchs 2014b; Jenkins 2014). In April 2014, a group of internet scholars, media practitioners, librarians, activists and media policy-makers, including the prominent Marxist media theorist Christian Fuchs, released *The 2014 Vienna Declaration on Freedom of Information and Expression*, which they circulated on various scholarly forums calling for other academics to sign. The declaration called for 'public vigilance to defend freedom of information and expression as key democratic rights', particularly in relation to internet dataveillance and corporate and state control of the media (Avaaz.org 2014).

'Open' has become a buzzword in relation to digital technologies, with many advocating for open-source software, open data, open online education and, as discussed in Chapter 4 in relation to academic research, open access to scholarly publications. The term 'open data

movement' has been employed to describe a political perspective that valorises access to the data archives of government bodies. The open-data movement assumes that government bodies tend at best to be inefficient, wasteful in their spending and lack attention to issues that citizens consider important, and at worst corrupt, and that opening their data archives will reveal this. There is much focus on key words such as 'transparency', 'accountability', 'citizen empowerment' and 'participation' in open-data initiatives. It is contended that such practices not only involve greater democratic participation, but also may lead to the generation of new industries and innovations. There is talk of producing a global ecosystem of data to which communities from all over the world may have access for their own purposes (Davies and Bawa 2012).

'Community informatics' is a term that is also often used in relation to community members engaging in their own data collection and analysis, while 'citizen sensing' or 'participatory sensing' is employed more specifically to denote the activities that involve citizens gathering data, particularly environmentally related, using sensor-enabled technologies. These include sensors that may be worn by individuals as wearable computing, mounted on vehicles (including bicycles), attached to balloons and installed in people's houses or on street furniture (Kamel Boulos *et al.* 2011). An increasing number of calls have been made for children to learn computer coding from an early age as part of the school curriculum, supported by the argument that digital and coding literacies are as important in the contemporary digital society as are the more traditional forms of literacies. Coding literacy is represented in such arguments as helping children and young people to become equipped for a future workplace that may require such skills and also to protect themselves against incursions against the privacy of their personal digital data (Williamson 2013a, 2013b).

Various organisations and groups have developed for the purposes of helping people learn about creating and using digital data. The School of Data and Open Data Institute in the UK, for example, offers courses and activities for non-commercial organisations, social activists, journalists and citizens to instruct them in creating, accessing and using digital data. Many initiatives are now in operation to support digitally enabled citizen science activities, assisting people to use digital technologies to gather data about environmental conditions in their locality, for example, so that they can use these data to agitate for change. The Mapping for Change initiative is one such example. This organisation provides mapping, geographical analysis and community engagement services, including helping communities create online interactive maps demonstrating geographical information about such

features as community services or environmental pollution. Some of these mapping activities involve the use of digital sensors and other digital technologies, such as social media for generating data, so that participants are able to collect their own data and then represent these data visually on an online map. We the Data's website (which, interestingly, is a joint partnership between what the website describes as 'friends', 'TED Fellows' and 'some visionaries' from the computer giant Intel) outlines a number of activities it promotes in the interests of enhancing citizens' access to their digital data: platform openness, data literacy, digital access and digital trust (defined as 'the ability to control our personal data "exhaust" and build systems of reputation and accountability').

It is evident that increasing numbers of people are learning about gathering and interpreting data using digital tools. When Typhoon Haiyan hit the Philippines in late 2013, for instance, volunteers were called into action to use social media data to inform aid efforts. Faced with a lack of information about how citizens were faring in the more far-flung regions, particularly given the lack of landline telephone access due to damage from the typhoon, social media messages – supported by emergency digital technology infrastructure, such as inflatable broadband antennae – were able to provide details. Workers using the MicroMappers platform were able to pinpoint where people were asking for help by using volunteers to sift through tweets and other digital media updates, noting descriptions of the situation and the content of any images uploaded. The online mapping tool OpenStreetMap was used by other volunteers to create new versions of digital maps that showed changes to the topography of affected regions to promote better access for relief workers (MacKenzie 2013). In other developing countries, citizens have used open government data to monitor politicians' actions (Ghana), demonstrate waste in government spending (Nigeria) and engage in political action designed to improve public sanitation and access to clean water (India) (Firth 2013).

CRITICAL PERSPECTIVES

Despite the many examples of successful uses of social and other digital media for political activism and citizen participation, some critics have challenged what they identify as an overly utopian and simplistic perspective on what these practices can achieve. They suggest that the apparent power of the new digital media in facilitating protest and social change, championing their liberating potential, tends to

present an overly simplistic view of digital media's role. A more complex approach acknowledges the interaction of digital media with traditional media and other forms of disseminating information and inciting action is complex and multifaceted, involving a heterogeneous collection of actors, both human and nonhuman, and both old and new media. Community and social network concepts tend to be employed in internet research as if they are bounded and unidimensional, rather than heterogeneous and dynamic. Postill (2008) proposes instead the concept of the 'social field', a space in which social agents compete or collaborate, including both local residents who may be agitating for change and the authorities resisting change. A diverse range of different human actors are contributing to the current convergence of digital freedom activism and popular protest, including computer geeks and hackers, journalists and lawyers specialising in copyright and internet issues, other knowledge producers such as academics as well as social activists and citizens. An equally diverse range of actors may seek to limit, contain or repress such activities (Fuchs 2011, 2014b; Postill 2013; Tufekci and Freelon 2013).

The human and nonhuman actors that work together to produce digital data – the developers, coders, web hyperlinks, algorithms, search engines and engineering of the infrastructure of the internet itself – structure and delimit the ways in which people are able to search for and find relevant information or indeed upload and manipulate their own data (Ruppert and Savage 2011). Castells has been criticised for neglecting discussion of surveillance and privacy issues and for his assumptions that all citizens have equal access to the internet (Fuchs 2014a; van Dijk 2010). As shown in Chapter 6, many people continue to lack expertise in using digital technologies or even the kind of access to them that utopian visions of community mobilisation via the internet tend to assume. A significant disparity exists online in terms of skills and expertise to use digital media for political purposes. A high-profile digital presence is often a result of access to funds to pay for it. Those groups and organisations that have access to greater resources are able to pay for technical expertise and for their websites to achieve greater visibility (Adams 2011; Halford *et al.* 2013; Mager 2009).

Regardless of citizen data initiatives, as described in Chapter 5, the internet empires retain a firm hold of the data they collect and archive. While the ideals of sharing and participatory democracy that are promoted in Web 2.0 cultures suggest that average citizens can both contribute to and benefit from the affordances of digital media technologies, the people who create the data rarely benefit financially from them. It is Google, Amazon, Facebook, Twitter and the like and

the corporations to which they sell their data who are able to make money from these data. While 'transparency' is a major discourse in the big data rhetoric, many collectors of big data sets do not reveal how they are collected or to what purposes they are put. While big data analytics are used to generate decisions and predictions about individuals, those individuals often have no idea how these were made, and thus how they can be challenged (Richards and King 2013). Big digital companies still exert power over the content that they allow on the social media sites they have developed. Continuing battles over Facebook's refusal to allow women to upload photos of themselves breastfeeding as this is considered to be publishing inappropriate images of female nudity is one example.

While social media allow social activists and political protesters to organise their movements, they are also a source of data for intelligence and policing agencies to mobilise against them and for use in legal charges (Werbin 2011). Governments can move to shut down, prohibit or censor digital media sites. In countries like Singapore (Bell and Dourish 2007), Syria (Richards and King 2013) and China (Tang and Sampson 2012), for example, the government exerts tight censorship over both the traditional media and internet sites. While there is some opportunity for the citizens of these countries to use the internet as part of social protest and activism, there is much less freedom to do so compared to countries with less government intervention. Indeed, Singapore was targeted by Anonymous in November 2013 for its censorship activities. An example of such repression of free speech on social media occurred in March 2014, when the Prime Minister of Turkey, Recep Erdoğan, restricted access to Twitter in his country as part of his attempts to silence political dissent and challenges to his political power. Twitter and other social media platforms had been used by dissidents to leak documents and wire-tapped recordings that allegedly provided evidence of corruption among Erdoğan's inner circle.

In addition to censoring social media political activism or dissent, some government regimes have themselves employed the internet to conduct surveillance on political activists and organisers. They have used social media data to identify and arrest them, thus turning the communicative and networking functions of online technologies against attempts at free speech and political change (Fuchs 2014a). Thus, for example, the Syrian government used the social media output of pro-democracy activists working as part of the Arab Spring to secretly profile and identify them (Richards and King 2013).

A further critique of the assumptions and ideologies underpinning advocacy of digital activism argues that advocates represent digital

activism as unfailingly productive and positive. There is little questioning of the rhetoric of openness and participation that suffuses these assumptions. The privileging of leaderless and horizontal organising and an aversion to hierarchies tend to be part of the rhetoric of digital activism, as is the representation of social media as vibrant and progressive compared to previous forms of political organising (Kavada 2014). Here the discourses of digital utopianism and technological determinism are as evident as they are in other spheres of human endeavour. Advocates of digital activism tend to represent traditional media as obsolete and inefficient in organising political activism, even as 'dead' and corrupt, while positioning new digital media as progressive and revolutionary (Natale and Ballatore 2014). Indeed, it has been asserted that both the popular media and certain academic portrayals of digital activism have tended to romanticise such activism (Markham 2014; Natale and Ballatore 2014). Fuchs (2014a) speculates whether events such as the Arab Spring and Occupy Wall Street protests would have taken place without the use of digital technologies. He concludes that these protests would still have occurred, albeit using different forms of media and organisation of activists.

Critics have also pointed out that prosumption has various levels of political and economic participation, some of which are minor and some of which have more major implications. Uploading detailed content agitating for political change on social media platforms and actively using digital media networks to collaborate on political activities and encourage membership of dissident groups, for example, are very different practices from simply sharing or liking others' social media content. In the increasingly commercialised environment of prosumption, some forms of digital participation are revolutionary and resistant to current modes of power. Other forms are part of dominant, powerful institutions and support their power: for example, economically powerful corporations such as Google, Apple and Amazon (Fuchs 2011, 2014b; Jenkins 2014). As Jenkins (2014: 10) contends, the Web 2.0 business model seeks 'to capture, commodify and control the public's desire for meaningful participation'. Some of the sites that have been established for the communication of resistant political ideas or to enhance support among marginalised groups have become commercialised (Lupton 2014a; Soriano 2014).

Some commentators have challenged the ideals of citizens learning to gather and manipulate digital data or to learn computer coding. It has been asserted that these ideals may be interpreted as yet further examples of citizens encouraged to act as responsible in the context of neoliberal politics, enjoined to participate in coding, data gathering and data analysis for political purposes (Bates 2012) or in the interests

of commercial enterprises (Williamson 2013a). It may be argued that such utopian ideals tend to discount the realities of the messiness, inaccuracies, partial nature and incompleteness of the data with which citizens may be encouraged to grapple (Davies and Bawa 2012), as well as the fact that collecting data, coding and data analysis practices are themselves often complex to teach and learn. Even professional coders struggle to keep up with changes in programming languages, coding packages and operating systems, and are largely unaware of the social and economic consequences of their coding work (Williamson 2013a).

Furthermore, releasing data sets to render them 'open' in itself is not an emancipatory or politically progressive act: the conditions in which this occurs, the quality of the data and the uses to which they are put all structure how this process operates and is interpreted. Bates's (2012) analysis of the Open Government Data initiative in the UK found that powerful political interests attempted to shape the release of data and represent this process as serving commercial interests rather than progressive social policy. Open data initiatives, therefore, are the sites of significant social and political struggle, with community groups attempting to access data sometimes subject to continuing efforts to co-opt and exploit them in the interests of elite groups. The project of 'releasing data' is far more complex and politically contested than some of its advocates are willing to acknowledge.

Concern has been expressed in some quarters that in the face of the accumulation of data and other forms of information, people are now dealing with an 'info-glut', or data overload. In this age of opinion-expression and citizen journalism activities as part of Web 2.0 prosumption, a myriad of ways of representing events and constructing views of reality are available. Digital media users need to find some way of sifting through these opinions and representations and making sense of them. It is argued that there are simply too many forms of data to which individuals are now exposed, and it is difficult for people to assess which data are important, valuable and accurate and which are trivial or inaccurate. This is the case both for those entrepreneurial operators who seek commercial value from big data and for ordinary citizens. However, those who own the data stored in corporate archives have privileged access to these data and greater resources for making connections between them and interpreting their meaning (Andrejevic 2013).

A distinction between the 'big data rich' and the 'big data poor' was made by boyd and Crawford (2012) in pointing out the power relations inherent in differential access to digital data. Andrejevic (2013: 34–35) takes this further by predicting that what he describes as 'two

different information cultures' will co-exist: one based on traditional information sources such as their own and others' experiences, news media and blogs, and the newer information culture offered by big data that relies upon computerised analytics for its comprehension. He contends that the new information culture has instituted new forms of social, economic and political disadvantage. Those with greater cultural and economic capital are able to make big data work in their favour, while others simply lack access to the benefits offered by big data. As this suggests, there remain limits to the contributions that people in general are able to make to the new digital knowledge economy, the authority they are able to develop and the benefits they are able to accrue. While the rhetoric suggests that platforms for prosumption serve to create 'new informational gatekeepers and data interpreters' (Ruppert and Savage 2011: 87) (that is, members of the digitally empowered public), the digitally engaged citizen as an ideal-type is configured through dominant and often continuing hierarchies of power and knowledge.

Some advocates of the open digital data movement are beginning to realise these issues and encourage people to develop a critical approach to the big data phenomenon itself: a 'critical citizen science' that goes beyond the notion of citizen scientists as sensor-based nodes in the Internet of Things (McQuillan 2013). As McQuillan (2012) puts it, critical citizen science involves people 'examining and questioning what represents their world inside the big data machine, and having the ability to intervene on their behalf of their preferred futures'. He asserts that once people start to engage with digital data, they will realise its 'obstinacy and material resistance' (McQuillan 2012). They will come to see the flaws and inaccuracies of digital data (the 'dirtiness' of the data), the assumptions and judgements that underpin them, the ways in which they are used for political purposes and that these forms of information and 'truths' are not as neutral and perfect as they are so often presented. They will be able to think about what kinds of data are most useful for their own purposes. McQuillan (2012) gives the example of the Counter Cartographies Collective, a group that attempts to 'queer' big digital data sets by using them for purposes unintended by the generators and archivers of the data.

THE NEGATIVE SIDE OF CITIZEN DIGITAL PUBLIC ENGAGEMENT

Encouraging citizens to participate in the creation of knowledge bears some significant risks and threats to other citizens' privacy and freedom. Practices of *sousveillance* and *synoptic veillance* are now integral

elements of many users' interaction with digital technologies. Mobile and wearable computing devices enable users to constantly monitor and record both visual and audio data as they move around domestic and public spaces, as well as monitor geo-location details (Mann and Ferenbok 2013; Michael and Clarke 2013). Users of these technologies can watch each other constantly and record and then share their observations with many others using social media platforms (in some cases, thousands or even millions of others). People moving in public spaces become imbricated within the field of public vision, representing a new configuration of space, visibility and social or even criminal censure. The recordings that ensue become subject to moral interpretation as they are disseminated and tagged through digital media platforms (Biressi and Nunn 2003).

Beginning with the amateur video-filming of Rodney King being beaten by police officers in Los Angeles in 1992, the notion that citizen journalists and activists can take images and circulate them in the interests of public accountability has gathered momentum. The opportunity to act as a civil witness has increased exponentially in the age of ubiquitous and mobile computing. It is now extremely easy to take photographs or videos on one's device and very quickly upload them to social media sites for sharing and circulation (Byrne 2013; Kingsley 2008). The behaviour of figures of authority, such as police and security officers, may be placed under more public scrutiny by virtue of pervasive surveillance on the part of private citizens, who can distribute the images or audio files they record on social media sites and gain wide exposure (Bossewitch and Sinnreich 2013).

The surveillance capacities offered by digital media can work to bolster social mores and identify wrongdoing, but can also be used for harassment, manipulation, stalking, voyeurism, mob activism and wrongful punishment or social exclusion. People engaging in these activities participate in acts of public shaming, in which individuals or groups deemed to have acted outside the boundaries of moral behaviour are held up for castigation and blame. This may quickly descend into vigilantism, sometimes in the absence of firm evidence that the individual who has been targeted has behaved criminally or otherwise reprehensibly (Byrne 2013; Kingsley 2008).

One such example occurred in the wake of the Boston marathon bombings in April 2013. Sunil Tripathi, a university student who had been reported missing for more than a month, was wrongly nominated as a suspect, much to his family's distress. One of the members of the social bookmarking site Reddit, who was working as part of a joint effort to comb through photographs to identify the bombers from blurry images from security cameras that were available online,

decided that Tripathi resembled one of them. Very quickly, as this so-called identification was spread via other social media sites such as Twitter by journalists as well as other users, Tripathi became infamous. The Tripathi family's 'Help Us Find Sunil Tripathi' Facebook page was defaced by angry Reddit users and the family were forced to close it down. Tripathi's body was later found (he was presumed to have committed suicide in the days before the Boston bombings), and the real perpetrators of the bombing were identified.

The news media have traditionally exercised disciplinary power by 'naming and shaming' people who have come before the courts for criminal acts or otherwise gained public attention for wrongdoing. Now that many newspapers publish their news reports digitally, there is the potential for minor wrongdoings, offences and misdeeds to be reported online, circulated from the original source and remain in a digital format for perpetuity. Once an individual's name is linked many times on digital networks with criminal or antisocial behaviour, this association is impossible to eradicate. People's names, when entered into search engines, are immediately associated with the incident that garnered social media attention, even if it occurred years before or they were identified in error (Waller and Hess 2014).

Minor social *faux pas* have also been amplified by the circulation of shaming and acts of humiliation via social media (Kingsley 2008; Waller and Hess 2014). This has occurred frequently in relation to antisocial behaviours such as racist insults or urination in public spaces, for example, with the recording and digital sharing of such behaviours sometimes leading to police arrests. 'Twitter firestorms' are unleashed when individuals are identified in that social medium as behaving badly or criminally and then subjected to an intense degree of excommunication and attempts at shaming. I referred in Chapter 4 to Geoffrey Miller, the American academic who made an ill-judged offensive comment about fat students' supposed lack of self-control on Twitter. His remark was retweeted many times, often with negative appraisals of him appended, and he became known on the internet as 'the fat-shaming professor'. There are countless other examples, including the Destroy the Joint campaign against broadcaster Alan Jones that I described earlier in this chapter.

As the case of Sunil Tripathi demonstrated, sometimes social media sites not only spread erroneous 'news' but participate in making apparent 'breaking news'. The information disseminated on social media sites is taken very seriously by journalists working for major news organisations, who perpetuate the rumours in their own tweets and online 'breaking news' stories. The opportunities to create fraudulent content in the attempt to perpetuate a hoax or as part of propaganda efforts may

hamper news gathering and humanitarian efforts. To use the example of the Boston Marathon bombings again, thousands of fake profiles were created on Twitter very soon after this event for the purpose of malicious tweeting. The proportion of rumour dissemination and fake content among tweets was high. Fraudulent charity accounts were created and incorrect information was spread about the victims of the bomb blasts, including incorrect claims about children who allegedly had been killed and fake photos of them (Gupta *et al.* 2013).

This type of spreading of misinformation and rumour also occurred when Hurricane Sandy affected New York City in late 2012. Various fake images were created using digital image manipulation tools or taken from fictional materials such as films and art installations that were widely shared on Twitter and Facebook, as well as images of scenes that were represented as taken during the hurricane that were authentic but were actually of earlier events in New York City or other cities. These fake images included one of the Statue of Liberty surrounded by crashing waves that was from the 2004 film *The Day after Tomorrow*, another of threatening storm clouds over the city that predated the hurricane by a year and a digitally manipulated image falsely showing a shark swimming in flood waters in the city (Colbert 2012).

The reports of the deaths of various celebrities have also spread rapidly via Twitter, often forcing the celebrities themselves to make public protestations that news of their demise was premature. False Twitter accounts have been created and images and videos uploaded to social media sites in efforts to disseminate political propaganda or to slander political figures (Silverman 2012). Wikipedia entries are renowned for being manipulated by editors seeking to engage in pranks or to achieve political gain. April Fool's Day is a particularly popular date for Wikipedia hoaxes (see Wikipedia 2013). A common use of celebrity identity is evident in the phenomenon of celebrity fake porn, where people use Photoshop to digitally manipulate images of (mostly) female celebrities to represent them in fake pornographic poses and then post these images online.

Some writers, drawing on Castells's concept of network society, have used the term 'network(ed) journalism' to refer to the use by journalists of social and other digital media to create their news stories (Heinrich 2012). Journalists are increasingly using sources such as Twitter, YouTube, Flickr and Instagram to collect material on breaking news stories but are then confronted with the requirement to rapidly assess the validity and authenticity of the information uploaded on these sites. Citizen or crowd-sourced journalism and eyewitness accounts offer great possibilities for widening the scope of journalistic news-gathering, but they

also offer significant pitfalls, such as those outlined above, as well as the sheer difficulty of dealing with the increased flows and speed of information emerging from sources such as social media and blogs (Heinrich 2012). Verification of social media sources and citizen journalism is now a significant part of journalistic work, and several major news organisations employ dedicated teams of journalists to do this. Journalists themselves can now be held to account by others, who can more easily expose any fabrications or inaccuracies in their reporting by presenting their own information and posting it online (Silverman 2012). In this context, the audiences for news reports are no longer positioned as the passive recipients of this news, but as active creators and sometimes news breakers who themselves are authoritative sources that require management by journalists seeking to compile a news report (Harrington and McNair 2012).

I have argued in this chapter that there are many complexities to digital veillance, digital activism, citizen digital public engagement and the rhetoric and strategies of openness. Digital activism and citizen participation in the construction of knowledge via digital media are able to achieve certain objectives but continue to take place in a context in which powerful commercial and state interests can delimit citizens' freedom of expression and action. The opportunity for citizens to use digital media to conduct their own strategies of veillance and create and circulate knowledge also may support the reproduction of false and misleading information, social shaming, vigilantism, social discrimination and hate speech. I have further contended that the project to achieve 'openness' of data is not as unproblematic as it may first appear. Here again, a critical and reflexive sociological approach is vital to investigate the manifold issues that lie beyond simple calls for increased citizen participation in the creation of digital knowledges and the protection of digital privacy.

The digitised body/self

Various digital technologies have been developed to digitise the self or one's body. These include the sharing of photos on social media platforms, public profiles, blogs and comments written about themselves by social media users, and self-tracking devices that are used to monitor and measure aspects of everyday life and render these into data. These technologies facilitate the collection, sharing and dissemination of information and emotions that might in previous eras have been considered highly personal, including experiences of illness, surgery or the death of a loved one, information about one's moods or bodily functions, relationship break-ups, work difficulties and so on.

Digital sociologists and other digital media researchers have recognised the ways in which human embodiment and concepts of selfhood are represented and configured via digital technologies and digital social networks. It is not only the data or images produced via digital technologies that are important to research and theorise but also how the objects themselves – the devices, such as smartphones, tablet computers, gaming technologies and wearable devices – are used in practice. This chapter takes up theory and research from a diverse range of disciplines, including social computing, digital anthropology, media studies and cultural studies as well as sociology, to review the ways in which digital technologies are incorporated into everyday lives across a range of contexts.

INTIMATE COMPUTING

As I argued in Chapter 2, the concept of the cyborg, so popular in the early years of theorising computerised technologies, has lost much of its currency. Few of the new generation of scholars interested in digital media seem to refer to the established literature on the cyborg, perhaps because it seems no longer relevant. I would argue, however, that the very ubiquity and portability of new forms of digital technologies introduce potential ways of thinking about the digital device from the perspective of the cyborg body. By this, I do not mean the science-fiction version of the cyborg – that masculinised, aggressive sub-human exemplified by the figures of the Terminator or Robocop. Instead, I have developed the concept of the ‘digital cyborg assemblage’, which I see as a far more fluid and complex concept. The digital cyborg assemblage is the body that is enhanced, augmented or in other ways configured by its use of digital technologies that are worn, carried upon or inserted into the body, continually interacting with these technologies in dynamic ways. This concept draws upon Haraway’s revision of her definition of the cyborg, in which she goes beyond the concept of the hybrid body to emphasise the need to highlight the ever-changing multiplicities of human embodiment and identities as they come into contact with nonhuman entities (Chapter 2).

We are more cyborgs than ever before, with our mobile and wearable technologies that many of us carry throughout our day, position close to our beds at night or even wear in bed, in the case of biometric self-tracking devices (see more on this below). We are both the literal and the metaphorical cyborgs outlined in Haraway’s work. Indeed, our melding with our digital technologies, their incorporation into the envelopes of our bodies, has become so habituated that we no longer think of ourselves as cyborgs. Our bodies are literally constantly in physical contact with digital devices or rendered into digital formats via digital technologies. On the ontological level, our sense of selfhood and embodiment are implicated with digital technologies. We are entangled with the digital throughout our waking (and sometimes sleeping) hours. As digital devices become ever smaller and unobtrusive, their status as separate objects to our bodies/selves diminishes in importance. In the case of wearable computing, the devices are worn upon the body, as Google Glass, headbands, bracelets, clip-ons and jewellery. Some medical digital technologies are incorporated even more unobtrusively into the body, such as insulin pumps and ingestible tablets with microchips embedded into them that send out wireless signals from inside the body.

Such is the extent of our intimate relations with digital technologies that we often respond emotionally to the devices themselves and to the content contained within or created by these devices. The design of digital devices and software interfaces is highly important to users' responses to them. Devices such as iPhones are often described in highly affective and aestheticised terms: as 'beautiful' playthings, 'glossy and shiny' objects of desire, even as 'edible' or 'delicious'. Advertising for the iPhone and other Apple devices often focuses on inspiring child-like wonder at their beauty and magical capabilities (Cannon and Barker 2012). Affective responses to material objects are integral to their biographical meaning to their owners and their participation in intimate relationships. Writers on material culture and affect have noted the entangling of bodies/selves with physical objects and how artefacts act as extensions or prostheses of the body/self, becoming markers of personhood. Objects become invested with sentimental value by virtue of their association with specific people and places, and thus move from anonymous, mass-produced items to biographically inscribed artefacts that bear with them personal meanings. Over use and with time, such initially anonymised objects become personalised prosthetics of the self, their purely functional status and monetary value replaced by more personal and sentimental value (Miller 2008; Turkle 2007).

Two decades ago I and others were writing about the affective relationship that people had developed with their personal computers and their attempts to personalise and domesticate them. This scholarship identified the ways in which such objects are thought about, incorporated into selfhood and embodiment, their emotional meanings and resonances and their psychic investment in the self. My research in the 1990s demonstrated that personal computers were conceptualised as friends, work companions or even lovers, and were frequently given names or gender by their users. They were typically represented as anthropomorphic objects, as warm, soft and friendly, and, like humans, subject to birth and death, or to obesity or viral infection (Lupton 1995; Lupton and Noble 1997).

One decade ago, even before the advent of social media and the expansion in ubiquitous computing technologies, Bell (2004) was using the term 'intimate computing' to describe the ways in which digital technologies were acting as repositories of memories and intimate relationships and (via websites) means of communicating personal thoughts and beliefs to others online. She also commented on the use of devices as personal assistants or companions, helping users to manage and structure their everyday lives. Bell discussed the new closeness that users have with mobile devices and the emotional

and personal resonances they have for many people. She commented further on the ways in which digital devices were becoming more 'knowing' about users and their lives as they collected intimate data about users and predicted tastes and preferences.

All of these dimensions have become intensified in the ensuing decade since Bell wrote that piece. The advent of devices which are easily portable, carried on or worn on the body suggests an even greater physical intimacy. Moreover, not only are such devices easily incorporated into bodily movement, they are connected to friendship and family networks via social media. Unlike the older unwieldy, desk-bound computers, people with mobile digital devices are able to be connected almost anywhere they travel, at any time of the day or night, and thus able to contact intimate others at any time or virtually anywhere. This ease of access and ability to track movement represent a pivotal change in the ways in which devices are incorporated into everyday life.

The boundaries between self and Other, human and machine, body and technology have become ever more blurred. Thus, in the latest advertising for the iPhone, the Apple website 'introduces' 'Siri', a feature embedded in the phone's technology that allows the user to 'converse' with the phone. Siri is described in the advertising as: 'The intelligent assistant that's there to help . . . Siri understands what you say and knows what you mean'. The accompanying advertisement shows busy people engaging in various activities – jogging, driving, cooking – and talking to their phone, which replies to their queries with a personable and calm female voice. We are told to 'Talk to Siri as you would a person . . . You're actually having a conversation with your iPhone'. These portrayals of the new iPhone's capabilities suggest a relationship with one's device that is not only embodied but affective, positioning the phone as the medium for a human-like personality who is able to respond to any request or demand while constantly remaining helpful and friendly.

Spike Jonze's film *Her* (2013) plays upon and extends this concept. The film combines science fiction with romantic comedy. In the film a lonely middle-aged man, Theodore Twombly, played by Joaquin Phoenix, develops a close relationship with the Siri-like female voice/personality emitting from his smartphone (played by Scarlett Johansson). Named Samantha, the voice of his computer operating system conveys intelligent insight and emotional warmth. Theodore develops a close relationship with Samantha to such an extent that he feels that he has fallen in love.

While we may not yet have reached this degree of intimacy with our devices or operating systems, there is no denying that those who

use such technologies are increasingly coming to view them as extensions of their bodies. In Finland and Germany, mobile phones are referred to affectionately as ‘little hands’; a telling linguistic choice that suggests their use as an additional part of the body (Paasonen 2009: 19). These devices touch our bodies and our bodies, in return, touch them, in many cases, for many hours a day. The devices rest upon our skin or we touch them ourselves, swiping, pressing and typing on keyboards as we interact with social media, make phone calls or write documents. The new iPhone 5s uses fingerprints instead of passwords, reacting directly to users’ unique bodily configurations. As Balsamo (2012: 252) has remarked of her iPhone: ‘Not merely an extension of my ear, as McLuhan would have argued, it is me. My body/myself – my iPhone/myself. I become the cyborg I always wanted to be’. Our bodies are shaped and moved in certain ways when we use digital devices: typing, swiping, holding, gazing. The design of the device constrains our physical actions, and our bodies, in turn, leave traces upon the device – sweat, body oils, food crumbs, signs of accidental damage when we drop or scratch the device.

BODIES/TECHNOLOGIES/SPACES

New ways of using and interacting with digital technologies have fundamentally changed the ways that we think about the ‘space’ of online interaction and experience. As a result, virtual reality is almost a nonsensical term in today’s digitised world. The ubiquity and pervasive nature of computing, its entry into many spheres of everyday life and its portability have meant that nearly all ‘reality’ is now virtual, to the point that we no longer conceptualise it in these terms. Most digital technologies are continually connected to the internet, so we no longer go ‘online’ or ‘offline’. Instead of ‘entering cyberspace’ from a specific location and using a formal means of connection to do so, we simply use our devices and check in on our emails and social media updates wherever we are located (Paasonen 2009).

New locative technologies mean that, far from entering cyberspace or virtual reality when we use digital devices, we are identified ever more obviously with the place and space we are physically inhabiting. Geo-locational software that locates the user and tailors the content to which the user has access (in some cases, blocking the user) has challenged the notion that cyberspace is non-geographical or placeless. It has become increasingly difficult for people to interact anonymously online and take on new identities. The internet now knows where you live. It also knows who you are, and many things about not only you

but your friends and followers on your digital social networks (Rogers 2013).

Ubiquitous computing brings digital devices off the desktop and into public spaces that are already populated and inhabited with heterogeneous actors that may facilitate or detract from the connectivity of the device. This therefore raises the issues not only of the culturally inflected factors that influence digital infrastructures, but also of the spaces, both private and public, in which devices are used. Just as technologies are cultural configurations, so are spaces, and the interactions between the two are complex, unstable and dynamic (Dourish and Bell 2007). What Miller and Horst (2012: 25) describe as 'digital context' is also material: the places, spaces and people that are part of the environment in which digital technologies are used.

In addition to the participatory affordances of Web 2.0 technologies, the capabilities of 'smart' devices to be connected to the internet at any time and in almost any place and the presence of microchips in these devices that measure bodily movement and geo-location offer new ways to monitor and measure bodies and identify the spaces in and through which bodies travel. Kitchin and Dodge (2011) have formulated the concept of 'code/space', which represents the mutually constitutive nature of computer codes with spatiality. As they argue, in digital society spaces are increasingly designed and monitored with the use of computer software programs. Any space that is dependent on software to function as intended can be viewed as a code/space. They give the example of the contemporary supermarket, which is reliant upon the digital scanner and cash register for customers to purchase goods, and which produce data that then inform the supermarket what goods are popular and which require re-stocking. Through the use of customer loyalty cards operating through the digitised checkout system, the supermarket owners are able to monitor the purchasing habits of individuals. If this system crashes, the supermarket can no longer function as a supermarket. Human bodies (checkout operators, shelf stockers, supply truck drivers and customers) interact with the computerised programs to produce the coded assemblage (or alternatively the code/space) of the supermarket.

As a contemporary alternative to virtual reality the concept of 'augmented reality' has been proposed, in which it is acknowledged that everyday life is extended (augmented) by the use of technologies such as digital devices and software. There is no online or digital 'second self': the self configured through the digital is always already part of the self (Jurgenson 2012). Related to this term is that of 'augmented co-presence', which refers to the distributed nature of social relationships and physical locations on social media networks.

Using such features as geo-location details and images of the spaces in which they are located, social media users can establish a new sense of place that is a hybrid of physical and virtual co-presence (Hjorth and Pink 2014).

The use of digital devices also tends to blur spatial boundaries for their users. In combining a material object (the device such as the smartphone or tablet computer) with the information that flies between these objects and repositories such as digital archives and repositories, and also in connecting private spaces with public spaces (one may use the device at home but in doing so connect to others outside this domestic space), mobile media inhabit a liminal space (Beer 2012b; Schneider 2012). Smartphones such as the iPhone are supremely tactile and visual in their materiality, but also immaterial, thus blurring the boundaries as objects between the two. It is no longer possible to make definite distinctions between hardware and software. In such devices, touch, vision and immaterial objects of knowledge (digital data objects) are aligned (Schneider 2012). So too, the need to connect one's device to a broadband network when in public spaces and finding a strong enough signal bring together the visible with the invisible aspects of digital technologies, and avoiding encroaching on other users' wireless connections highlights 'the physicality of the virtual' (Dourish and Bell 2007: 424).

In engaging in locative media practices, users are able to inhabit one physical space while simultaneously engaging with others in other locations. They are establishing co-presences through practices that are social, mobile, locative and photographic all at the same time (Hjorth and Pink 2014). Using a mobile digital device, an individual may be located within a certain material space surrounded by other people ('present others'), but can 'exit' that space and relate to 'absent others' outside that space (Enriquez 2012: 60). A casual observation of the users of public transport demonstrates how digital devices are used in public spaces to enter private worlds. Enter any train or bus and many of one's fellow passengers can be seen using mobile digital devices to pass the time, often communicating with 'absent others' outside the physical space. Such use enables passengers to achieve private actions in public spaces and to evade interactions with the 'present others' sharing the material space (Enriquez 2012).

Recent research has focused on the new digital media technologies in investigating the embodied habitual practices of their use. For example, Pink and Leder Mackley (2013) used video ethnographies to explore the meaning of digital media as part of people's everyday sensory and affective embodied routines in their homes. They identified the ways in which these media contributed to concepts of the

domestic setting ‘feeling right’ for the participants, or achieving the appropriate atmosphere and texture in their home surroundings. The researchers moved around participants’ homes with their video cameras, recording the participants as they explained their domestic routines. They were particularly interested in the routines in which participants engaged in relation to energy use and conservation: practices such as switching off electronic technologies or plugging them in to recharge them each night, for example.

This research brings together three related analytical ‘prisms’ of behaviour in relation to digital media: environment/place, movement/practice and perception/sensory embodied experience. Based on their ethnographic research, Pink and Leder Mackley (2013) argue that people realise the extent to which their lives are saturated by digital and other media, but often this knowledge is embodied and affective rather than easily explained via the use of words (returning to the concept of the domestic space ‘feeling right’ at specific times of the day). By documenting with the use of ethnographic observation how people are engaging with media (so that the participants can demonstrate their practices rather than simply talk about them), such less obvious dimensions can be observed. People may ‘feel right’ if their radio alarm wakes them at the appropriate time each morning, if they watch television at the usual time and then switch it off before going to bed, if they check their emails and text messages on their smartphone last thing at night, and so on.

REPRESENTATIONS OF BODIES/SELVES ONLINE

People discuss and visually represent their (and others’) bodies incessantly as part of using social media. The body is represented in ever finer detail on the types of digital networks and platforms that are now available for use. Social media sites such as YouTube, Tumblr, Pinterest, Instagram and Flickr focus on the uploading, curating and sharing of images, including many of bodies. Facebook and Twitter also provide opportunities for users to share images of bodies. Bodies receive much digital attention, particularly those of celebrities, but increasingly those of ordinary users. Female celebrities, in particular, are the subject of continual digital visualising by paparazzi and fans and constant commentary in social media and news sites on the appropriateness and attractiveness – or otherwise – of their bodies (Gorton and Garde-Hansen 2013).

Due to the plethora of online platforms and apps devoted to human anatomy, the internal organs and workings of the human body have

moved from being exclusively the preserve of medical students and surgeons to being open to the gaze of all. Online technologies now allow anyone with access to a computer to view highly detailed visual images of the inside of the body. Although these images may have been produced for medical students and medical practitioners and other healthcare workers, they are readily available to the general public. Tapping in the search term 'human anatomy' will call up many apps on the Apple App Store and Google Play that provide such details. Many websites also provide graphic images of the human body. The Visual Human Project used computer technologies to represent in fine detail the anatomical structure of male and female cadavers. Each body was cross-sectioned transversely from head to toe and images of the sections of the bodies, using magnetic resonance imaging, computed tomography and anatomical images, were uploaded to a computer website and can also be viewed at the National Museum of Health and Medicine in Washington, DC.

All shapes and sizes of living human bodies are available for viewing online. Sites as diverse as those supporting people wishing to engage in self-starvation or purging (the so-called 'pro-ana' or 'thinspiration' sites), promoting cosmetic surgery, fat activists seeking to represent the fat body in positive ways that resist fat-shaming, those for people engaged in self-harming practices or body-building, for transgender people and tattoo or body-piercing devotees, not to mention the huge variety of sites devoted to pornography and sexual fetishes, all display images of a wide variety of body shapes and sizes and of bodies engaged in a multitude of practices that are both normative and go beyond the norm. In addition there are the sites that represent bodies undergoing various forms of medical procedures (there are many videos of surgery on YouTube), providing vivid images or descriptions of the ills and diseases from which bodies may suffer.

Social and other digital media have facilitated the sharing of images and descriptions of many varied forms of human life, from the very earliest stage of human development. A huge range of representations of embryos and fetuses, and indeed even the moment of fertilisation of a human ovum by a sperm cell, can be viewed on the internet. Such media as YouTube videos of conception and embryonic development and websites such as the Human Embryo Project featuring detailed images and descriptions of each stage of unborn development allow people to gaze upon and learn about the unborn human. Proud parents now routinely post obstetric ultrasound images of their unborn to social media sites to announce a pregnancy. Some parents who have experienced miscarriage, foetal loss or stillbirth use memorialisation websites or make videos to post on YouTube featuring ultrasound

images, hand- or footprints of the dead unborn and even images of its dead body. As a result, via digital media the unborn human entity now receives a far greater degree of visibility than at any other time in the past (Lupton 2013a).

At the other end of the human lifespan, the dead are achieving a kind of online immortality. Just as with the online memorialisation of the dead unborn, a person's death can be announced and memorialised via a plethora of online media. A digital afterlife may be achieved using these technologies. For example, Facebook pages are now frequently used to memorialise people who have died. The dead person's own personal Facebook page may be used by others to communicate their feelings with each other about the person's death, or they may establish a dedicated Facebook Group to exchange thoughts and memories about that individual (Bollmer 2013; Brubaker *et al.* 2013).

Commercial websites have been established that provide 'afterlife online services', as one such website – the Digital Beyond – puts it, that help people 'plan for your digital death and afterlife or memorialize loved ones'. They encourage the bereaved to submit photos and stories about a dead person or provide an online site for people to store their own memorabilia about their lives or important documents in anticipation of their death, leave or send posthumous messages, plan their funerals and provide details of what should happen to their social media profiles after death. Such terms as 'digital estate' and 'digital assets' are used to denote important documents, images and other information that have been rendered into digital formats for storage and distribution following a person's death. Some services provide the facility for people to send email messages, images and audio or video recordings up to 60 years following their death. The LifeNaut platform allows people to create a 'mindfile': a personal archive of images, a timeline of their life, documents, places they have visited, and other information about themselves, as well as an avatar that will react and respond with their beliefs, attitudes and mannerisms. The company also provides a storage facility for preserving the individual's DNA material. All of these data are preserved for the benefit of future generations.

The increasingly digitised representation of people is highlighted in artist Adam Nash's collaborative art project *Autoscopia*. In this project the available online images for individuals are derived from web searches and configured into new, recombinant portraits of that individual (anyone can try it using their own name or any other person's name). These digitised portraits then enter into the internet via tweeted links, thus recursively feeding themselves back into the latest

versions of the portraits. In this project, data-as-data (the digitised image data that are mined by the Autoscopia computer program from many parts of the internet) are remodulated for the purposes of the art project into a different type of image, one formed from many images.

This art project raises intriguing questions about the ways in which digital data forms can be configured and reconfigured (or in Nash's terms modulated and remodulated) that have implications more broadly for the power of digital data to configure embodiment. A digitised map, for example, demonstrating outbreaks of infectious diseases in certain geographical locations (as produced by the Health Map platform) is a modulation of various types of data that have been entered into the platform, whether from mining social media or by users themselves reporting their own illnesses. These visualisations are virtual body fragments, representing as they do various bodily sensations and signs reinterpreted as symptoms and mapped in geo-located form. Bodies themselves become represented as forms of disease in this mapping technology, their fleshly reality stripped down to their symptoms. Infectious diseases are also reinterpreted as digital objects via such technologies. They are constantly remodulated by new data inputs just as the digital portraits produced through the Autoscopia project continually reconstitute the 'reality' of an individual's visage.

Digital technology practices produce new and constantly changing forms of digitised cyborg assemblages. When engaging in digital technologies, bodies and selves become fragmented in certain ways as various types of data on our selves and our bodies are transmitted along specific pathways but then joined together in new formations (Enriquez 2012). Via these accumulations of data about individuals' bodies, the body is extended beyond the flesh into digital data archives. The data assemblages thus configured have separate, although intertwined, lives in relation to the fleshly bodies that they represent (Bollmer 2013).

The data assemblages that are configured from the diverse forms of data that are produced from our digital interactions are constantly shifting and changing as new data are added to them. Data doubles feed information back to the user in ways that are intended to encourage the user's body to act in certain ways. When individuals receive positive comments or likes from social media friends or followers on the images or information they post about their bodies, this may encourage them to continue in the enterprise of embodiment that they so publicised (whether this is a certain hairstyle, way of dress, use of cosmetics or fitness or weight-loss regime). If responses are negative or non-committal, users may represent their bodies or engage in different bodily practices in response. The flow of information,

therefore, is not one-way or static: it is part of a continual loop of the production of bodily related data and response to these data. Digital data doubles support a reflexive, self-monitoring awareness of the body, bringing the body to the fore. They are part of the augmented reality of the digital cyborg assemblage.

SOCIAL MEDIA AND SELF-FORMATION

Previous chapters have identified the ways in which digitised watching takes place in ways that may be coercive, covert, discriminatory or exclusionary. When aspects of people's bodies and selves become increasingly subject to digitisation, the potential for ever more detailed veillance becomes evident. Indeed digitising the body/self may incorporate all of the forms of veillance outlined in Chapter 2. In the present discussion, however, I focus on voluntary watching practices as they are carried out in social media engagement and self-tracking strategies using digital devices. Many users of digital technologies voluntarily engage in practices of watching each other or monitoring themselves as part of social veillance and participatory veillance. There is always an implied audience for many forms of digital engagement, and most particularly the use of social media platforms. These practices of watching are often reciprocal: people expect others to observe and comment on their content and do the same for the people they follow or friend on social media networks (Marwick 2012).

I referred in Chapter 2 to the Foucauldian concept of the practices of the self, and noted that some digital media researchers have represented social media participation as new forms of such practices. Via social media, users engage in practices of ethical self-formation. Theresa Sauter (2013) locates the writing about the self that is part of Facebook status updates as the latest in a long history of such practices, from ancient Greek and Roman self-reflections to the Christian confessional writings, the autobiography of the Romantic era and the transgressive self-writing of the Enlightenment through to the modern tendency to interpret one's thoughts and experiences via psychoanalytic discourses and those emphasising the importance of openness and self-expression. The practices of self-formation that take place in social media sites are merely one way by which the modern individual engages in configuring selfhood. One feature of social media that differs from previous eras and technologies for self-writing and self-formation, however, is the potentially public nature of expressions of the self, the instantaneous responses from others that may eventuate and the permanent nature of any such content.

Some people view their content creation concerning their personal lives on sites such as Facebook as developing a 'personal brand'. This includes the images or descriptions about one's body that appear on such sites, and involves careful selection of these texts. Shaping one's persona can be a difficult enterprise in a context in which one's friends or followers may be from different areas of the user's life and may post content themselves that challenges the 'brand' the user wishes to present. Self-monitoring or self-censoring of the content one uploads is part of the presentation of the ideal body/self on social media. Users may have 'different online bodies' for different audiences or at different times of their lives, and juggling this can be a complex task, particularly when the Facebook Timeline feature preserves all their status updates in chronological order for any Facebook friend to review. This feature locks Facebook users into a particular narrative of their bodies that they may later regret or wish to change (Goodings and Tucker 2014). For some Facebook users, however, the Timeline feature provides a welcome record of their thoughts, appearance and interactions with others. As one Australian user commented: 'The visual diary aspect really appeals to me. The timeline aspect of Facebook is also very seductive. I used to keep a diary, but now I keep my diary in public and in a [computing] cloud' (quoted in Hjorth and Pink 2014: 49).

The shaping by the Facebook platform of the memories and past events recorded in individual users' profiles became particularly evident on the occasion of the platform's tenth anniversary in February 2014. Facebook members (at that point, more than a billion of them) were invited to access a personalised 'Look Back' compilation video, in which highlights of their most liked status updates and posted images since the time they first joined were selected and presented as a video set to music that members could share with their Facebook friends. The catch was that users had no control over what content was selected: it was all done for them by the Facebook algorithms, which chose 'personalised highlights' for each person who requested the video automatically.

The 'selfie' phenomenon (posting photographic self-portraits taken by oneself using a digital device) has become the archetypal representation of the body/self in online forums. The popularity of the selfie (at least among some social groups) demonstrates that some people enjoy the opportunity to shape their bodily image in online forums in ways that allow them full control of what the image looks like and where it will appear. It also represents the intensification of the digitisation of the bodies of 'ordinary' people in public forums. Many celebrities use the selfie as a self-promotional tool, as do world leaders and high-ranking politicians (for example, Barack Obama, the Clintons, David Cameron

and Pope Francis), and people who take selfies are often accused of being narcissistic or vain. However, the selfie is also an everyday practice that often involves a mundane portrait taken to show others what that individual is doing at the time or to personalise a greeting or share an experience (Wortham 2013).

Taking and posting selfies is both an intensely personal practice as a means of representing the body/self on a popular social media image-sharing website and a communal practice that demonstrates cultural norms about who should engage in this practice and how they should present themselves. This is demonstrated by the Selfiecity website, developed as part of a research project led by Lev Manovich to investigate features of these self-portraits in different cultural and geographical locations. A random selection of thousands of selfies posted to Instagram from five cities in three continents – Bangkok, Berlin, Moscow, New York and São Paulo – is included in the project. The researchers used both data-mining and algorithmic software and human judgement (drawn from the Amazon Mechanical Turk labour force) to code elements of each image, such as age, gender, mood/emotional expression, eye, nose and mouth position and head tilting. Their findings reveal that more women than men in all cities take selfies, particularly in Moscow, more younger than older people post selfies to Instagram (median age 23 years) and that people smile in selfies more in Bangkok and São Paulo than in the other three cities.

While veillance technologies pre-existed the digital era, digitisation has resulted in new forms of participatory veillance. Social media sites afford users the opportunity to upload images such as selfies and textual information about themselves so that others can see and comment on these materials. The whole point of the types of self-reflection and self-formation that occur on these sites is to hold this content up to the scrutiny of others and to invite their responses. These devices and platforms cater to an increasing desire for scopophilia – the desire to be seen – in promoting sharing of information and observations about one's self (Lyon and Bauman 2013). Such activities and the resultant visibility to others can be enjoyed for the intimacy, playfulness and friendship they may create or support. When people want to share their data with others, others' watching becomes valued. These practices invite responses from other users (Bucher 2012; Marwick 2012). If other users like a Facebook status update or photo, favourite or retweet a tweet or read one's blog post, these are all measures of success as part of social media networks. Indeed lacking or losing visibility may be considered problematic for social media users, as this denotes lack of popularity, importance or interest in one's updates and other posts. In this context, 'visibility is a reward, not a punishment' (Bucher 2012: 1174).

As I observed earlier in this chapter, celebrities, including politicians and members of royalty, are subjected to intensive monitoring whenever they appear in public spaces (and sometimes in private domains), facilitated not only by the paparazzi profession but also by people wielding their mobile devices. Participatory, synoptic and sousveillance modes of watching operate here. Celebrities often voluntarily engage in social media as a means of promoting their 'brand', connecting with their fans, promoting a sense of intimacy and publicising news about their latest activities (Marwick and boyd 2011). Their number of Facebook friends or Twitter followers can be a marker of their global popularity (at the time of writing, Lady Gaga is competing with Justin Bieber for this measure of success and fame). Many politicians and world leaders have also employed social media sites as part of their attempts to bolster their support and disseminate news. Both President Obama and the Pope have Twitter accounts. (Obama's tweet announcing his re-election in 2012 is the second-most retweeted of all time.) Obama's success in his election and re-election campaigns has been attributed in no small measure to his campaign managers' judicious use of social media to garner electoral and financial support (Zavattaro 2010).

Famous people can exert a high degree of control over the content that they themselves generate and disseminate in social media. As objects of the gaze of others, however, they are also often under intense scrutiny as part of sousveillance and synoptic watching practices, and can attract high levels of criticism on social media forums (Marwick and boyd 2011). Mistakes or comments considered to be inappropriate that are made by well-known people on social media often 'go viral' and receive a heightened level of attention on social media sites which is then often picked up by news outlets and further disseminated as news. Visibility as a prized measure of popularity can often turn quickly into mass opprobrium and ridicule.

Users of social media sites may engage in practices of self-surveillance when deciding what content to post, so as to preserve or present a certain kind of desired selfhood and to preserve privacy (Goodings and Tucker 2014; Marwick 2012). Many users of social networking platforms are grappling with coming to terms with new ways of defining privacy in a context in which concepts of 'the public' and 'the private' are no longer confined to a spatial dimension. Notions of intimacy, solitude, the personal, the secret and the hidden are challenged by the confessional of social media sites such as Facebook and Twitter, in which participants' inner thoughts and private behaviours are often revealed to a large number of friends or followers, and frequently several times throughout the day. This phenomenon has

been referred to as 'the privatization of the public and publicization of the private' (van Manen 2010: 1026).

Contemporary digital devices and software provide even greater capacity than ever to become part of people's personal biographies, given their ability to document and archive vast quantities of personal information about their users' lives. Taking selfies or photos of the places one is occupying can become a means of promoting sociability and bolstering relationships with others. This practice also bestows personal meaning upon places, adding social, emotional, psychological and aesthetic dimensions. New forms of intimacy are being created by the sharing of geo-location details and images (Hjorth and Pink 2014). Not only photos but personally written documents, social media status updates, favourite music, newspapers and books, lists of telephone numbers and email contacts and the like can all be stored on digital devices and their associated platforms.

I noted in Chapter 5 that such overtly anonymous features as search engine histories on one's digital device can be profoundly personal indicators of the searcher's habits, tastes, preferences, stage in the life cycle and social group membership (and indeed sexual proclivities if the user engages with online pornography or sexual chat sites). Balsamo (2012) similarly claims that in using her iPhone she leaves traces of herself; her self becomes an assemblage of her travels online. Her iPhone reflects herself back at herself in the data it provides on her tastes, opinions, social interactions, places she has visited (including material spaces as well as online sites), becoming 'my most intimate personal digital companion' (Balsamo 2012: 253).

Many of these personal details are now open to access by others on the internet. In the participatory and confessional culture of Web 2.0 prosumption, it has become common for people to talk about their lives in intimate detail, reveal aspects of their thoughts and behaviours that they might previously have kept to themselves, and to comment on others' revelations. The digital device may therefore be conceptualised as a 'gateway' or 'portal' into realms of personalised data and material, such as one's digital music collection or personal photographs (Beer 2008: 79). Beer (2012b: 366) further points out that, given the dual nature of mobile digital devices as both material objects and repositories of personal data, it can be difficult to distinguish which dimensions of the objects are creating an affective relationship. Is it the material object of the smartphone one holds in one's hand as one makes a call or sends a text to an intimate other, or the content of the call or text itself? In other words, do we love our phones as hardware or as portals to digital content or (more likely) some combination of both?

As an interview study of Australian young people who used digital technologies to collate their musical collection found, the ‘immateriality’ of digitised music files does not necessarily detract from the pleasure of maintaining such a collection or the role the collection plays in people’s personal identities. Whether in traditional material form (such as a record, tape or CD) or purely digital, music collections can have strong affective and biographical meanings to their owners. Indeed the capacity for users to make personally curated playlists of their online collections to suit their mood or environment and to share their collections easily with others online, among the other affordances of digital music collection tools, may contribute considerably to the emotional, symbolic, social and personal meanings attributed to the music (Kibby 2009).

When platforms such as Facebook abruptly change their privacy settings or change the ways in which personal data are displayed or recorded, members may feel that their privacy has been violated, because information that previously was not emphasised may suddenly come to the fore (as happened in 2006 when Facebook introduced its ‘News Feeds’ feature). People who previously may have been comfortable with the ways in which their personal data were dealt with often respond to such changes by feeling confronted by new relationships between the public and the private (boyd 2008). The greater reliance one may have upon a particular technology, the more it is incorporated into everyday life, subjectivity and embodiment, the more one feels an emotional connection to it, the greater the potential for ambivalence (Lupton 1995). One study interviewing users of social media sites found that violations of privacy were common on such sites, particularly in relation to other users revealing personal details about the interviewee. The interviewees recounted such experiences as a boyfriend sharing detailed relationship information with a Facebook friend on their public wall, a confidante sharing sensitive financial information with a group of mutual friends and friends using an individual’s Facebook page to gossip about her past experiences that she would rather have not made public. These breaches of privacy incited the emotions of distress, anger and shock from the individuals who had experienced them, particularly in response to friends or former partners betraying their trust (Houghton and Joinson 2010).

SELF-TRACKING AND QUANTIFYING THE SELF

Nowhere is the concept of self-imposed digital veillance more apparent than in the discourses and practices of self-tracking, life

logging or quantifying the self. These concepts refer to the practice of gathering data about oneself on a regular basis and then recording and analysing the data to produce statistics and other data (such as images) relating to one's bodily functions and everyday habits. Some self-trackers collect data on only one or two dimensions of their lives, and only for a short time. Others may do so for hundreds of phenomena and for long periods. Such individuals often represent themselves as 'body hackers' or 'self-experimenters' who are using digital and other technologies to learn more about their bodies and their selves. People who engage in these practices often share the data they have collected about themselves on social media, but may also prefer to keep these data private or only share them with medical practitioners, care-givers or intimate others.

Like the practice of self-writing, the tracking and analysis of aspects of one's self and one's body are not new. People have been recording their habits and health-related metrics for centuries as part of attempts at self-reflection and self-improvement. What is indisputably new is the term 'the quantified self' and its associated movement, which includes a dedicated website with that title and regular meetings and conferences, as well as the novel ways of self-tracking using digital technologies that have developed in recent years. Several of the technologies of self-surveillance can be worn upon or carried upon the body. With their smartphones users can quickly and easily take a selfie or a photo of the food they are eating or the place they are visiting, or type in or dictate some comments on everyday experiences, and upload these to social media. Some life loggers wear tiny cameras that hang around their necks all day, automatically snapping hundreds of images. An array of 'smart objects' – for example, toothbrushes, ear buds, shoes, clothing, furniture and jewellery – are now becoming available for use that include sensors and microprocessors that can monitor and measure aspects of the self and the body.

The number and types of wearable digital devices are expanding quickly. In early 2014 it was estimated that there were 181 wearable devices currently on the market, divided into 43 for medical purposes, 86 for fitness, 13 for gaming, 10 for industrial purposes, 121 for life-style and 28 for entertainment (some devices falling into more than one category) (Vandrico Inc. 2014). Medical devices allow patients with chronic conditions to engage in self-monitoring at home, often sending data wirelessly to healthcare providers or care-givers. These and some fitness self-tracking devices also provide well people with the ability to monitor their own bodily functions such as physical activity, blood pressure, heart rate, body weight, blood glucose levels, brain activity and lung function. Some devices are able to pull together

data from a number of sources. One of the latest is Sony's SmartBand SWR10, a digital life-logging wristband that is designed to be worn day and night. It connects to a smartphone wirelessly and also to Sony's Lifelog app, which enables the user to access other apps and platforms such as Facebook, and their phone to log such aspects as places visited, music listened to, people interacted with and games played as well as body biometrics such as sleep and exercise activities. It can notify the user of incoming phone calls and messages by vibrating, and connects to a camera so that users can log visual aspects of their day-to-day activities.

People engaged in various digital gaming and sporting activities can also use wearable devices to track their activities. Digital gaming technologies now frequently incorporate sensors that can monitor users' bodies. Digital headsets can be purchased for gaming purposes that detect electric signals in the wearer's brain. Nintendo's Wii gaming console involves a direct focus on engaging in fitness and sporting activities via the device. Wii Fit programs, which can detect and record body movements, allow for the recording, measuring and computing of physical activities and bodily features such as body weight, body mass index, body control, physical fitness indicators and balance. The latest version of this game, Wii Fit Plus, allows for the development of customised exercise routines and for the intensity of the exercise and calories burned during exercise and one's 'Wii Fit Age' to be calculated. As such, this technology plays a dominant and overt role in configuring concepts of health, correct body weight and fitness levels, prescribing advice for improving and normalising these bodily dimensions (Miah and Rich 2008; Millington 2009).

While the terms 'the quantified self' and 'quantifying the self' first began as part of the official Quantified Self organisation and website, they have now spread more widely into popular culture to denote self-tracking practices more generally (Lupton 2013c). The concept of the practices of the self is again evident in the discourses on digital self-quantification or life logging. Generating detailed data about oneself using digital devices is represented as an undeniable good as part of the ethos of working upon the self. Part of engaging in data collection using self-tracking devices is the idea that the self-knowledge that will eventuate will allow users to exert greater control over their destinies. It is assumed that the data and the knowledge contained therein will help them achieve greater health, higher-quality sleep, greater control over mood swings, improved management of chronic conditions, less stress, increased work productivity, better relationships with others and so on (Lupton 2013c). The data that are collected from digital devices used for self-tracking are represented as offering

certainty, while the body's perceptions were represented as untrustworthy, inexact, inaccurately mediated through human experience rather than being objective. In these representations, technology and the data it produces become portrayed as offering unique insights into the workings of the human body that individuals' unmediated haptic (physical) sensations cannot.

The valorising of data evident in discussions of the quantified self is itself part of the broader data-utopian discourse, particularly that discussing the benefits of big digital data. Unlike the apparently anonymous and mechanistically aggregated big digital data sets, the data produced by quantified selfers are frequently acknowledged to be human-made and customised, wrought from the personalised decisions and individual objectives of the people who gather the data. Quantified selfers work to produce their own data assemblages as an element of the project of selfhood. Part of what they seek to achieve is control over their data and the manner and extent to which they share their data with others, which the big data economy currently does not offer them.

These individuals have readily adopted the subject of the responsible, entrepreneurial citizen as it is privileged in neoliberal governmentality in seeking to take action to improve their lives and potential. Anthony Elliott (2013) argues that we are currently in an age of reinvention of the self and the body. The concept and practices of reinvention have become central to both private lives and organisations, and it is generally accepted that they are important endeavours. Reinvention is about transformation for the sake of personal growth, achievement, career success, health or wellbeing. Elliott (2013: 11) views the current focus on reinvention as part of a 'new individualism' that is particularly evident in developed countries. This new individualism involves concentrating on the self to the exclusion of social groups, organisations or communities. As part of the new individualism, self-reflection and critical self-examination are encouraged, viewed as ways of improving the self via therapeutic discourses and practices. Self-tracking practices are frequently represented as ways of achieving reinvention. They conform both to the notion of self-work and self-improvement that is part of the reinvention paradigm and to the new individualism in their focus on the self.

SEAMS IN THE CYBORG

Bell and Dourish (2011) refer to the mythologies and the mess of ubiquitous computing technologies. By myths they mean the cultural

stories, values and meanings that are drawn upon to make sense of and represent these technologies. The types of myths surrounding new digital technologies tend to focus on their very novelty, their apparent divergence from what has come before them and their ability to provide solutions to problems. The mess of digital technologies inheres in the challenges to myths that suggest that they are infallible and offer an ideal solution to a problem: the ‘practical reality’ of their everyday use (Bell and Dourish 2011: 4). When digital technologies operate as we expect them to, they feel as if they are inextricably part of our bodies and selves. Inevitably, however, there are moments when we become aware of our dependence on technologies, or find them annoying or difficult to use, or lose interest in them. Technologies break down, fail to work as expected; infrastructure and government regulations may not support them adequately; users may become bored with using them or their bodies may rebel and develop overuse symptoms. There may be resistances, personal or organised, to their use, and contestations over their meanings and value (Lupton 1995; Miller and Horst 2012).

Freund (2004: 273) uses the term ‘technological habitus’ to describe the ‘internalised control’ and kinds of consciousness required of individuals to function in technological environments such as those currently offered in contemporary Western societies. The human/machine entity, he argues, is not seamless: rather there are disjunctions – or, as he puts it, ‘seams in the cyborg’ – where fleshly body and machine do not intermesh smoothly, and discomfort, stress or disempowerment may result. Sleep patterns, increasing work and commuting time and a decrease in leisure time, for example, can be disrupted by the use of technologies, causing illness, stress and fatigue. Our bodies may begin to alert us that these objects are material in the ways that they affect our embodiment: through eye-strain, hand, neck or back pain or headaches from using the devices too much (Lupton 1995).

People may feel overwhelmed by the sheer mass of data conveyed by their digital devices and the need to keep up with social network updates. Analyses of social media platforms such as Facebook are beginning to appear that suggest that users may simultaneously recognise their dependence upon social media to maintain their social network but may also resent this dependence and the time that is taken up in engaging with them, even fearing that they may be ‘addicted’ to their use (Davis 2012). Users may also feel ‘invaded’ by the sheer overload of data that may be generated by membership of social networking sites and the difficulty of switching off mobile devices and taking time out from using them (boyd 2008).

Technology developers are constantly working on ways to incorporate digital devices into embodiment and everyday life, to render them ever less obtrusive and ever more part of our bodies and selves. As the technical lead and manager of the Google Glass (a wearable device that is worn on the face like spectacles) project contends, 'bringing technology and computing *closer* to the body can actually improve communication and attention – allowing technology to get *further* out of the way' (Starner 2013; emphasis in the original). He asserts that by rendering these devices smaller and more easily worn on the body, they recede further into the background rather than dominating users' attention (as is so overtly the case with the current popular smartphone and tablet computers). Despite these efforts, Glass wearers have been subjected to constant attention from others that is often negative and based on the presumption that the device is too obvious, unstylish and unattractive, or that the people who wear them are wealthy computer nerds who do not respect the privacy of others. They have reported many incidences of angry responses from others when wearing Glass in public, even to the point of people ripping the device off their faces or asking them to leave a venue (Gross 2014). The design of digital devices, therefore, may incite emotional responses not only in the users themselves but also in onlookers.

Some people find wearable self-tracking devices not fashionable enough, or not waterproof enough, or too clunky or heavy, or not comfortable enough to wear, or find that they get destroyed in the washing machine when the user forgets to remove them from their clothing. One designer (Darmour 2013) has argued that if these technologies remain too obvious, 'bolting' these devices to our bodies will 'distract, disrupt, and ultimately disengage us from others, ultimately degrading our human experience'. She asserts that instead these objects need to be designed more carefully so that they may be integrated into the 'fabric of our lives'. Her suggested ways of doing this include making them look more beautiful, like jewellery (brooches, necklaces, bracelets, rings), incorporating them into fashionable garments, making them peripheral and making them meaningful: using colours or vibrations rather than numbers to display data readings from these devices.

Creative and physical labour is also an integral dimension of the materiality of human–technology enactments. I referred in Chapter 2 to the intellectual and creative labour involved in prosumption, and noted that this largely unpaid labour is provided as part of the ideals of the sharing subject and participatory democracy. While prosumers are not paid for this labour, the developers of the platforms to which they uploaded their content often profit handsomely from the data

that are created. While prosumption is largely unpaid, paid workers who bid for freelance work on online platforms such as Amazon's Mechanical Turk and Freelancer.com are provided with very low recompense for their work, experience job insecurity and are granted none of the benefits offered by most other workplaces (Philip *et al.* 2012; Scholz 2013).

People also labour physically as part of the digital knowledge economy. There is a massive digital labour force involved in the physical production of digital devices: Apple alone employs half a million in their factories in two cities in China. These workers are paid, but not very well, and often work in conditions that are poor and exploitative. Many of the workers involved in the manufacture of digital technologies are physically affected by their manual labour. As discussed earlier, digital infrastructures such as servers, hard drives and data storage systems are material objects located in geographical spaces, and require continuing maintenance from human actors. For those who labour in mines to produce the minerals required and factories to make digital technologies, often in suboptimal conditions where they may be exposed to noxious chemicals, the materiality of the digital is omnipresent (Parikka 2013; Philip *et al.* 2012).

Various large, wealthy computer manufacturers have been accused of exploiting the workers in their Chinese factories. It has been claimed that these companies have suppressed or resisted attempts by workers to join trade unions, provide poor pay, force workers to labour for long hours and face continual economic insecurity and flout human rights. Workers are subjected to exhausting, repetitive work and exposure to chemicals, provided with cramped and crowded living conditions in the dormitories in which they are housed, and given inadequate safety protection. Some companies have been charged with using child labour in their factories. News reports of suicides by workers in some of these Chinese factories, including young workers producing Apple iPads, have drawn attention to the sub-standard conditions endured by these workers (Chamberlain 2011; Chen 2013).

As Parikka (2013) observes, for all the focus on the lightness and mobility of contemporary digital devices, their 'hardness', or the conditions in which many such devices are built, is obscured. He argues that there is a 'geopolitics of hardware', in which the working conditions of those who labour in mines and factories to make digital devices for people living in more advantaged regions are often removed from the sight of those who see only the gleaming, polished final products. Bodies produce these machines, and sometimes suffer for it; these bodies 'register the materiality of information technology

production – and discarding – in lungs, brains, nervous systems, and more. They are indeed inscription systems for the “persistence of hardware” (Parikka 2013). These observations demonstrate the dual meaning of hardware, both as tangible, touchable devices and as the products of hard labour on the part of those who make them.

I have argued in this chapter that digital devices and their associated software and platforms have become incorporated into the ontology and practices of embodiment and selfhood. There are four main dimensions to the ways in which human embodiment is enacted via the digital. First, human bodies are portrayed by digital media technologies using visual images and verbal descriptions: in medical surgeries, on websites, social media platforms, apps and news sites. Second, people touch and view digital devices and carry or wear them on their bodies. Third, the movements and activities of human bodies are monitored and tracked using digital devices that are able to upload data continuously to apps and platforms, including technologies that can locate bodies in space using global positioning systems, sense movements using embedded accelerometers and gyroscopes and collect detailed biometric data. And, fourth, human bodies manufacture digital devices and digital data through their intellectual and physical labour.

Conclusion

I end with a brief summary of the main points of this book.

Why should sociologists be interested in theorising and researching digital technologies?

- Digital technologies are increasingly an integral part of everyday life for many people across the lifespan, whether or not they are aware of – or consent to – this.
- Social life is configured through and with digital technologies.
- Digital technologies are increasingly playing a major role in configuring concepts of selfhood, social relationships, embodiment, human–nonhuman relations and space and place.
- What counts as ‘the social’ is increasingly enacted via digital technologies.
- Digital technology use and practice are structured through social categories such as gender, social class, geographical location, education, race/ethnicity and age.
- Digital technologies are integral parts of contemporary social networks and social institutions such as the family, the workplace, the education system, the healthcare system, the mass media and the economy.
- Digital technologies offer alternative ways of practising sociology.
- Digital technologies are important both to ‘public sociology’ (engaging with people outside of academia) and ‘private sociology’ (personal identities and practices as sociologists).

Important insights that have been generated by sociologists of the digital include the following:

- Digital technologies and digital data objects are sociocultural artefacts.
- Digital technologies and digital data objects are shared accomplishments between human and nonhuman actors.
- Digital technologies have generated a new knowledge economy in which thought has become reified, public and commodified.
- Digital data objects have a social life of their own outside the archive, circulating in diverse forums and taking on new forms and value.
- Digital technologies have created new political relationships and power relations.
- Users of digital technologies are increasingly observers and documenters of their own lives, both consuming and creating digital data.
- People are constituted as dynamic digital data assemblages via their interactions with digital technologies.
- New forms of social research devices are generated by digital technologies.
- Digital technologies configure new forms of veillance.
- Digital media technologies can contribute to innovative ways of conducting sociology, generating a vision of a different kind of sociological sensibility.

I began this book with reference to contentions by some sociologists that big digital data sets and the increasingly distributed nature of social research among a diverse range of actors challenge sociologists' role as pre-eminent social researchers. I argue that rather than sociology being threatened by these changes, new opportunities have been generated to demonstrate that sociologists can offer valuable skills and insights and expand their authority in social research. Sociologists may not hold a monopoly over collecting and analysing data, but they are highly trained in maintaining a critical distance from simplistic assumptions about the benefits of digital technologies and the data they accumulate. Sociologists are able to stand back and take a provocative approach by identifying and asking difficult questions. In the face of those promoting ever-more detailed analysis of ever-greater data sets, a perspective that is able to both reflect on the social implications of big data and give meaning to these data is vital.

As the points above demonstrate, the new field of digital sociology goes well beyond an examination of the digital. It raises questions about what should be the focus and methods of contemporary sociological research and theorising. As such, sociologists writing about digital technologies are important contributors to debates about the future of sociology and how the discipline can remain vibrant, creative and responsive to new developments and social change.

DISCUSSION QUESTIONS

- What do big data offer society? What are the limitations and ethical considerations of big data? What are the implications for sociologists of the big data phenomenon?
- How would a Marxist/political economy perspective on prosumption compare with a Foucauldian perspective? What are the differences in the ways each theoretical position interprets prosumption? Are there any overlaps in these two perspectives' interpretations?
- List the manifold ways in which an individual might be tracked by digital veillance technologies in the course of an average day. What devices might this person use? What data might be collected about this person? How can this person know what data are being collected? To what extent can this person reject or resist these practices of dataveillance?
- Make a list of the positive and negative aspects of the various forms of digital veillance. What benefits can each provide to individuals or society? What are their potential limitations or harmful implications for individuals or specific social groups?
- How have concepts of privacy changed in response to digital technologies and dataveillance? What might the future of concepts of privacy look like? Do we need to rethink privacy in the digital age?
- In what ways might algorithms be said to possess power or authority? Give some examples of how this power/authority operates.
- In what ways might digital technologies and digital data objects be considered immaterial and in what ways are they material artefacts?
- Choose one digital media practice and discuss the ways in which it contributes to concepts of the self, the body or social group membership (e.g. 'selfies', self-tracking devices, blogging, tweeting, Facebook membership, online gaming, making videos for YouTube).
- What can digital sociology offer to the discipline of sociology? In what ways might it be unable to contribute to the discipline? What are its strengths and deficits?

APPENDIX: DETAILS OF THE 'ACADEMICS' USE OF SOCIAL MEDIA' SURVEY

I utilised the commonly used online survey tool SurveyMonkey to construct a brief questionnaire about academics' use of social media. The survey included both fixed-choice questions and open-ended questions that allowed respondents to write in their answers. The survey was opened on 1 January 2014 and closed after four weeks. I publicised it several times during this period, using a variety of social media, including Twitter, Facebook pages, LinkedIn and listservs of which I was a member. My tweets publicising the survey generated a high number of retweets, and although I cannot be sure how the respondents who completed the survey came across it, I would estimate that many did so via Twitter networks.

The survey was non-representative, relying on volunteers who heard about it through social media networks and then chose to complete it, rather than using probability sampling. Given this method of recruitment, there is a strong probability that the academics who responded were more likely to use social media for professional purposes than the general population of academics and were more favourably disposed towards such use than a randomly selected, representative sample. My findings, therefore, are not generalisable to the population of academics as a whole. They do, however, provide some interesting insights into what academics find useful, interesting, challenging or confronting about using social media in their work in higher education. This is especially true of the responses given to the open-ended questions.

A total of 711 academics completed the survey, two-thirds of whom were women. In terms of geographical region, the largest response was from the UK (37 per cent), followed by Australia/New Zealand (25 per cent), the US (20 per cent), continental Europe (10 per cent) and Canada (5 per cent). The remaining 3 per cent of respondents were from Ireland, the Caribbean and countries in Africa, Asia and South America. Most of the respondents were relatively junior in terms of their career stage: 33 per cent were early career academics and 27 per cent were postgraduate students. Mid-career academics comprised 24

per cent of the respondents, while only 15 per cent described themselves as senior academics and 1 per cent as retired or emeritus academics. Almost half of the respondents (47 per cent) were in the social sciences; 19 per cent were in medicine, public health or allied health areas; 16 per cent were in the humanities; and 12 per cent were in science, technology or engineering. The remaining 6 per cent were in education, commerce, the creative and performing arts, law, library science and archaeology, or described themselves as 'multidisciplinary'.

The full report can be found at www.canberra.edu.au/faculties/arts-design/attachments/pdf/n-and-mrc/feeling-better-connected-report-final.pdf.

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WEB RESOURCES

- Autoscopia: <http://www.autoscopia.net/about.html>
- BSA Digital Sociology: <http://digitalsociology.org.uk>
- Computational Culture* (online open-access journal): <http://computationalculture.net>
- Culture Digitally blog: <http://culturedigitally.org>
- Cyborgology blog: <http://thesocietypages.org/cyborgology>
- Data.gov: <http://www.data.gov>
- Digital Methods Initiative (online course and media analysis tools compendium): <https://www.digitalmethods.net/Digitalmethods/WebHome>
- Digitize Me, Visualize Me, Search Me* (open-access online book edited by Gary Hall): http://www.livingbooksaboutlife.org/books/Digitize_Me,_Visualize_Me,_Search_Me#World_of_Data
- DMLCentral (Digital Media and Learning): <http://dmlcentral.net/about>
- Every Minute of Every Day: <http://everyminuteofeveryday.org.uk>
- FibreCulture Journal* (online open-access journal): <http://fibreculturejournal.org>
- First Monday* (online open-access journal): <http://firstmonday.org/ojs/index.php/fm/index>
- Global Pulse: <http://www.unglobalpulse.org/about-new>
- Hybrid Pedagogy: A Digital Journal of Learning, Teaching, and Technology*: <http://www.hybridpedagogy.com/>
- Internet.artizans: <http://www.internetartizans.co.uk>

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- ISTC Social (Intel's Science and Technology Center for Social Computing): <http://socialcomputing.uci.edu>
- LSE Impact of the Social Sciences blog: <http://blogs.lse.ac.uk/impactofsocialsciences>
- Media Gifts: <http://www.garyhall.info/journal>
- Our Mobile Planet*: <http://www.thinkwithgoogle.com/mobileplanet/en>
- Oxford Internet Institute: <http://www.oii.ox.ac.uk>
- Pew Research Center: <http://www.pewinternet.org>
- Phototrails: <http://phototrails.net>
- Quantified Self: <http://quantifiedself.com>
- Scrutiny blog (Tarleton Gillespie): <http://tarletongillespie.org/scrutiny>
- Selficity: <http://selficity.net/#>
- Social Media Collective Research blog: <http://socialmediacollective.org>
- Software Studies Initiative: <http://lab.softwarestudies.com>
- Surveillance Studies network (including the online open-access journal *Surveillance Studies*): <http://www.surveillance-studies.net>
- The Digital Beyond: <http://www.thedigitalbeyond.com/online-services-list>
- The Digital Self (the author's Scoop.it collection): <http://www.scoop.it/t/the-digital-self>
- The Digitised Academic (the author's Bundlr collection): <http://bundlr.com/b/the-digitised-academic>
- The Social Life of Big Data and Algorithms (the author's Bundlr collection): <http://bundlr.com/b/the-social-life-of-algorithms>
- The Sociology of the Digital (the author's Bundlr collection): <http://bundlr.com/b/the-sociology-of-the-digital>
- The Sociology of the Quantified Self (the author's Scoop.it collection): <http://www.scoop.it/t/the-sociology-of-the-quantified-self>
- Thinking Culture blog (David Beer): <http://thinkingculture.wordpress.com>
- This Sociological Life (the author's blog): <http://simplysociology.wordpress.com>
- Triple C* (online open-access journal): <http://www.triple-c.at/index.php/tripleC/index>
- Visible Human project: http://www.nlm.nih.gov/research/visible/visible_human.html
- We the Data: <http://wethedata.org/#home>

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