Digital ethnography, or 'deep hanging out' in the age of big data

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8

DIGITAL ETHNOGRAPHY, OR 'DEEP HANGING OUT' IN THE AGE OF BIG DATA

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Ethnography in crisis?

I am writing this contribution whilst comfortably working from an attic in my home in The Hague, a location which for the last year has served as a home office. Like most of my colleagues, I have hardly been on campus for more than a year. Most of our teaching has been done online, and so has much of our research. When COVID-19 forced us all into lockdown, and international travel was suddenly not an option, most of us started to think about how to continue doing fieldwork now that everything and everyone seemed to have retreated on screen. Not surprisingly "digital ethnography" quickly became a magical buzz-term. Seminars were organised, reading lists were collectively compiled, oftentimes at the risk of reinventing the wheel, and neglecting the fact that digital ethnography is already established as a field of inquiry with its own practices and preferences, and as a tradition with classics and a canon of its own (cf. Aouragh 2018; Christin 2020). Expectations of what digital ethnography potentially can offer in the time of a pandemic have not always been realistic, whilst at the same time simple small opportunities, or tools and tricks of doing ethnography online, often may have been overlooked. Some good introductions to digital ethnography are mentioned below, but the field is continuously in flux and so this chapter introduces undergraduate students to some of the more exciting trends, familiarising them with what digital ethnography is and what it should do. Digital ethnography has put to the test the very definition of what is a "field of study," what counts as "full immersion," what participant observation consists of once online and how, for example, to establish rapport within something as volatile as a WhatsApp discussion or Twitter thread. This chapter will address some of these issues. Additionally, it responds to pertinent questions such as: What is the added value of an ethnography of and with the digital? Is it necessarily about technology or the Internet?

DOI: 10.4324/9781003132417-8

Are there any new languages to learn and skills to obtain in doing so, and can and should it be done wholly online?

The main argument of this chapter is that digital ethnography is neither new nor consists of one single approach. It is an umbrella term for what is a set of highly flexible and adaptive methods (Hine 2015; Markham 2018) that study the use of digital technology both on- and offline, while at the same time using affordances of these very same digital technologies for studying the impact of the digital on cultural practice and social relations. With digital technologies rapidly becoming ubiquitous and ever more complex, having the potential to affect all life on earth, it is increasingly uncommon to find yourself as an anthropologist doing an ethnographic project in which the digital does not matter. So, those less interested in studying digital technology per se may also benefit from what digital ethnography has to offer to them.

I will first address some of the definitional issues of an ethnography of the digital. How is it defined as a form of inquiry? Is it new? To what extent can (and should) it be claimed solely by anthropologists? Do we need a separate sub-discipline in order to study the digital ethnographically? Secondly, I will refer to some of the foundational moments of digital ethnography, explaining how these have triggered new approaches and novel ways of understanding the digital. The fourth section focuses on the methodological consequences of such shifts, looking at some of the classical methods and techniques used in doing digital ethnography whilst exploring three new frontiers where the 'fireworks' are expected to happen: the ethnography of opaque complex technological systems (AI, algorithms and bots); the physical impact of digital infrastructure, too often deemed ephemeral and consisting of bits and bytes only; and one of anthropology's key-interests: diversity – e.g. how people and communities are differently positioned vis-à-vis emergent technologies, depending on age, class, gender and beliefs. After a brief section delving into some of the emergent ethical issues in this field, I conclude this contribution with recommendations on how to teach (ourselves) digital ethnography.

Defining digital ethnography

What is digital ethnography? As is the case with other social sciences and the humanities, anthropologists increasingly have taken an interest in the "digital turn." A shorthand for what "the digital" implies is provided by Daniel Miller (2018, first section), who defines it as "new technologies that are ultimately reducible to binary code" – i.e., 1s and 0s. The process of digitalisation – the much celebrated (and sometimes feared) "turn" itself – makes many "cultural artefacts easier and quicker to both reproduce and to share" (Miller and Horst 2012, 5). Hine (2015, 2017a, 2017b) amongst others, has shown how ethnography is likely to play a key role in furthering our understanding of the uptake and acceptance of digital technologies, especially "the social significance of the Internet, ever since it began to be a mainstream technology in the 1990s" (Hine 2015, 315).

"Ethnography" generally pertains to the act of doing long-term and immersive fieldwork within a particular and traditionally space- and time-bound setting, with the ethnographer using their own body as the main instrument in creating co-presence and using interviews, observation and participation. Questioning taken-for-granted notions, one thus turns from stranger to apprentice. Ethnography continues after exiting "the field," as it also denotes the reporting and writing up of the results of one's fieldwork. The point of digital ethnographic fieldwork is a similar long-time immersion, not just to observe what people are saying (online) but also to look at what they are doing and to bring contextual depth to our understanding of the human condition (Aouragh 2018, 5). Hence, digital ethnography is still very much about sustained proximity, with digital ethnographers stressing the need for "co-presence" (Hjorth et al. 2017) or "immersive cohabitation" (Bluteau 2019) in order to familiarise oneself with settings and systems that at first are alien to us.

Is digital ethnography new? The digital turn begs for new inventive ways of ethnography, or what (after Renato Rosaldo) anthropologists like to call "deep hanging out." Nonetheless, digital ethnography extends the principles mentioned above, "deploying the ethnographic to understand digital culture" (Hjorth et al. 2017, 2) but also making use of digital methodologies as research tools to collect, analyse and communicate the ethnographic experience.

One of the prevailing questions is whether digital ethnography is "real" enough or if it leaves us with second-hand observations, and at best it turns out to be an armchair anthropology? Needless to say, the digital almost always implies interaction with persons as producers of digital environments. It's important here to make a difference between digital and more traditional remote ethnography, the latter also often used in times of crisis and trying to overcome distance by means of doing interviews by letter, phone or mail. It's also very different from internet ethnography, where the focus is predominantly on online texts and their surrounding practices. Nonetheless, nobody lives life wholly online, and it's the digital ethnographer's task to understand ways of life as they are lived. This makes it necessary to extend studies to other spaces and other media. The field starts somewhere online, but finding one's way through immersion, and following people, technologies and their interactions renders digital ethnography by definition "a multi-modal, multi-sited study" (Hine 2017b, 22).

To say that digital ethnography is something entirely new turns a blind eye to the many continuities, but there obviously are some key differences with "old school ethnography." Amongst them – and possibly most often discussed – is the changing notion of "the field" in fieldwork. Many scholars, taking their lead from Marcus' (1995) "multi-sited ethnography," argue that the field in a digitally connected world is about dynamics and flows rather than emplacement (Markham 2018, see also the third section, encompassing ecologies, landscapes and polymedia). People invest the digital with meanings as they move from one platform to the next but also between the on- and the offline. How and why do people move between physical and digital localities (Postill and Pink 2012, 125)? How and why do the interactions

at the intersection of technology and people matter to those involved (Hine 2017b; Markham 2018, 1135)?

Another key difference of "being there" online is that it's more difficult to determine where "the field" begins and where it ends, if it does at all, as "with social media, the people anthropologists work amongst expect to retain those relationships over distance and subsequent to the completion of the ethnography" (Miller 2018, sec. 5). Airoldi (2018) shows, nevertheless, that the notion of a field in flux is hardly new; rather, it is just another obvious step in the logical transformation of what the ethnographic field is about. Moving from early twentieth-century ethnographers studying seemingly isolated "primitive people" in "exotic places," to the ghettos, gangs and other discrete but much more fluid units studied by urban sociologists, to the networks and flows of the postmodern condition or anthropology at home, the notion of the "field" has constantly been redefined. Ethnographers are disciplined "place makers," but, importantly, ethnographic fields, either on- or offline, are always defined by research queries. Digital ethnography is but another step in reformulating the ways that a field is imagined and constructed (Airoldi 2018).

Is digital ethnography also more democratic? Many scholars have hailed the liberating and participatory potential of new and social media in doing fieldwork (but see the long-standing debate between "techno-optimists" such as Shirky [2009] and "techno-pessimists" such as Morozov [2011]). Not surprisingly, digital ethnographers have embraced the ways digital technologies, often cheap and portable, may become tools of self-representation, enabling everyone (including the very people we study) to become auto-ethnographers. We follow them, and … they will follow us back, introducing new ethical dilemmas (see Section 4). Through MS Teams and Zoom we can train our interlocutors to film their own lives and post excerpts of their notes with comments on self-curated blogs. Blogs allow respondents "to exercise some of their ownership of their emotional and discursive share in the research project" and give voice to traditionally under-represented disciplines, perspectives and actors (Murthy 2008, 846). Murthy observes that digital ethnography may not only provide researchers with an exciting choice of methods to tell other people's stories, but that their using those same tools and speaking up may also help to demarginalise the interlocutor's voice and thus help in questioning how anthropological theories come into being (see on some of these trends, Fortun et al. 2017). Good examples of new explorations into collaborative ethnography on the digital are offered by George Marcus, who further elaborates the agenda and rearticulates the concerns expressed in his earlier work on *Writing Culture* (Clifford and Marcus 1986). For the ethnographic study of and with the digital, he refers to "third spaces" – namely dynamic archives, studios and labs with the anthropologist's involvement in the design and prototyping as forms of cultural critique, which moves beyond the mere ethnographic text and offers an entrance to markets and commerce.[1] New digital formats such as ethnographic podcasting (Lundström and Lundström 2020) can make academia "doubly open" (Cook 2020). Firstly, because they make content normally hidden behind a paywall accessible to all, in what is everyday language, but more importantly "open" in the sense of collaborative,

in a more open dialogue and as part of conversations, instead of representations. However, "access to these technologies remains considerably stratified by class, race, and gender of both researchers and respondents" (Murphy 2008, 839). Underberg and Zorn (2013) emphasise the need to see digital technology used in culturally responsible and responsive ways, indicating the ongoing importance of cultural translators in a world in which everyone increasingly has (access to) the means for self-representation. Hence, theirs is a call to digital ethnographers to not only fully collaborate (and co-design) with "cultural insiders," but also to learn and teach the culture of digital media production and design in order to communicate efficiently.

Do we need a new sub-discipline? Yes, there is added value in an anthropological study of the digital. One of the key contributions of anthropology, as Miller (2018) states, is that in using ethnographic immersion and classical tools such as holism and relativism, anthropologists have been very successful in countering claims made about the impact of digital technologies by "more universalising disciplines" such as psychology and internet studies. Today there are plenty of anthropologists who would self-identify as digital anthropologists, as there are programmes and textbooks of digital anthropology. However, I tend to agree here with Annette Markham (2018, 1134), as she argues that the ethnographic attitude, aspects of which we described above, "doesn't necessarily change when we study the digital. But the digital is transforming what it means to be social and human in the world."

Ethnography is the anthropologists' core business and fieldwork, and in almost stereotypical ways has defined what it is what we anthropologists do. Nonetheless, ethnography increasingly enjoys a fashionability beyond the discipline, with many in the humanities and adjacent social scientific disciplines (especially sociologists) now using versions of ethnography, including market researchers, policy-makers and even trend-watchers turning to ethnographic "fieldwork" to explore meaning-making practices online. This explains the wide range of terms often used to refer to what are overlapping interests and intersecting approaches. These include labels such as "netnography" (Kozinets 2009) and "networked" and "virtual" or "internet" ethnography, although some of these terms are more closely related to Internet and Communication Studies and may not prioritise the on- and offline interaction as much as anthropologists tend to do. Markham (2018) may be right that the Internet and digital technology are simply too big for just one discipline to wholly comprehend, and she describes how various frames have so far resulted in different interpretations of what the digital does. Nevertheless, as this textbook also aims for an undergraduate anthropological readership, and the field of digital ethnography is already vast enough, I here restrict myself mostly to how anthropologists have ethnographically studied the digital turn, and in the next section I refer to some of the landmark studies in the discipline.

Foundational issues: anthropological studies of digitalisation

From how anthropologists so far have ethnographically studied the digital turn, it is apparent that digital technologies have considerably changed over time. Studying changes that are often still under way makes this "an anthropology of the

emergent" (Fischer 1999, 456). Some have a keen eye for the ways technological visions may serve as future-making claims (Beckert 2016). The main focus of digital ethnography is still the Internet, a US military technology that first connected the world back in 1969. Initially a tool for the army, academics and geeks, the Internet was popularised from the mid-1990s onwards and today an estimated 51% of the global population has some form of access to internet-related technology (ITU 2020). But the Internet is notoriously difficult to pin down, being concurrently a concept, a commodity, a system and a cultural artefact with infinite meanings (Aouragh 2018, 6).[2] This section looks at some of these shifting meanings, which to a large extent are given by technological changes, but oftentimes have aligned with both academic fashions and long-standing anthropological interests, including the discipline's stress on sociality, material culture and globalisation.

Interest in technology is as old as the discipline (think of Marcel Mauss' famous distinction between *technology* and *technique*), but for quite some decades studying technology was associated with the evolutionist displays of objects and tools one could find in old ethnographic museums (Pfaffenberger 1988). Anthropology was relatively late in studying computers, the Internet and digital technology (but see Fortun et al. 2017, on early anthropological studies of and with computers). This changed with the "technological turn" of the late 1980s, which first occurred in adjacent fields such as Science & Technology Studies (STS). Scholars such as Latour and Pfaffenberger injected the idea of the social construction of technology into the larger discipline. Anthropologists moved beyond the "standard view of technology" and a one-sided focus on innovation, need-driven evolution and a functionalist study of technological artefacts. The notion of "affordance" was borrowed from psychology and STS, referring to perceived and not exclusive properties of tools and artefacts. Technologies may be ideally but also alternatively used. Rejecting an overt determinism, technologies were to be studied for their underlying normative frameworks, and technological systems as a linkage between technological know-how, artefacts and the coordination of human labour (Pfaffenberger 1992). This stress on social technologies – namely, on how social relations, human values and technologies are often co-produced – is still a mainstay in the anthropology of the digital.

Postcolonial and development scholars have also put technological power imbalances on the agenda. Arturo Escobar's (1994) "anthropology of cyberculture," echoing the fascinations of 1990s popular culture and science, was one of the first anthropological studies to call for an ethnography of a new emergent world order, shaped by trends in biotechnology, AI, VR and the Internet. In the early 2000s, anthropology and neighbouring disciplines became obsessed with the possibilities of such "newish worlds" (Miller 2018). These were the early internet years of text-based bulletin board systems and embryonic gaming environments, such as multi-user dungeons, often resulting in close-knit communities of "nerds." This was a time of techno-optimism as it was widely believed that the Internet would help us escape old ills even while dominant race and gender ideologies continued to prevail online (Nakamura 2002). In these years a 1993 cartoon drawn by Peter Steiner for

the *New York Times* showed two dogs behind a PC arguing that "on the Internet nobody knows you are a dog." Consequently, much of the work from that period, anthropological or not, was enthralled by "virtuality" and creative play with online identities. Classic studies from this era include the work by communication studies scholar Nancy Baym, linguist Naomi Baron and the early work of danah boyd, an ethnographer working with Microsoft on online discussion groups and the first social network sites. Together with Sherry Turkle (1984), who at much earlier date had already written about computers as an extension of the self, they aimed to develop a set of virtual ethnographic methods that were in sync with these new developments and life worlds. Triangulation through mail and chat complemented online text analysis, and an offline double check was introduced to study who these people were "in real life." It was not long before anthropologists started to critique the artificial distinction between the real and the virtual, as well as the bemoaned "loss of natural sociality" (Turkle 2011). There is no such thing as prior authenticity (versus "virtuality"), Miller and Horst (2012) would later observe. Life is not more, or less, but differently mediated by using the digital. Anthropologists including Nardi (2010) and Boelstorff (2015) would insist that being immersed in online worlds such as *World of Warcraft* or *Second Life*, sophisticated software environments with millions of inhabitants, is sufficient to understand their conditions and the ways participants socialise with each other.

Miller and Slater's (2000) *Anthropology of the Internet* was one of the first studies to break with a stress on "the virtual," reinstating the importance of the material dimension of the digital and showing that cyberspace is not a place apart from offline life, but embedded in social places in the here-and-the-now. Using a classic grounded ethnographic approach with house-to-house surveys, collecting website data online, interviewing Trinidadians at home and abroad, and participating in online chats and cyber cafes, Miller and Slater concluded that the Internet may indeed facilitate new socialities (e.g., online communities beyond existing family ties), but that more often it is used to maintain and reproduce conventional social and spatial structures. Besides praise for their study, however, there is criticism (Martin 2002) that they fail to see how the Internet is also a platform which helps to produce new conditions that promote the flexible arrangements commonly associated with neoliberalism (flow of goods, information, capital and peoples), a condition governed by large corporate players who own the very infrastructure and backbone the Internet is built on. Escobar's 1994 study had already warned how especially the uneven relation between North and South would continue to be mediated by new technologies.

Another discernible strand within the anthropology of digitalisation is the discipline's long-standing investment in the study of globalisation, especially its keen interest in local adaptations of global commodity chains. Many anthropologists can live with the observation that digitalisation is in fact the latest incarnation of globalisation's metanarrative (Aouragh 2018). Its emergence coincides with similar fears of homogenisation and with the Internet commonly being seen as "the great leveller" (Barendregt 2012). In what they dub the Years of YASNS ("Yet Another

Social Network Site"), boyd and Ellison (2007), however, call for a return to anthropology's classical staple foods such as holism and relativism, enabling the study of Facebook not just as a successful media format but also for its place within the global political economy. This focus on global power imbalances does not imply that anthropologists have been blind to the affordances that new digital platforms may offer to the less privileged, as is attested by a range of important anthropological studies on topics such as the use of mobile phones and social media by Eritrean diaspora and Filipino migrants (Bernal 2014; Madianou and Miller 2013), or its uptake in movements for social justice (Coleman 2014; Postill 2018). Additionally, studies such as those by Horst and Miller (2005) on the mobile phone as a tool for "linking up" and extending kinship connections in Jamaica, and again a study by Miller (2011) on Trinidadians' *Tales of Facebook*, show that seemingly global and universal technology formats are 'brought home' and reconstituted and indigenised in different places, thereby extending local and vernacular practices and preferences (Miller 2018). Both scholars conclude that many disciplines study the speed by which digital technology changes, the new exciting trends and contents it helps highlight, or the political transformations one can expect. Yet, an anthropology of digitalisation is useful in other ways, precisely pointing out that what is astonishing is not the speed of change, but the speed with which digital culture is often taken for granted (Miller and Horst 2012).

Much has changed now we are moving into a third decade of anthropologists studying digitalisation. Gone are the days of observable mailing lists, internet relay chats and dial-up modems. The majority of the world's internet users, many of them located in the global South, have started to access the Internet, albeit not through computers but often using reconditioned phones, creolised technologies and other forms of "cheap globalisation" (Barendregt 2012). Also, the face of digital technology has significantly changed in other ways, as is probably best described by Christine Hine's notion of the triple E internet: "embedded, embodied, and everyday" (2015, 13).

The contemporary Internet (or, better yet, 'internets') is very different from the one foregrounded in previous studies. Christine Hine's 2015 book shows that the Internet has become a mass phenomenon, almost banal, as in most places it is so fully embedded and worn on the body in everyday contexts that we tend to overlook its often unevenly distributed infrastructure and simply appreciate it for the convenience its applications seem to offer almost daily. From time to time, due to moral panics and our projections of hope and fear on the Internet, it may become more topical, bringing its material and spatial features more fully into the picture. Not only has the Internet become somewhat mundane and omnipresent, our interaction with digital technology over time also has grown increasingly complex, with the proliferation of platforms (Vallas and Schor 2020; Van Dijck et al. 2018), algorithms (Christin 2020), AI and the so-called "Internet of Things." The digital experience is now "enacted in volatile environments such as social networks' feeds, social media aggregators and changeable collections of contents featuring a given keyword or tag" and the ethnographer needs to attend to "dispersed communicative

traces, algorithmic logics, [and] moving assemblages of contents" (Airoldi 2018, 662). Participant observation still plays a role within these new contexts, but it becomes unpredictable, secretive and sporadic, as Hine (2017b) argues, now that "participation in human activity is supplemented with attention to the traces of activity maintained by machines" (Hine 2017b, 25). Knox and Nafus (2018, 2) ask "what happens to our sense of what knowledge is when the agents of knowledge production are not necessarily human." Critical data studies by anthropologists such as Seaver, Gillepsie and Dourish continue to stress the "human in the machine": who or what makes big data; how is it collected, analysed and stored; and whom is left out? They underline the importance of ethnographic studies of human–machine assemblages, a next frontier for digital ethnography to which I will return in the following section, which deals with the ways academic strands and technological developments have impacted our digital ethnographic methods.

Recent ethnographic trends

The pioneers of digital ethnography advocated the triangulation of online observation, email interviews and focus groups by chat, as well as an offline double check. Additionally, one could make use of online questionnaires as hosted by SurveyMonkey and other similar services, which, next to a broadening cohort of respondents, guarantees ease of storage, retrieval and qualitative analysis through packages such as NVivo and ATLAS.ti (Murphy 2008): software packages for qualitative data analysis. The proliferation of webcams and camera phones enables video research diaries, through which research participants can report on their own day-to-day activities. Social network sites provide researchers with the opportunity to glance at data, as well as looking at who shares what with whom and under which circumstances. Digital ethnographers would soon add the need for full immersion and participation, as well as the need to make traditional ethnographic fieldnotes of the experiences in online and offline spaces. A good example of long-term on- and offline immersion is provided by Bluteau (2019), who became an Instagrammer posting self-portraits of clothing while doing offline fieldwork with tailors in London. Using the nickname @anthrodandy, he created an account, started to follow other people, observed their online activity and became comfortable with the platform's interface. Whilst making sense of an intricate web of interactions, Bluteau posting his own content gave him "a substantial insight into not only the content being produced by others, but the invisible production of this content," which he was replicating (Bluteau 2019, 4).

Yet, the emergence of the "triple E Internet" as described by Hine requires rethinking our ethnographic efforts, as we have moved from self-contained but easily observable discussion groups to an increasingly privatised and fragmented internet which is password protected and proprietarily owned, and in which individual users are constantly on the move as they curate "a collection of personal connections" (Hine 2017a, 318). In three subsequent chapters, Hine (2015) offers insights from her own online and offline research work: for example, as a participant moderator

for Freecycle and other mailing lists, the development of e-science in biology, and exploring meaning-making through TV practices on the Internet.[3] The main proposition of Hine's book is that, when studying the Internet and how it is being practiced and lived in various places by diverse people, the ethnographic method is the obvious choice, offering rich data other approaches simply do not deliver. It is an unobtrusive method, characterised by periods of unstructured observation and a focus on experiencing the setting in whatever sense it presents itself (Hine 2015, 161). At the same time, as both internet technology and its cultural embedding are constantly in flux, it must also be a highly flexible approach that needs adaptation from one research context to another. While Hine nicely concludes each of the separate chapters with some points of careful reflection and ethical considerations, she remains keen on retaining the flexibility of the ethnographic approach, even proposing the idea for a "pop-up" version of ethnography.[4]

Other scholars have suggested that it is best to ethnographically approach this new incarnation of internet-related technologies in terms of "ecologies" à la Bateson, and the field as "temporary or momentary assemblages" in which the dynamic human–machine interaction can be studied (Markham 2018, 1135): "fluid meta-fields" (Airoldi 2018) or "landscapes" (Hine 2017a). Madianou and Miller (2013) urge digital ethnographers to study social media and internet-use not in isolation but as part of a wider set of "polymedia": defining each individual medium (e.g. WhatsApp, Instagram, YouTube, etc.) and its use in the context of all other media to understand why people prioritise which medium for what message (and for whom).

The principles of ethnography in digital contexts remain the same as their offline (and online) predecessors, but increasingly resort to creative use of a rich pallet of possible methods, many of which are described in useful compendiums (see, for example, Underberg and Zorn 2013; Pink et al. 2015; Hjorth et al. 2017). Pink et al. offer a set of "principles" on "how we might do ethnography as the digital unfolds as part of the world that we co-inhabit with the people who participate in our research" (2015, 1). These include non-digital-centricity, reflexivity and an open mind for the multiple ways in which people may be making use of the Internet. This also implies adapting one's chosen methodological tools, adjusting them from one context to another and including the possibilities of "video tours" (Pink et al. 2015, 46), with participants filming, showing and explaining their own social-media use, but also excitingly exploring the sensory and haptic dimensions of social media practices (see also Chapter 3, this volume).

As digital technology continues to evolve, potentially so will our ethnographic methods. Although digital ethnography is a highly adaptive and flexible mode, digital ethnographic inquiry has recently moved into new exciting areas, some of which continue the strands described in the previous section as well as being the main foci of the Leiden CADS program. I will briefly discuss the considerations and tools for three such areas: the ethnography of big data and the opaqueness of technological systems such as algorithms and AI; the environmental impact of digital infrastructure; and how to ethnographically study the ongoing proliferation of and obstacles to digital diversity.

An ethnography of big data and algorithms

Intel's in-house anthropologist Genevieve Bell (2015) urges us to focus on the ethnography of "big data custodians" and regulatory frameworks on data ownership, which may differ depending on context. What counts as data is a social process that calls for ethnographic scrutiny: who has the agency to produce (big) data? To control it? What are temporal imaginations of big data (whose purpose, significantly, often seems to lie in the future)? Are there accounts of non-Western contexts or intercultural conjunctions that illuminate or complicate past and present understandings of data (Gitelman 2013)? Anthropologists have endorsed the limits and particularities of 'algorithm' as an emic term used "within a particular professional culture" (Dourish 2016, 2), and they have shown how classical concepts such as "kinship" or "gift exchange" may be brought to the study of AI-technologies, asking "what kind of relation is data?" and "whose child is data?" of the users, or of companies such as Google (Maurer 2015). The use of older anthropological debates to explain the digital transformations we are witnessing includes Boellstorff's revisiting of Claude Lévi-Strauss's "culinary triangle" (from the well-known 1969 *The Raw and the Cooked*). Boellstorff challenges the notion of "raw" (big) data and the simplistic assumption that it must simply be collected prior to interpretation, only waiting to be analysed or "cooked." Following Lévi-Strauss, "rotten" data may help us theorise the make-up of big data, leaving room for the unexpected and accidental (as in "bit rot," or unplanned loss of data; Boellstorff 2015). Others have investigated laymen's interpretations of AI-technologies, asking them to visualise what such technologies mean to them or to explain how it affects them in their everyday lives (see Box 8.1).

BOX 8.1

Taina Bucher (2017) provides a fine example capturing the algorithmic imagination, namely ways of thinking about what algorithms are, what they should be and how they function. In order to explore the user's experience, she delves into people's personal algorithm stories. But "where does one go to gather stories about things algorithmic?" (Bucher 2017, 32). She decided to go for one of the most frequently discussed algorithms: the one used by the Facebook platform. Bucher collected tweets referring to that Facebook algorithm, contacted some of the people who had tweeted these, and by means of email interviews asked them a few questions related to their tweets. Such questions included: "What led you to write this tweet?," "How do you think the Facebook algorithm works?" and "Has your awareness of the algorithm affected your use of Facebook in any way?" Bucher's findings provide novel insights into the ways in which people experience algorithms: "If we want to understand the social power of algorithms, it is important to understand how users encounter and make sense of algorithms, and how these experiences, in turn, not only shape the expectations users have towards computational systems, but also help shape the algorithms themselves" (Bucher 2017, 33).

These insights into increasingly complex digital systems are complemented by the field of critical algorithms studies. Algorithms *shape* culture. Online platforms such as Facebook, Amazon and Google use algorithms to classify cultural groups according to their search queries, whereby similar preferences result in similar recommendations. Newsfeeds create feedback loops using the same social categories, thus affirming already-held assumptions and resulting in an "algorithmic culture" in which individuals are categorised based on similarities and "relevant" facts are selected by decision-making machines (Striphas 2015). Ethnographic evidence, however, proves there are no unsupervised algorithms (Seaver 2018; Dourish 2016). Humans provide monitoring and integrate human feedback into the AI system to improve and regulate its learning process; the "human in the loop" is able to identify misbehaviour and make AI accountable (Rahwan 2018). Various actors, technologies and meanings find place in one algorithmic system (Christin 2020), namely "a steady accumulation of feedback loops, little circuits of interpretation and decisions knit together into a vast textile. If you can't see a human in the loop, anthropologists argue, you just need to look for a bigger loop" (Seaver 2018, 378). Actual algorithmic systems are particular, unstable and malleable. We then need to investigate the social make-up of technical teams and the culturally situated interpretive processes by which they define and discover problems, and identify acceptable solutions.

Digital matters

Some of the best-known works written about the digital revolution celebrate its speed and cleanliness. Think of Dyson et al.'s (1996, 295) prediction of "the overthrow of all matter," Castell's (1989) "space of flows" (as opposed to twentieth-century space of places) and Negroponte's (1996) inexpensive transfer of electronic data at the speed of light. The dematerialised and supposedly sustainable digital transformation, however, is one of contemporary's society most dangerous myths (Fuchs 2008), a myth fed by prefixes such as "virtual" or "cyber," but also bits and bytes or 1s and 0s that do little to show the real-life consequences of our digital economy. We dream of telework and a reduced need for travel, and hence less environmental pollution, but before COVID-19 struck lame most of our societies relatively few people worked from home, and it remains to be seen if teleconferencing will be prolonged once the pandemic is over. Similarly, the paperless office and biodegradable hardware are within reach, but are only attractive to those appreciating such eco-chic alternatives. Something in the way we talk about complex technologies is meant to naturalise them, and even to make them look innocent and less demanding. When difficult-to-comprehend-technology needs to be explained in "lay terms," we often tend to turn to ecological metaphors. Think here of 'data flows,' 'streaming content,' 'mountains of data' or server farms.' We do so, ignoring "the planetary ramifications of minute individual practices that are fuelled by cultural values of connectivity and speed and that rely, above all, on the exploitative infrastructure of server farms" (Carruth 2014, 343). Carruth (2014) argues that some of the digital industry's favoured formats, such as word clouds and white

papers, simplify and "greenwash" complex matters. In particular, infographics are a much-used strategy to talk about the industry. Infographics work to simplify large, complicated, inaccessible infrastructure that moves data around the world. Building on Mirzoeff (2011) and Houser (2014), ethnographers should critically interrogate infographics as contemporary visualisation tactics, with often-hidden procedures of classification, separation and aestheticisation. We should produce counter-hegemonic infographics that expose digital technologies also as commodities, which work in a "system of extractive capitalistic logics" (Takaragawa et al. 2019, 521). With data amassing in exabytes and data centres consuming large amounts of water and coal to store the data we produce (Hogan and Shepherd 2015), digital society proves to be "no immaterial society but a new phase in the very material reality of capitalism" (Fuchs 2008, 299).

Ethnographers study hardware and software specifically for what they are: socio-material productions with a profound influence on everyday life. Increasingly they have looked at artistic interventions to make the public aware of the devastating effects of our digital transition. Well known is Rebecca Solnit's (2010) book *Infinite City*, which includes a map that superimposes famous culinary destinations in the US Bay Area with toxic Silicon Valley sites. A creative ethnographic method that has also been popularly used in interrogating the physical impact of digital infrastructure is the "data walkshop" (see Box 8.2).

BOX 8.2

Alison Powell (2018: 213) calls the "data walk" a framework for radical, collective, bottom-up process "of exploring and defining data, big data and data politics from the perspectives of groups of citizens who walk, observe, discuss and record connections between data, processes of datafication, and the places they live in." She devised the "data walkshop" in 2015 as a conceptual counterpoint to what she saw as "the celebratory rhetoric of big data," particularly the popularity of the smart city concept that was then gaining ground. Theoretically it combined Donna Harraway's "idea of situated knowledge" with previous efforts to collectively experience the city by means of "flash mob ethnography" (Powell 2018, 215). The walkshop is hence an encounter between participatory research and collective performance.

Participants are each assigned a role as they take a walk in an area of their choice. The group observes places and tries to define whether these places are "data-calm" or "data-rich": places of data activation or data resistance. These data can be simply CCTV cameras, which are often most visible, but depending on the theme the group has chosen such data objects or hubs may also consist of other indicators. A group may thus look, for example, at data related to citizenship, but one can also think of transport, food, health, etc. Whilst walking, groups record the area by means of drawings, pictures and maps.

Then, once the walk is over, they can tell their "data stories" to the group members or later share them with others. Data walking, as Powell (2018, 226) concludes, "potentially produces a way to create different experiences of data subjectivity that engage with new definitions, contentions and resistant positions." Ultimately, the data walk is about participants defining and critiquing data in a place and how they see that "datafication" takes place. It's a rereading of "top-down data assemblages not so much to be contested but as an alternative way of making sense" (Powell 2018, 214; see also Powell's website Data Walking [www.datawalking.uk]).

Digital diversity

Diversity remains at the heart of an anthropology of digitalisation. Such an anthropology therefore needs to ethnographically study how people and communities are differently positioned vis-à-vis the design, access and use of emergent technology, situating digital technology culturally, and foregrounding users and how their social creativity helps them adapt technology to local contexts. The concept of digital diversity is a response to previous debates on "digital divides," showing that access to the latest technology is sustainable only if it is culturally adequate for fostering community building, moral debate and appropriate digital literacy. Anthropology exposes the inbuilt biases of corporate digital technology and its tendency to reinforce existing inequalities by silently shaping everyday life. However, it also corrects earlier fears of cultural homogenisation by digitisation, offering scenarios of alternative "information societies," both elsewhere and at home.

Scholarship on "digital diverse worlds" is often not anthropologically informed and tends to focus on the inbuilt biases of digital technology (see, for example, Benjamin 2019), on its producers and on the lack of diversity in industry (McIlwain 2020). Relatively little ethnographic work thus far has focused on how digital diversity may work in practice and for its users (see Barendregt 2012), moving away from a view of technology as innovation-centric to technology in-and-as-used. Exciting work has been done by Ramesh Srinivasan, an anthropologist and programmer who argues that technology has mostly been used to uphold institutions of power and privilege (2017, 114), but marginalised communities are now becoming empowered by technology. Digital technologies may restore the dignity of indigenous or first nation people, preserve what is lost, Srinivasan hopes, doing research in a set of Native American reservations scattered in San Diego county in Southern California. In the period 2002–2005, and with the support of Hewlett Packard and the University of San Diego, he worked on the Tribal Digital Village project. Understandably, there is suspicion towards both alien academics and settler technologies as there is a long history of databasing culture (e.g., censuses, mapping) as a foreign-imposed technology that has misrepresented Native Americans until now (Srinivasan 2013). Together with his interlocutors he explores what helps

people immerse and engage again in their songs, dances and stories, using digital video and a database that moves beyond the usual interface of slave–master categories or binaries such as male–female, foregrounding the indigenous metaphor of the *manzanita*, a tree standing for rebirth as a prototype for the database's interface. Can "progressive algorithms" address the multiplicity of value systems, Srinivasan (2013, 219) asks? Digital design is ontological in the sense that all design-led objects, tools and services bring about particular ways of being, knowing and doing (Escobar 2018). This leads Srinivasan to advocate for a "fluid ontology," wherein communities create belief or value systems by consensus as they embrace knowledge, values and protocols that are or become part of their lives.

With big data research looming large in the social sciences and humanities, anthropologists are under pressure to explore new digital tools for automated analysis or visualisation. Ethnography ('thick data') is, more often than not, presented as the opposite of big data, and yet ethnographers have an important role to play in this respect and it would be nonsensical not to make use of some of the new affordances informing our ethnographic analysis. At present, a range of ready-to-use tools is available on the market, but the reflexive ethnographer should always watch out for often-hidden assumptions that shape such technologies (Hine 2015, 16). Anthropologists of the digital explore alternatives to proprietary software and study those developing it (Kelty 2008). One of the most exciting and promising venues is the idea of prototyping and co-design, of which some good examples are offered by both Srinivasan (2013) and Drazin (2012), not coincidentally teaming up with industry partners as well as communities that are peripheral to the industry (see Box 8.3).

Co-design combines an ethnography of the digital with explorations into design anthropology (Drazin 2021; Suchman 2011). It also opens up an exciting new world already paved by the likes of Bell, boyd and Seaver as anthropologists working within the industry (see Box 8.3), as it introduces new ethical dilemmas, the topic of the next section.

BOX 8.3

Since the early 2000s, anthropologists have been recruited by the digital industries to do research and development and initiate a move away from uniform design of hard- and software. Although we generally refer to this field as "design anthropology," there is much more at stake than mere design decisions. Much of the demand for anthropologists by the industry is inspired by the Scandinavian 1980s user-centred design which foregrounded consultation with workers and design-by-doing. Adam Drazin (2012, 250) describes how participatory design was boosted by the rise of domestic computing, but also the realisation of big corporate players that building computers the uniform way was not the only way to go. Big IT companies decided to open research

facilities beyond Silicon Valley, in Europe, India and China, and social scientists were recruited, among them anthropologists, to see what users demand of their machines. Good examples of anthropologists joining the ranks of the IT industry are Genevieve Bell's work in robotics for Intel and danah boyd's research with Microsoft on people who use social media in their everyday lives.

Drazin (2012) illustrates design anthropologists at work, for example through a project on remembering through digital media with Hewlett Packard, responding to the company's anxiety over what would happen to the camera now it was going digital. Drazin and his team visited people at their homes to talk about memories through images and sound, eventually coming up with the idea of audio-photographs, and making albums that combine photo and music collections. Next, such audiovisual albums were tried and combined with other formats and products. In another experiment for Intel, Drazin explored design for global ageing, working with the local Rural Transport Network and interviewing elderly passengers about their experience with design technology.

Co-design, Drazin argues, proceeds from participation more than from technology. Successful co-design raises questions about users' experience and the cultural dimensions or requirements of a product. Much of design anthropology uses the principles of performance and provocation (or "cultural commentary" as, Drazin refers to it), rather than design or marketing.

Emergent ethnographic dilemmas

Ethical guidelines and discussions on how to do fair and transparent ethnographic research online while minimising harm to others have been produced by a number of disciplines. By far the best overview can be found on the website of the Association of Internet Research (Franzke et al. 2020; see also Markham et al. 2018).[5] Some of the advice given is core to anthropological codes of conduct. Yet there are also aspects of digital ethnography here that are not covered elsewhere. Classical ethical dilemmas include the issue of who owns the data once it has been publicly posted online. In an essay on Facebook's (disastrous) dealing with privacy, boyd (2008) has shown that it's one thing to share information publicly with others, but quite another when, due to changed platform settings, such information suddenly occurs in other contexts and users feel themselves to be exposed. This is more about a perceived sense of privacy than about privacy as formulated in normative terms, and teaches the ethnographer that it's one thing to ask permission to observe, and another thing to use that data after observation. Other scholars have accordingly stressed the need for contextual integrity and the idea that it's best not to share posts, pictures, or other items outside of the context in which they were initially shared. An untagged YouTube clip beyond its niche audience, or a post or picture without further context may do harm to the rightful owners in ways we cannot foresee.

In the background of the newly emergent triple E internet and a digital world dominated by platforms and algorithms, some of these dilemmas are reformulated. Self-immersion means coming to know one's interlocutors personally, which, while a powerful tool, also comes with certain caveats. In an age where flaming and hate speech run rampant, how much should one share one's true identity online? Can we "perform" or fake identities, or is that ethically not justifiable? If using a professional account, what should academic employers do to protect their staff while doing research online? Participant observation, also online, must be based on explicit consent, preferably from all participants, but at least from a moderator. Murphy (2008, 840) observes, however, that social media research and the lurking attitude of many digital ethnographers have resulted in "a disproportionate number of covert versus overt projects." As we "read" blogs, posts and tweets, or browse through somebody's pictures on Instagram, we use aliases and anonymous web "avatars," thereby rendering ourselves invisible to those we observe. Dicks et al. (in Murphy 2008, 840) caution that the Internet should never be read as a "neutral" observation space as it always remains a constituted fieldwork site and is consequently shaped by the ethnographer's data selection: "[A]nalyses are always biased by agendas, personal histories, and social norms."

Asking consent was doable when observing the closed mailing lists of the early 2000s, but becomes increasingly difficult if we are to follow users as they move from one proprietary platform or app to the next. Do we need informed consent? And, if granted permission to observe on one platform, do we need to renew such consent for the other places as we travel with these users, meeting with yet others who may not be aware of our ethnographic presence? Ethnographers needs to sensitise themselves to the appropriate etiquette for each mode of interaction, realising that "there may be private interactions going on in back channels of otherwise public platforms, that are crucial for [understanding of] the participants' experience" (Hine 2017a, 321), yet (ethically) may require different treatment of data.

There also have been other shifts on doing digital ethnography, such as with regard to how to represent the data we collect and questions such as whether we should anonymise. Where and how, and for how long, should we keep that data? (see Chapter 9). To which parties should data be accessible? There is much to say for building open collaborative databases (Fortun et al. 2017), as this offers exciting new possibilities for co-creation of knowledge, now that many of our interlocutors use the very same means as we do. However, not everyone may be equally pleased to see his or her data end up in a large digital archive which is easily searchable and may lead to that data being used in new and often unpredictable circumstances. Aouragh (2018, 2) remarks that concerns about fulfilling ethical obligations towards our interlocutors "play out more intensely in relation to the push toward digital humanities" as they gradually become a bigger player in the field of big data research. This again raises concerns about how to store such data, and whether informed consent is sufficient, as now other indicators such as tags and metadata may help identify our interlocutors. In a certain, somewhat idealised sense, ethnographic research may also offer an important corrective as qualitative and ethnographic research may precisely

highlight those not present in big data sets, those less or not connected, or those differently connected.

A question increasingly important when doing research online is how to keep track of where we move, whom we meet and what data we collect, as digital storage allows us to keep more than we ever can revisit again. Importantly, fields are created by our research foci, and keeping track of such constitution not only says much about our own positionality, and whom or what we bring along when frequenting on- and offline spaces. How much of these constitutional processes we allow to surface when we share our stories and tell our ethnographies also becomes an ethical decision. In that sense, becoming a digital academic (Lupton et al. 2018) and making use of intermediate formats and fast media such as blogs and podcasts can help explain the decisions we are making, what is left in and what is left out. These are helpful considerations for explaining to students how the ethnographic exercise works in practice, and it is to the theme of teaching that I turn in the concluding section.

Conclusion: Lessons learnt and lessons yet to teach

Anthropologists were relatively late to join, but for the last three decades have been studying the digital turn as it unfolds. They do so in ways very differently attuned when compared to other disciplines. As Danny Miller (2018) has argued, anthropology, with its participatory and longitudinal research toolkit, is the discipline most likely to situate emergent technologies within a broader comparative cultural and social context. Moreover, anthropology has the potential and the mission to show that there are always multiple directions and different solutions to the challenges posed by the digital transition (Barendregt 2012).

Digitalisation is changing the way we do, think and talk about anthropology, and in the near future it surely is likely to change the way we teach ethnography, anthropology's signature method. It does not take much to imagine a future campus where anthropology students will prepare themselves for doing fieldwork in virtual research environments styled after gaming worlds.[6] Immersive video (see Chapter 7) is very likely to offer elements for such virtual field labs. Labs cannot substitute for the "real thing" – full face-to-face immersion in the field – but they may offer training support in pandemic times as they offer exciting new venues for popularising cultural translations. What if we don't write, or film, but perform our ethnographies within such new virtual worlds? While that may seem far-fetched, it is worth taking into account some of Markham's observations (2018). She describes the experiences of her students doing autoethnography online, concluding that the challenge lies not so much in the actual findings they uncover, but in "training students what to do and how to operate in an online digital environment." Helping them build new digital literacies teaches them "about how digital media [may] function in our everyday lives, and with what possible effects on us, personally and culturally" (2018, 1149).

The way we are to teach digital ethnography also raises the issue of bilingualism. Should we, as ethnographers studying the use of digital technologies, be able to

understand computer language? It is one thing to learn a relatively simple HTML or Python, but what about more sophisticated technologies such as AI, algorithms and bots? Or is it the ethnographer's task to explore emic conceptions of such technologies whilst leaving room for lay interpretations, asking our interlocutors to "algorithmically imagine" (see Box 8.1) or visualise (by means of drawing, video diaries or data-walks) abstract ideas such as "the cloud," "5G" or "the internet"? And if we, as anthropologists, are to program, can we do it differently? Do we teach our students that there are always alternatives, especially in times when we are increasingly subjected to the vendor-lock of corporate software and the proprietary platforms of big educational tech, which threaten to turn our universities into content industries (Weller 2014)? Opting for free and open yet-to-be-modified alternatives and new digital infrastructure that is "deviously designed" (Fortun et al. 2017, 14) is also in line with anthropology's larger mission to choose the side of the marginal, the less privileged and those often under-represented. Can we use the digital to defend those otherwise left out of the much-hyped digital revolution?

In line with this, it is good to think of other new data literacies, and the need to not only teach our students how to read and (mis)use statistics, but also allow them to focus on increasingly slicker visual formats such as the infographic. How can this much-favoured communication mode of the industry be strategically subverted and read against the grain? What is left unsaid, and which data are kept silent or left out? Teaching digital ethnography also comes with larger and more fundamental queries, including the question of whether human practice can be reduced to data. Is deep hanging out and producing 'thick data' an adequate antidote to the prominence of big data in our times? In the end (digital) ethnography is all about listening to other people's stories and to how they make sense of a changing world, both on- and offline. And it is about retelling such stories to others. Digital technology increasingly provides us with new means to do so, as the other chapters in this volume also attest.

Notes

1 In the same volume edited by Orin Stern, Fortun (2015) provides a lucid example of such an experimental third space. Her own project, named the *Asthma Files*, offers an online and dynamic aggregate of blog posts, articles and comments by anthropologists, epidemiologists, policy makers and patients that collaboratively contribute to this new sort of ethnographic project.
2 Markham (2018, 1132) suggests that "the term internet remains a useful umbrella." It also avoids persistent false binaries that alternative terms might carry, such as online (offline), virtual (real, actual), or digital (analog)."
3 Parts of this description are clipped from a longer review of Hine's book in Barendregt (2017).
4 But as Markham (2018, 1145) so poetically puts it: "[E]ven the most subtle and sophisticated qualitative methods are not designed to grapple with the personalized experience of time and place, the multiplicity of identity, or the simultaneity of global and local in a single moment when a participant swipes her finger across a screen and feels multiple locations, brings the 'there' into the 'here,' or takes the here somewhere else."

5 See the AOIR website at https://aoir.org/ethics/.
6 One exciting example of this is offered by Natalie Underberg and the late Elayne Zorn (2013, chp. 6) in an educational computer game (actually a modification of an existing game, redesigned to teach its users about cultural heritage of the Latin immigrant population of Florida). Those more cynical about such efforts may refer to Forte's (2011) essay on the US Army's Human Terrain System (HTS) and the then recruitment of anthropologists to provide "cultural knowledge" for the purpose of more effective counterinsurgency in Iraq and Afghanistan.★

References

Airoldi, Massimo. 2018. "Ethnography and the Digital Fields of Social Media." *International Journal of Social Research Methodology* 21 (6): 661–673.

Aouragh, Miriyam. 2018. "Digital Anthropology." In *The International Encyclopedia of Anthropology*, edited by H. Callan, 1–10. Wiley Online Library. doi:10.1002/9781118924396.wbiea1982.

Barendregt, Bart. 2012. "Diverse Digital Worlds." In *Digital Anthropology*, edited by H. Horst and D. Miller, 203–224. London: Bloomsbury Academic.

Barendregt, Bart. 2017. "Deep Hanging Out in the Age of the Digital; Contemporary Ways of Doing Online and Offline Ethnography." *Asiascape: Digital Asia* 4(3): 307–319.

Beckert, Jens. 2016. *Imagined Futures: Fictional Expectations and Capitalist Dynamics*. Cambridge, MA: Harvard University Press.

Bell, Genevieve. 2015. "The Secret Life of Big Data." In *Data, Now Bigger and Better*, edited by T. Boellstorff and B. Maurer, 7–26. Chicago: Prickly Paradigm Press.

Benjamin, Ruha. 2019. *Race After Technology. Abolitionist Tools for the New Jim Code*. Cambridge: Polity.

Bernal, Victoria. 2014. *Nation as Network: Diaspora, Cyberspace and Citizenship*. Chicago: University of Chicago Press.

Bluteau, Joshua M. 2019. "Legitimising Digital Anthropology through Immersive Cohabitation: Becoming an Observing Participant in a Blended Digital Landscape." *Ethnography* 138: 1–19.

Boellstorff, Tom. 2015. *Coming of Age in Second Life: An Anthropologist Explores the Virtually Human*. Princeton: Princeton University Press.

Boelstorff, Tom. 2015. "Making Big Data, in Theory." In *Data, Now Bigger and Better*, edited by T. Boellstorff and B. Maurer, 87–108. Chicago: Prickly Paradigm Press.

boyd, danah. 2008. "Facebook's Privacy Trainwreck: Exposure, Invasion, and Social Convergence." *Convergence* 14 (1): 13–20.

boyd, danah, and Nicole B. Ellison. 2007. "Social Network Sites: Definition, History, and Scholarship." *Journal of Computer-mediated Communication* 13 (1): 210–230.

Bucher, Taina. 2017. "The Algorithmic Imaginary: Exploring the Ordinary Affects of Facebook Algorithms." *Information, Communication & Society* 20 (1): 30–44.

Carruth, Allison. 2014. "The Digital Cloud and the Micropolitics of Energy." *Public Culture* 26 (2): 339–364.

Castells, Manuel. 1989. *The Informational City: Information Technology, Economic Restructuring, and the Urban-Regional Process*. Oxford: Blackwell, 1989.

Christin, Angèle. 2020. "The Ethnographer and the Algorithm: Beyond the Black Box." *Theory and Society* 49: 897–918.

Clifford, James, and George E. Marcus. 1986. *Writing Culture: The Poetics and Politics of Ethnography: A School of American Research Advanced Seminar*. Oakland: University of California Press.

Coleman, Gabriella. 2014. *Hacker, Hoaxer, Whistleblower, Spy: The Many Faces of Anonymous*. London: Verso.

Cook, Ian M. 2020, October. "Critique of Podcasting as an Anthropological Method." *Ethnography* https://doi.org/10.1177/1466138120967039.

Dourish, Paul. 2016. "Algorithms and their Others: Algorithmic Culture in Context." *Big Data & Society* 3 (2) 1–11.

Drazin, Adam. 2012. "Design Anthropology: Working on, with and for Digital Technologies." In *Digital Anthropology*, edited by H. Horst and D. Miller, 245–265. London: Bloomsbury Academic.

Drazin, Adam. 2021. *Design Anthropology in Context: An Introduction to Design Materiality and Collaborative Thinking*. London: Routledge.

Dyson, Esther, George Gilder, George Keyworth and Alvin Toffler. 1996. "Cyberspace and the American Dream." *The Information Society* 12: 295–308.

Escobar, Arturo. 1994. "Welcome to Cyberia: Notes on the Anthropology of Cyberculture." *Current Anthropology* 35 (3): 211–231.

Escobar, Arturo. 2018. *Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds*. Durham: Duke University Press.

Fischer, Michael M. J. 1999. "Emergent Forms of Life: Anthropologies of Late or Postmodernities." *Annual Review of Anthropology* 28 (1): 455–478.

Forte, Maximilian C. 2011. "The Human Terrain System and Anthropology: A Review of Ongoing Public Debates." *American Anthropologist* 113 (1): 149–153.

Fortun, Kim. 2015. "Ethnography in Late Industrialism." In *Writing Culture and the Life of Anthropology*, edited by O. Starn, 119–136. Durham: Duke University Press.

Fortun, Mike, Kim Fortun and George E. Marcus. 2017. "Computers in/and Anthropology: The Poetics and Politics of Digitalization." In *The Routledge Companion to Digital Ethnography*, edited by L. Hjorth, H. Horst, A. Galloway and G. Bell, 11–20. London: Routledge.

Franzke, Aline Shakti, Anja Bechmann, Michael Zimmer, Charles Ess and the Association of Internet Researchers. 2020. "Internet Research: Ethical Guidelines 3.0." *AOIR website*. Accessed 14 May 2021. https://aoir.org/reports/ethics3.pdf.

Fuchs, Christian. 2008. "The Implications of New Information and Communication Technologies for Sustainability." *Environment, Development and Sustainability* 10 (3): 291–309.

Gitelman, Lisa. 2013. *Raw Data is an Oxymoron*. Cambridge, MA: MIT Press.

Hine, Christine. 2015. *Ethnography for the Internet: Embedded, Embodied and Everyday*. London: Bloomsbury.

Hine, Christine. 2017a. "Ethnography and the Internet: Taking Account of Emerging Technological Landscapes." *Fudan Journal of the Humanities and Social Sciences* 10 (3): 315–329.

Hine, Christine. 2017b. "From Virtual Ethnograhpy to the Embedded, Embodied, Everyday Internet." In *The Routledge Companion to Digital Ethnography*, edited by L. Hjorth, H. Horst, A. Galloway and G. Bell, 21–28. London: Routledge.

Hjorth, Larissa, Heather Horst, Anne Galloway and Genevieve Bell. 2017. "Introduction." In *The Routledge Companion to Digital Ethnography*, edited by L. Hjorth, H. Horst, A. Galloway and G. Bell, 1–7. London: Routledge.

Hogan, Mél, and Tamara Shepherd. 2015. "Information Ownership and Materiality in an Age of Big Data Surveillance." *Journal of Information Policy* 5: 6–31.

Horst, Heather, and Daniel Miller. 2005. "From Kinship to Link-up: Cell Phones and Social Networking in Jamaica." *Current Anthropology* 46 (5): 755–778.

Houser, Heather. 2014. "The Aesthetics of Environmental Visualizations: More than Information Ecstasy?" *Public Culture* 26 (2 (73)): 319–337.

ITU 2020. *Measuring Digital Development: Facts and Figures 2020. International Telecommunication Union*. Accessed 14 May 2021. www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2020.pdf.

Kelty, Chris. 2008. *Two Bits: The Cultural Significance of Free Software*. Durham: Duke University Press.

Knox, Hannah, and Dawn Nafus. 2018. "Introduction." In *Ethnography for a Data-saturated World*, edited by H. Knox and D. Nafus, 1–29. Manchester: Manchester University Press.

Kozinets, Robert. 2009. *Netnography: Doing Ethnographic Research Online*. London: Sage.

Lundström, Markus, and Tomas Poletti Lundström. 2020. "Podcast Ethnography." *International Journal of Social Research Methodology* 24 (3): 1–11.

Lupton, Deborah, Inger Mewburn and Pat Thomson. 2018. *The Digital Academic: Critical Perspectives on Digital Technologies in Higher Education*. London: Routledge.

Madianou, Mirca, and Daniel Miller. 2013. "Polymedia: Towards a New Theory of Digital Media in Interpersonal Communication." *International Journal of Cultural Studies* 16 (2): 169–187.

Marcus, George E. 1995. "Ethnography in/of the World System: The Emergence of Multi-sited Ethnography." *Annual Review of Anthropology* 24 (1): 95–117.

Markham, Annette N. 2018. "Ethnography in the Digital Internet Era: From Fields to Flows, Descriptions to Interventions." In *The Sage Handbook of Qualitative Research*, edited by N. K. Denzin and Y. S. Lincoln, 1129–1162. London: Sage.

Markham, Annette N., Katrin Tiidenberg and Andrew Herman. 2018. "Ethics as Methods: Doing Ethics in the Era of Big Data Research – Introduction." *Social Media+Society* 4 (3): 1–9.

Martin, Gary J. 2002. "Review of The Internet: An Ethnographic Approach." *Economic Geography* 78 (1): 100–102.

Maurer, Bill. 2015. "Principles of Descent and Alliance for Big Data." In *Data, Now Bigger and Better*, edited by T. Boellstorff and B. Maurer, 67–86. Chicago: Prickly Paradigm Press.

McIlwain, Charlton. 2020. *Black Software. The Internet and Racial Justice, from the Afro Net to Black Lives Matter*. Oxford: Oxford University Press.

Miller, Daniel. 2011. *Tales from Facebook*. London: Polity.

Miller, Daniel. 2018. "Digital Anthropology." In *The Cambridge Encyclopedia of Anthropology*, edited by F. Stein et al. http://doi.org/10.29164/18digital.

Miller, Daniel, and Heather A. Horst. 2012. "Introduction: The Digital and the Human: A Prospectus for Digital Anthropology." In *Digital Anthropology*, edited by H. A. Horst and D. Miller, 3–37. London: Berg.

Miller, Daniel, and Don Slater. 2000. *The Internet: An Ethnographic Approach*. London: Berg.

Mirzoeff, Nicholas. 2011. *The Right to Look: A Counterhistory of Visuality*. Durham: Duke University Press.

Morozov, Evgeny. 2011. *The Net Delusion: How Not To Liberate The World*. London: Penguin.

Murthy, Dhiraj. 2008. "Digital Ethnography: An Examination of the Use of New Technologies for Social Research." *Sociology* 42 (5): 837–855.

Nakamura, Lisa. 2002. *Cybertypes: Race, Ethnicity, and Identity on the Internet*. New York/London: Routledge.

Nardi, Bonnie. 2010. *My Life as a Night Elf Priest: An Anthropological Account of World of Warcraft*. Ann Arbor: University of Michigan Press.

Negroponte, Nicholas. 1996. *Being Digital*. London: Hodder & Stoughton.

Pink, Sarah, Heather Horst, John Postill, Larissa Hjorth, Tania Lewis and Jo Tacchi. 2015. *Digital Ethnography: Principles and Practice*. Los Angeles: Sage.

Pfaffenberger, Bryan. 1988. "Fetishised Objects and Humanised Nature: Towards an Anthropology of Technology." *Man* (1988): 236–252.

Pfaffenberger, Bryan, 1992. "Social Anthropology of Technology." *Annual Review of Anthropology* 21: 491–516.

Postill, John. 2018. *The Rise of Nerd Politics: Digital Activism and Political Change*. London: Pluto.

Postill, John, and Sarah Pink. 2012. "Social Media Ethnography: The Digital Researcher in a Messy Web." *Media International Australia* 145 (1): 123–134.

Powell, Allison. 2018. "The Data Walkshop and Radical Bottom-up Data Knowledge." In *Ethnography for a Data-Saturated World*, edited by H. Knox and D. Nafus, 212–232. Manchester: Manchester University Press.

Rahwan, Iyad. 2018. "Society-in-the-Loop: Programming the Algorithmic Social Contract." *Ethics and Information Technology* 20 (1): 5–14.

Seaver, Nick. 2018. "What Should an Anthropology of Algorithms Do?" *Cultural Anthropology* 33 (3): 375–385.

Shirky, Clay. 2009. *Here Comes Everybody: How Change Happens When People Come Together*. London: Penguin.

Srinivasan, Ramesh. 2013. "Re-thinking the Cultural Codes of New Media: The Question Concerning Ontology." *New Media & Society* 15 (2): 203–223.

Srinivasan, Ramesh. 2017. *Whose Global Village? Rethinking how Technology Shapes Our World*. New York: NYU Press.

Striphas, Ted. 2015. "Algorithmic Culture." *European Journal of Cultural Studies* 18 (4/5): 395–412.

Solnit, Rebecca. 2010. *Infinite City: A San Francisco Atlas*. Berkeley/Los Angeles: University of California Press.

Suchman, Lucy. 2011. "Anthropological Relocations and the Limits of Design." *Annual Review of Anthropology* 40: 1–18.

Takaragawa, Stephanie, Trudi Lynn Smith, Kate Hennessy, Patricia Alvarez Astacio, Jenny Chio, Coleman Nye and Shalini Shankar. 2019. "Bad Habitus: Anthropology in the Age of the Multimodal." *American Anthropologist* 121 (2): 517–524.

Turkle, Sherry. 1984. *The Second Self: Computers and the Human Spirit*. New York: Simon and Schuster.

Turkle, Sherry. 2011. *Alone Together*. New York: Basic Books.

Underberg, Natalie M., and Elayne Zorn. 2013. *Digital Ethnography: Anthropology, Narrative, and New Media*. Austin: University of Texas Press.

Vallas, Steven, and Juliet B. Schor. 2020. "What Do Platforms Do? Understanding the Gig Economy." *Annual Review of Sociology* 46: 273–294.

Van Dijck, José, Thomas Poell and Martijn de Waal. 2018. *The Platform Society: Public Values in a Connective World*. New York: Oxford University Press.

Weller, Martin. 2014. *The Battle for Open*. London: Ubiquity Press.