Data that Matter: On Metaphors of Obfuscation, Thinking 'the Digital' as Material and Posthuman Co-Operation with AI

ANNIE RING

Since the 1990s, there has been a near-worldwide spread of Internet use and an accompanying growth in the consumption of networked devices. The way these devices gather, monetize and trade data has material effects, whose acknowledgement is a prerequisite for creating more justice in our current era, when large datasets are being used to train AIs to mimic and extend human capacities. And yet, obfuscating metaphors have proliferated as the shared language most often used to describe these phenomena. As a result, it is easy to feel as if the Internet does not exist anywhere in particular, and that the networked technologies which allow people to access it are greener and more ephemeral than other kinds of hardware. Seb Franklin notes how technology users 'experience their devices as media of frictionless connection'.[1] This is a good description of the denial of materiality in today's cultures of consuming and thinking about technology. Such a relation of repression or denial ignores the high carbon footprint of networked devices, the waste they create and the hidden labour that goes into making them. Beyond hardware, too, the data that are routinely gathered from Internet-connected devices and used to train AIs can easily seem to belong to an abstract, immaterial sphere quite separate from material bodies and environments.

Regarding the storage of data, it is usual to hear of them being held in a place invoked by a corporate brand-name, the 'Cloud'. This name originated in 1996 in Texas-based company Compaq's branding for new Internet-based businesses under the name 'cloud computing'.[2] Equally metaphorically, the Internet itself came to be described as The World Wide Web after British computer scientist Tim Berners-Lee's research led to the creation of a

networked information system. The natural metaphors of a 'web' and a 'cloud' invoke materials which are porous, flexible, and airborne, made of moisture alone, or at most permeable tissue that could dissolve at the touch of a finger. Surely, such materials will do little more than tickle our sensitive bodies and float over the fragile environments we inhabit. The most obfuscating metaphor of all is that of 'the digital': this is the ubiquitous name given to a wide array of contemporary computational phenomena. The adjective 'digital', which signifies any sequence of linear numerical functions, has little to do with the way new technologies actually operate alongside and on their users.

My argument in this article is that metaphors are themselves technologies of power and can be used problematically to obscure truths and disempower people. This problem has special urgency in the realm of new technologies and the data they gather, and yet it has a longer philosophical history. In 1893, Nietzsche criticized the nature of all language as consisting of deceptive metaphors, and claimed – in demonstratively metaphorical writing of his own – that the resulting shared jargons powerfully generate meaning without having any direct relationship to material reality. In his essay 'On Truth and Lies in a Non-Moral Sense', Nietzsche writes of a language whose metaphorical construction makes it at once light and tough: 'like one constructed of spiders' webs: delicate enough to be carried along by the waves, strong enough not to be blown apart by every wind'.[3] 'The digital' is a metaphor belonging to just such a light, tough language: the term is used and encountered everywhere, and its meaning is as ungraspable as it is apparently inarguable.

'The digital' is also a term that obscures the material effects of networked technologies and the data they make available for mining, trading and training machine intelligence. In the following pages, I therefore advance a critique of the ubiquitous metaphor of 'the digital', as well as the related metaphors of 'the web' and 'the Cloud'. In service of that critique, I bring together key approaches to datafication and the Internet by contemporary

scholars of technology, who are opening up new ways of thinking about data science, coding, and technology's impacts in terms of race, gender and the environment. These fields have traditionally been led by white, cis male technicians, and technology designs tend even today to be dominated by people of that particular identity. The approaches considered here, from cultural theories of technology and critical data studies, are generating much needed new understandings of data and their materially lived effects. These approaches are made even more urgent by the incipience of artificial intelligence (AI), the new kinds of machine cognition that are trained on data and are emerging to function ever more capably alongside humans in an ever-changing, posthuman world.

The title of this article is inspired by Judith Butler's concept of 'bodies that matter', the gendered bodies that performatively come into being at the place where materiality and discourse interact in repeated, socially-recognized rituals.[4] Butler developed this idea in the mid 1990s, when mainstream use of the Internet and networked technologies was rapidly expanding. While the Internet is not part of Butler's argument about the gendered body, my claim here is that new technologies need to be considered in any theoretical approaches to how material bodies come into being, and exist together in our current era of technological growth. Several decades on from the publication of Butler's performative theory of gender, Internet use is now extremely widespread, allowing vast swatches of data to be gathered and employed to analyse technology users' identities through their likes and habits, their states of health and finance and their social contacts. These data are being bought and sold between big data companies, other corporations, and governments around the world. The archiving, analysis and deployment of those data are all unseen processes. Some of them are governed by black box algorithms, whose decision-making routes cannot be overseen, even by the technicians who coded them in the first place.

Given the technical invisibility of these data-mining processes, what is needed is a language that makes clear the outcomes they bring about in relation to material bodies. This is especially important in light of the undemocratic, populist politics that have regrettably proliferated with the growth of new technologies and media platforms into the present day. In this regard, feminist theorist Donna Haraway's early writing on technology in the 1980s was prescient. I show below how Haraway foresaw the way information technology's effects would be obscured and so worsened by dematerializing rhetoric that defines the marketing of these technologies and the experience of using them. I also explore the politics that thrive in this era of technological innovation, which tend to be exclusionary, as we see with the revival of racist and sexist populisms made possible by the growth of social media platforms, and which tend to deny or diminish climate science, so slowing down global efforts to mitigate the devastation of natural environments. My goal here is to move cultural theoretical thinking away from the current situation, in which any analysis of contemporary technologies and the worrying politics they cultivate is reliant on an army of metaphors of 'the digital' and 'big data'. As I show in the following pages, these metaphors do little to describe how new technologies and the data they deal in have their effects, rather they generate a thoughtlessness about technology that is certainly harmful now and could be even more so in a future of inevitable human-machine co-operation.

Data discrimination, algorithmically-governed futures, and justice Leading cultural theorists of technology – many of whom are women, non-binary and trans people, and scholars of Colour, all groups traditionally underrepresented in software design and the tech industry – have been critical of immaterial thinking about technology since the 1980s. Most presciently, in her 'Manifesto for Cyborgs', Haraway predicted that bodies would begin to appear more immaterial as networked technologies developed, giving rise to cyborgs, a vision of the

human body that is implanted with technological prostheses and enhancements.[5] Through her playful manifesto for these still-fictional cyborgs, Haraway wrote for a humanity that she saw as moving away from the 'material and opaque' bodies of the analogue age to the 'ether, quintessence' of the cyborg body (MC, 153). In her futuristic theory, Haraway foresaw an end to bodies that matter, predicting the way material life would be neglected in discourses about an existence increasingly lived online, in a world of 0's and 1's.

In the early era of mass Internet use, N. Katherine Hayles went on to confirm this prediction, as she noted that the body was being left out of studies of new technologies and the Internet altogether.[6] Hayles argues that a neglect of embodied thinking has resulted in highly abstract ways of conceiving networked communication and connectivity, including in terms of the developing relationships between machines and human beings. In the immaterial mode of thinking, 'mind' – which in Hayles' argument means both human and computational cognition – takes precedence over matters of the body. Continuing this line of thought after the rise of Web 2.0, the participatory internet, Aylish Wood argued persuasively that we must recognize the embodied quality of new media,[7] with which Internet users began to interact more dynamically through early social media platforms such as Myspace and MSN Messenger, paving the way for today's socially-networked age of technology.

All the interactive Internet platforms that developed around the turn of the millennium are reliant on computational code. Concerned about the common misconstruction of coding as a purely mathematical and so largely immaterial process, Chun argued that code implies a specific distribution of agency, where access to the skill and resources required for coding mean that there is no neutrality in the way software is written.[8] Quoting Chun, José Van Dijck argued in her 2013 book on cultures of 'connectivity' for a need to recognize 'the historical, material specificity of code and […] the intricate relations among people, machines, and symbolic environments carried as code'.[9] Indeed, the physical components

(hardware) and the mathematical calculations of code always bring forth specific effects in the way they set up relations between technology corporations and users – usually relations we can analyse in terms of agency and subjection. Given the material impacts code has in contemporary distributions of power and agency, Chun even claims that the distinction between software and hardware is effectively invalid.[10] Of course, it is not always expedient for states or corporations to communicate the consequences a given code is having, especially when it has been written to serve a business case, and not designed to account for its impact in the world.

Recent work in critical technology studies has made clear the harm that networked technologies are doing. Barbara Cassin's book *Google Me* (2017) seeks to bust the myth of Google as a friendly, neutral search engine,[11] as does Safiya Noble in *Algorithms of Oppression* (2018), where Noble investigates the link between search engines, which users rely on to call up information, and racism in the offline world. For instance, inputting the keywords 'Black girls' or 'Latina girls' into Google's search function yields pornography not just as the first search result but as the first several pages of results.[12] Google's algorithms that generate these results are complicit with longstanding associations of racialized women with hypersexualization and objectification, and they pull up results that are themselves discriminatory and so perpetuate discrimination in the world.

Not only the Internet corporations that technology users inevitably interact with, but also governments rely on algorithms – and hence on the data they process – to make decisions. These decisions can be as fundamental as immigration rulings and remote drone strikes. Simone Browne has argued that the data-analytics used now in corporate and governmental surveillance represent a modern form of branding.[13] In her reading, the biased categorization of race and gender in biometric surveillance enables a continuation of racist policing in league with developing technologies of identification. Also considering the effects

of these regimes in terms of racial justice, Ghanaian-American computer scientist Joy Buolamwini's video installation *The Coded Gaze* (2016), and the documentary *Coded Bias* (2020) based on her work at MIT, both explore the trouble facial recognition software has recognizing Black women's faces as faces.[14] Buolamwini's work reveals the biases underpinning the way machine vision is coded, biases which are carried forward by the technology itself and used in decisions that define the course of data subjects' lives.
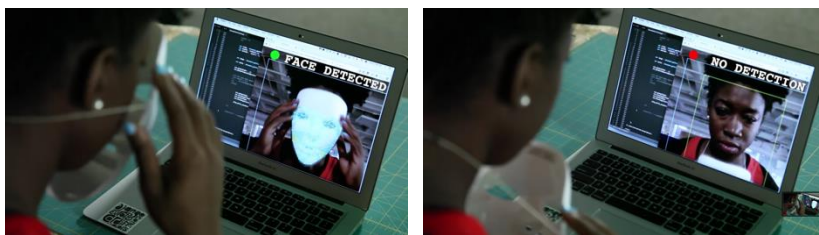

Figure 1: A failure of technological recognition in *The Coded Gaze* by Joy Buolamwini (2016). By permission

The uses of data by algorithms have other effects beyond racism, too: Caroline Criado Perez has revealed wide-reaching gender bias in the way data are applied in areas as crucial as heart medication and car safety-testing. In response to such systemic biases, Catherine D'Ignazio and Lauren Klein have developed a set of feminist and anti-racist principles for dealing with data with a view to justice.[15]

Data are the matter on whose basis algorithms make decisions in all kinds of contexts about the futures of individuals and communities, and perpetuate injustice in the process. In a co-edited volume of keywords for analysing big data, *Uncertain Archives*, colleagues and I bring in perspectives from a wide range of disciplines to analyse the impact big data have had since the hype around them peaked in the mid-2010s.[16] In the volume, Brooklyne Gipson, Frances Corry and Noble argue for an intersectional approach to data and their uses. They bring in Kimberlé Crenshaw's influential theory of intersectionality and emphasize this

theory's 'origins in Black feminist thought, and its use in critical data studies and intersectional Black feminist technology studies' in order to 'break open big data's black boxes'.[17] Building on Crenshaw's legal theory, Gipson et al highlight how the categories of vulnerability and invisibility intersect in the misuses of data, harming groups who are already experiencing multiple disadvantages.

These approaches from the cultural theory of technology make clear the structural violence of data-analytics regimes, which by their nature will only become visible at unknown future times. Louise Amoore's analysis of ethics in the age of the 'Cloud' considers the problematic uses of algorithms to make important and often deadly decisions in terms of their relationship to the future.[18] The conclusions algorithms come to are based on lives that have been reduced to data that are by no means neutral. Moreover, algorithmically-made decisions are mathematically binary and so allow no space for nuance or the openness of potentiality; as such, Amoore finds that algorithms calculate possible futures out of existence, rather than opening up any technological utopias their programmers may have dreamed of. Amoore convincingly sets out 'the predictive power of algorithms to undermine the democratic process, determine the outcomes of elections, decide police deployments, or make financial, employment, or immigration decisions' (CE, 4). So far, big data have not kept their promises for more security, and no-fly lists have not been documented to prevent terrorist attacks, but they have instead subjected people with particular profiles to needless surveillance and travel-bans. There is no reason to believe this injustice will stop unless algorithmic regimes deploy data in radically different ways.

Elena Esposito argues that the way algorithms make predictions is rendered problematic by 'the available data and the way they affect our attitude toward the future', for instance by basing predictions on past behaviours of people whose experience of discrimination has reduced the possibilities for their lives so far.[19] For Esposito, algorithms

that forget existing biases, rather than endlessly reproducing them, would be preferable. Such forgetful algorithms are tantalizing, but they remain fictional, since they would need to be trained on data other than those which have been gathered and misused in such discriminatory fashion so far.

The idea common to these approaches and many others within critical data studies is that networked technologies have substantial impacts in the world, and more so for already disadvantaged groups. This way of thinking about data can take us away from being naively excited about the 'digital' age, about the *bigness* of big data and the possibilities of security they promise. In place of naïve techno-optimism, a critical data-studies approach reveals how much the way data are gathered and deployed urgently matters, both in governmental and corporate decision-making processes and in the training of smart machines for the future. It has been made obvious how data can be gathered with the intent to abuse and manipulate, as seen in the actions of Cambridge Analytica. This behavioural science and data analytics company used psychographics and political advertising that together influenced the harmful Brexit and Trump campaigns in the UK and US in 2016.[20] While data-gathering technologies are still designed by very particular identity-groups, and the data they mine are traded between governments and corporations without any legal checks or ethical considerations, harm is sure to follow.

Environmental impacts, thoughtlessness and 'situated knowledges'

The technologies associated with big data have significant impacts on the planet, which can be understood, to a degree, with the aid of metaphor. For instance, the vast profits that have been generated by data-trading led *The Economist* to describe data as 'the new oil'.[21] Practices that capture and monetize data are certainly analogous to the extraction of oil for

profit,[22] and networked technologies cause environmental harms comparable to the effects of the extraction of oil. Many communication devices stay switched on perpetually, so that in 2019, the 'ICT sector [was] using 50 per cent more energy than global aviation', and the production of personal networked devices is especially carbon intensive. These devices are also made of substances mined under inhumane conditions.[23]

The metaphor of data-mining as a kind of extraction comparable to that of fossil-fuels is helpful because it reflects the very material way data are stored and processed. This happens in data centres, refrigerated warehouses made of silicon, steel, and glass. Often containing thousands of servers, data centres use a significant proportion of the world's electricity and most are powered by fossil fuels: coal and natural gas. The centres are connected by heavy fibre-optic cables, which are laid under the ocean, connected by tonnes of wiring.[24] Whether they are kept on land, underwater or even, as is the ambition of some companies, planned to be stored in space, data-servers are always on, processing information in their powerful computers. These data centres contribute significantly to climate change as well as damaging local environments.[25] Their construction has also been shown to exacerbate inequitable regional and local politics, including colonial and military legacies, rural marginalization, and post-industrial decline.[26]

These extremely materially-existent data centres are owned by companies like Google and Amazon, whose unstoppable monopolies enjoy low regulations and non-existent taxation. The large amounts of data these companies command also mean they can develop artificial intelligence very quickly and exploitatively, because their AI learn from datasets without the consent of the people whose data have been extracted, and without regard to copyright law or intellectual property. The use of language and image datasets for this kind of training happens in a way that is difficult to trace and hold to account, making it impossible

to regulate how data are used in the machine learning that will make the kinds of decisions discussed above in future.[27]

Governments around the world are reliant on collaboration with big data companies until such time as they build their own data-management infrastructure. Only the largest companies with access to the most expensive and smartest machines are able to bid for contracts such as the $10billion Joint Enterprise Defense Infrastructure tender, a vast cloud-computing contract to work with the US military, which was cancelled following a bitter bidding war between tech giants Amazon and Microsoft. Such companies are reliant on the invisible infrastructure of data-processing, so that data infrastructure forms an often unacknowledged source of power and wealth for some, and an influential material background to the contact anybody has with the Internet and so with governmentality itself. There is also material inequality, of course, in the results of that concentration of power, its denied material aspects, and the damage these do to the climate. People living in more climatically insecure parts of the world are already likely to experience the worst flooding, fire and resulting displacement resulting from climate breakdown. These in turn lead to more loss and harm, as climate refugees are forced to seek liveable conditions in other, often hostile societies.

The danger with metaphors of abstraction is that they suggest harmlessness; they evoke a beautiful, unobtrusive 'cloud', or an appealing, even decorative 'web' that hides the effects of powerful and energy-intensive new technologies in the world. This danger of abstraction is highlighted in Haraway's 'Manifesto for Cyborgs', when she claims that when '[a]bstraction and illusion rule in knowledge, domination rules in practice' (MC, 158). Haraway is referring here to Marx's analysis of alienated labour, in which he was concerned with the separation of the labourer from the material artefact produced by their physical work, through new factory-based work processes.[28] In the 1980s, Haraway built on Marx's

argument in order to analyse the coming Internet age as heralding heightened conditions of abstraction and so of domination. She foresaw how the humans of the future would interact more and more closely with technologies, without this atomized interaction promising liberation or even greater knowledge.

Haraway's predictions have largely been proven right. The habit that many technology companies and users share, of describing networked technologies and the data they extract only in abstract terms, as 'digital' content that sits somewhere in an evanescent 'Cloud', enables a domination based in denial. In the face of the combined abstraction and inevitability of tech users' implication in the abuses implied by the 'digital', viewpoints from living bodies and from a troubled planet are vital. Haraway was also prophetic with regard to this vital ethical requirement in the era of networked technology. Soon after writing the 'Manifesto for Cyborgs', Haraway argued for 'situated knowledges', or modes of knowing that acknowledged their material reality and locatedness.[29] These knowledges may need to reject 'rational knowledge claims', but this risk can be worthwhile, since, in Haraway's arresting words, claims to universal rationality can also turn out to be unacknowledged 'claims on people's lives' (SK, 589). Suspicious of apparently neutral rationality, Haraway argues for 'the view from a body, always a complex, contradictory, structuring, and structured body, versus the view from above, from nowhere, from simplicity' (SK, 589). The *view from nowhere* implies a gods'-eye view that surveils from a safe aerial position. This viewpoint does not need to acknowledge the violence going on down below in the world it is busy mapping and rationalizing.

Thinking about the 'digital' in merely metaphorical fashion risks what Haraway calls 'astralization', this aerial mode of rationality that denies the relational aspects of our technological age. In *Staying with the Trouble*, her 2016 book on environmental ethics, Haraway is scornful of the 'astral gods', those representatives of corporate surveillance and

profiteering, who float separately and unethically apart from the rest of life.[30] Appropriately

for these figures' association with the abuse of technology for profit, clouds are the place

where Haraway's astral gods separately and aloofly spend time. Her astral gods are like the

gods in Bertolt Brecht's Marxist drama, *The Good Person of Szechuan*, who cannot help the

play's protagonist, the good person Shen Teh/Shui Ta with their very material problems.[31]

Unable to offer any substantial help, these Brechtian gods float away on a cloud, leaving the

other characters to despair of ever living together ethically.

In *Staying with the Trouble*, Haraway develops her critique of astral thinking in light

of the work of German Jewish philosopher Hannah Arendt, who wrote about the 'banality of

evil' embodied by Adolf Eichmann, one of the most senior Nazis and architects of the Shoah,

in *Eichmann in Jerusalem* (1963).[32] Haraway writes: 'Eichmann was astralized right out of

the muddle of thinking into the practice of business-as-usual no matter what. There was no

way the world could become for Eichmann and his heirs—us?—a "matter of care."' (ST,

36).[33] Arendt's original analysis of Eichmann's trial claimed that his 'remoteness from reality

and […] thoughtlessness' meant he could not think about his crimes, and, as such, he could

not act ethically (EJ, 288). Haraway's recent argument about Eichmann is somewhat

different, in that she sees this architect of the Shoah as not having been able to think

materially about the position he held in a shared world with others. Lacking material

thinking, Eichmann could not feel any ethical relation with others; he could not feel that

others mattered. And in Haraway's hard-hitting analysis, anybody who denies the

connections between contemporary technologies and the harms they do are Eichmann's

thoughtless heirs.

Admittedly, there are flaws in both Arendt's and Haraway's approaches to

Eichmann's thoughtlessness. One can criticize Arendt by noting it is possible Eichmann

thought about his actions: perhaps, having thought about them, he still concluded the mass

murder of Jews and other people killed by the Nazi regime was actually something he wanted to make happen. Meanwhile, his work in organizing the atrocities may have included a consciousness of what they would materially mean, even if he denied this at his trial. Still, thinking with both of these philosophers about Eichmann's case reveals how business-like, abstract thinking-as-usual becomes divorced from matters of care, with potentially devastating consequences.

In place of the Eichmann-like, unethical absence of thinking in relation to others, Haraway advocates for a situated and, crucially, embodied kind of knowledge, one that she explores more in her work on *Companion Species* (2003), about human life in its other, post-human contexts.[34] The knowledge theorized by Haraway is corporeal in quality, as is clearest in her most recent work on the tentacled, earth-bound figures of the Chthulucene, the chthonic or subterranean life-forms among which she locates an alternative to disembodied astral thinking. Haraway's focus is the wisdom that can be gained by thinking materially about embodied life on a posthuman planet. This is wisdom that allows for human and other kinds of complexity. It is not afraid to be involved or, in Haraway's terms, 'entangled' with others, and to think about the consequences of that entanglement.

A future of co-operative entanglement

In our current age of datafication, we see a Foucaultian "intensification" of power through new media and technologies, and this is a power that presents itself as qualitatively *light*. Jeffrey Nealon writes about Foucault's concept of biopower, those more liberal forms of governmentality associated with late capitalism: 'power becomes lighter, more ubiquitous […] more effective while offering less obvious potential for resistance'.[35] In response to the illusion that big data's power-knowledge formations are immaterial and so not harmful, the

material and embodied approaches explored in this article, from feminist and other progressive technology studies, are urgently needed. I have therefore advocated for bringing materiality back into our thinking about datafication and the uses of data for current and future technology. I make this argument in the hope that discourses about technology can move away from Nietzsche's 'army' of 'metaphors which are worn out and without sensuous power' (OTL, 7), in favour of making more conscious and sensible what is happening in our era of technological development.

This is about bringing to the surface the real-world impacts of what Chun calls 'habitual new media' – the networked devices Chun rightly views as being designed for 'habitual' rather than fully conscious use, with the result that technology users' bodies become unknowing 'archives' of the networked world (URS, xi). While data are being archived about technology users, they themselves are being turned into archives of unacknowledged materiality. As material archives of a 'digital' world, contemporary bodies do indeed hold unacknowledged and entrenched behaviours of media habituation. Metaphors of obfuscation permit that habituation to remain unexamined. At this point when machines are so intertwined with everyday life in homes, workplaces and the public sphere, a posthuman entanglement between bodies and machines is inevitable. Therefore, thinking critically about the risks and the promises of such entanglement is indispensable.

Entanglement with technology is not a purely negative phenomenon. I have argued elsewhere that working together co-operatively across disciplines, and even with non-human cognition, can orient technology use more towards justice.[36] Positive examples of machine-human co-operation include an Amnesty International initiative that trained algorithms to map conflict zones within Syria,[37] and the recent invention of pipe bots to collaborate in checking for leaks in the United Kingdom's disastrously mismanaged water system.[38] In a

corporate context, machine-learning designers at AlphaGo have used their game code to process data in more environmentally friendly ways for Google and DeepMind.[39]

The arrival of collaborative writing AIs, such as ChatGPT, and image-generators such as Stable Diffusion and LAION, has understandably been greeted with more ambivalence than the above projects. It is important for artists and writers to challenge platforms like Open AI not to infringe on their copyright in the form of the vast data corpuses their AIs are trained on. There are of course limits in AI writing and image-creation that are based on mimicry, and so lack the ability to innovate as human writers and artists can. But given the ubiquity of these technologies, and the potential for innovation they bring with them, the art and writing of the future are likely to take on co-operative, posthuman qualities more often. This is the case in works by Mario Klingemann and Anna Ridler, both of whom train AIs to create images that the artists then develop and curate.[40] Such a co-operative approach to authorship and artmaking can be a positive outcome of AI's new applications. It contains the possibility of finally debunking the astral myth of a sovereign, solo author or artist, who works alone and without recourse to any infrastructure and material supports to his (sic) craft.[41]

These new developments in human-machine co-operation show how entangling co-operatively with technologies, to change the material ways they are used and have an impact, offer constructive ways forward. I would argue, moreover, that such co-operations are only possible because their initiators have been willing to think about data and its uses, including uses for AI, materially, and so to innovate in a manner that is conscious of the effects data have in the world. To think this way means seeing more clearly what it means to live in bodies and on this planet in our current technological era. It can also prompt technology's creators and users to make design and purchase decisions geared towards more liveable material conditions, both for today and for our networked, datafied future.

[1] Seb Franklin, *The Digitally Disposed: Racial Capitalism and the Informatics of Value* (Chicago: University of Minnesota Press, 2021), 3.

[2] See Antonio Regalado, 'Who Coined "Cloud Computing"?', *MIT Technology Review*, 31 October 2011, https://www.technologyreview.com/2011/10/31/257406/who-coined-cloud-computing/, consulted on 13 May 2021. For more on the prehistory of the Cloud, especially its military origins, see Tung-Hui Hu, *A Prehistory of the Cloud* (Cambridge, MA: MIT Press, 2015).

[3] Friedrich Nietzsche, *On Truth and Lies in a Nonmoral Sense* (Scotts Valley, CA: CreateSpace Independent Publishing Platform, 2012), 4, hereafter OTL.

[4] Judith Butler, *Bodies That Matter: On the Discursive Limits of Sex* (Oxford and New York, NY: Routledge, 1996).

[5] Donna Haraway, 'A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century', in *Simians, Cyborgs and Women: The Reinvention of Nature* (New York, NY: Routledge, 1991), 149–181, hereafter MC.

[6] Katherine N. Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (Chicago, IL: Chicago University Press, 1999).

[7] Aylish Wood, *Digital Encounters* (London: Routledge, 2007).

[8] Wendy Hui Kyong Chun, *Updating to Remain the Same: Habitual New Media* (Cambridge, MA and London: The MIT Press, 2017), hereafter URS.

[9] José Van Dijck, *The Culture of Connectivity: A Critical History of Social Media* (Oxford: Oxford University Press, 2013), 180.

[10] Wendy Hui Kyong Chun, *Programmed Visions: Software and Memory* (Cambridge, MA and London: The MIT Press, 2011).

[11] Barbara Cassin, *Google Me: One-Click Democracy* (Fordham: University Press, 2017).

[12] Safiya Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York, NY: New York University Press, 2018).

[13] Simone Browne, *Dark Matters: On the Surveillance of Blackness* (Durham, NC: Duke University Press, 2015).

[14] *The Coded Gaze,* directed by Joy Buolamwini (US: Civic Media, 2016); and *Coded Bias* directed by Shalini Kantayya. (US and UK: 7th Empire Media, 2020).

[15] Perez Caroline Criado, *Invisible Women: Exposing Data Bias in a World Designed for Men* (London: Penguin Books, 2019); and Catherine D'Ignazio and Lauren F. Klein, *Data Feminism* (Cambridge, MA: The MIT Press, 2020).

[16] Nanna Bonde Thylstrup, Daniela Agostinho, Annie Ring, Catherine D'Ignazio and Kristin Veel (eds), *Uncertain Archives: Critical Keywords for Big Data* (Cambridge, MA: The MIT Press, 2021).

[17] Brooklyne Gipson, Frances Corry and Safiya Umoja Noble, 'Intersectionality', in *Uncertain Archives: Critical Keywords for Big Data*, edited by Nanna Bonde Thylstrup, Daniela Agostinho, Annie Ring, Catherine D'Ignazio and Kristin Veel (Cambridge, MA: The MIT Press, 2021), 306. See also: Kimberlée Crenshaw, 'Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics', *University of Chicago Legal Forum*, 1 (1989), 139–167; and 'Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color', *Stanford Law Review* 43:6 (1991), 1241–1299.

[18] Louise Amoore, *Cloud Ethics: Algorithms and the Attributes of Ourselves and Others* (Durham NC: Duke University Press, 2020), hereafter CE.

[19] Elena Esposito, 'Unpredictability', in *Uncertain Archives: Critical Keywords for Big Data*, edited by Nanna Bonde Thylstrup, Daniela Agostinho, Annie Ring, Catherine D'Ignazio and

Kristin Veel (Cambridge, MA: The MIT Press, 2021), 538.

[20] Carole Cadwalladr and Emma Graham-Harrison, 'Revealed: 50 million Facebook profiles harvested for Cambridge Analytica in major data breach', *The Guardian*, 17 March 2018, http://www.theguardian.com/news/2018/mar/17/cambridge-analytica-facebook-influence-us-election, consulted on 25 April 2022.

[21] *The Economist*, 'The world's most valuable resource is no longer oil, but data', 6 May 2017, https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data, consulted on 13 May 2021.

[22] See also Jussi Parikka, *A Geology of Media* (Minneapolis and London: University of Minnesota Press, 2015).

[23] Izabella Kaminska, 'Just because it's digital doesn't mean it's green', *Financial Times*, 6 March 2019, https://www.ft.com/content/4749756c-1149-334f-b3cb-16ce6acfbca0, consulted on 13 May 2022.

[24] Nicole Starosielski, *The Undersea Network* (Durham, NC: Duke University Press, 2015).

[25] Mél Hogan, 'Data Flows and Water Woes: The Utah Data Center', *Big Data & Society* (July-December 2015), 1–12; and Julia Velkova, 'Data Centers as Impermanent Infrastructure', *Culture Machine* 18 (2019), 1–11.

[26] Alix Johnson, 'Data Centers as Infrastructural In-Betweens', *American Ethnologist* 46:1 (2019), 75–88; Jenna Burrell, 'On Half-Built Assemblages: Waiting for a Data Center in Prineville, Oregon', *Engaging Science, Technology, and Society* 6 (2020), 283–305; Asta Vonderau, 'Technologies of Imagination: Locating the Cloud in Sweden's North', *Imaginations* 8:2 (2017), 8–21; and Graham Pickren, 'The Factories of the Past are Turning in to the Data Centers of the Future', *The Conversation*, 4 January 2017, https://theconversation.com/the-factories-of-the-past-are-turning-into-the-data-centers-of-the-future-70033, consulted on 25 January 2022.

[27] Gebru Bender, McMillan-Major, and Shmitchell Shmargaret, 'On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?', in *FAccT '21: Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency* (New York, NY: Association for Computing Machinery, 2021), 610–623.

[28] Karl Marx, *Capital: Critique of Political Economy v. 1*, translated by Ben Fowkes (London and New York, N.Y: Penguin Classics, 1990).

[29] Donna Haraway, 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies* 14:3, (1988), 575–599, hereafter SK.

[30] Donna Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham, NC: Duke University Press, 2016), hereafter ST.

[31] Bertolt Brecht, *The Good Person of Szechwan* (London and New York, NY: Bloomsbury, 1985).

[32] Hannah Arendt, *Eichmann in Jerusalem: A Report of the Banality of Evil* (New York: Penguin Books, 1977), hereafter EJ.

[33] Haraway draws on the notion of 'matters of care' from the work of Puig de la Bellacasa to demonstrate that caring always necessitates thinking about material experience. See: Maria Puig de la Bellacasa, *Matters of Care. Speculative Ethics in more than Human Worlds* (Minneapolis, MN: Minnesota University Press, 2017).

[34] Donna Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago, IL: Prickly Paradigm Press, 2003).

[35] Jeffrey T. Nealon, *Foucault Beyond Foucault: Power and its Intensifications since 1984* (Stanford, CA: Stanford UP, 2008), 71.

[36] Annie Ring, 'Complicity', in *Uncertain Archives: Critical Keywords for Big Data*, edited by Nanna Bonde Thylstrup, Daniela Agostinho, Annie Ring, Catherine D'Ignazio and Kristin Veel (Cambridge, MA: The MIT Press, 2021), 87–98, p. 94/

[37] Amnesty International UK, *A Map of Non-Violent Activism in Syria*, 2013, https://www.amnesty.org.uk/blogs/campaigns-blog/map-non-violent-activism-syria, consulted on 25 April 2022.

[38] See https://pipebots.ac.uk/.

[39] DeepMind, 'AI Reduces Google Data Centre Cooling Bill by 40%', *Deepmind*, 20 July 2016, blog/article/deepmind-ai-reduces-google-data-centre-cooling-bill-40, consulted 20 May 2021.

[40] See https://aiartists.org/mario-klingemann and http://annaridler.com/.

[41] Also on co-authorship in the age of networked technology, see Emily Baker and Annie Ring, 'Now are we Cyborgs? Affinities and Technology in the Covid-19 Lockdowns', in *Lockdown Cultures: The Arts, Humanities and Covid-19*, edited by Stella Bruzzi and Maurice Biriotti (London: UCL Press, 2022), 58–67.