New
Dark Age

Technology and the
End of the Future
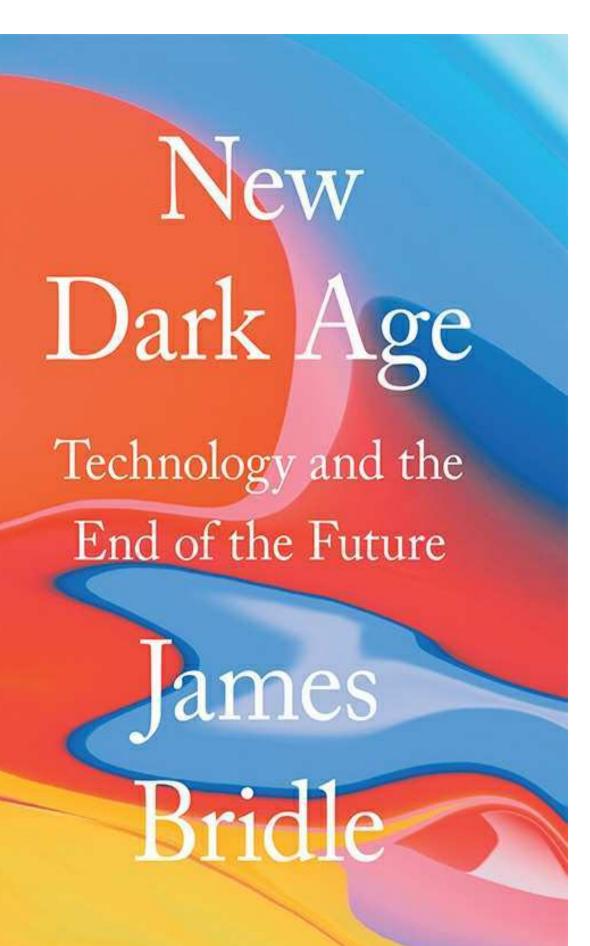
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and the End of the Future*

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For Navine

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Chasm

'If only technology could invent some way of getting in touch with you in an emergency,' said my computer, repeatedly.

Following the 2016 US election result, along with several other people I know and perhaps prompted by the hive mind of social media, I started re-watching *The West Wing*: an exercise in hopeless nostalgia. It didn't help, but I got into the habit, when alone, of watching an episode or two in the evenings, after work, or on planes. After reading the latest apocalyptic research papers on climate change, total surveillance, and the uncertainties of the global political situation, a little neoliberal chamber play from the noughties wasn't the worst thing to sink into. One night I am halfway through an episode from the third series, and President Bartlett's chief of staff, Leo McGarry, is regretting attending an AA meeting and as a result missing the early stages of an emergency.

'What would you have done a half hour ago that hasn't already been done?' asks the president.

'I'd have known a half hour ago what I know now,' replies McGarry. 'This is exactly why I'm not going to my meeting anymore – it's a luxury.'

Bartlett circles McGarry, teasing him: 'I know. If only technology could invent some way to get in touch with you in an emergency! Some sort of telephonic device with a personalised number we could call to let you know that we needed you' – he reaches into Leo's pocket and pulls out his phone – 'Perhaps it would look something like this, Mr Moto!'

Except the episode didn't get that far. The image on the screen continued to change, but my laptop had crashed, and one sentence of the audio looped over and over: 'If only technology could invent some way to get in touch with you in an emergency! If only technology could invent some way to get in touch with you in an emergency! If only technology could invent some way to get in touch with you in an emergency!'

This is a book about what technology is trying to tell us in an

emergency. It is also a book about what we know, how we know, and what we cannot know.

Over the last century, technological acceleration has transformed our planet, our societies, and ourselves, but it has failed to transform our understanding of these things. The reasons for this are complex, and the answers are complex too, not least because we ourselves are utterly enmeshed in technological systems, which shape in turn how we act and how we think. We cannot stand outside them; we cannot think without them.

Our technologies are complicit in the greatest challenges we face today: an out-of-control economic system that immiserates many and continues to widen the gap between rich and poor; the collapse of political and societal consensus across the globe resulting in increasing nationalisms, social divisions, ethnic conflicts and shadow wars; and a warming climate, which existentially threatens us all.

Across the sciences and society, in politics and education, in warfare and commerce, new technologies do not merely augment our abilities, but actively shape and direct them, for better and for worse. It is increasingly necessary to be able to think new technologies in different ways, and to be critical of them, in order to meaningfully participate in that shaping and directing. If we do not understand how complex technologies function, how systems of technologies interconnect, and how systems of systems interact, then we are powerless within them, and their potential is more easily captured by selfish elites and inhuman corporations. Precisely because these technologies interact with one another in unexpected and often-strange ways, and because we are completely entangled with them, this understanding cannot be limited to the practicalities of how things work: it must be extended to how things came to be, and how they continue to function in the world in ways that are often invisible and interwoven. What is required is not understanding, but literacy.

True literacy in systems consists of much more than simple understanding, and might be understood and practised in multiple ways. It goes beyond a system's functional use to comprehend its context and consequences. It refuses to see the application of any one system as a cure-all, insisting upon the interrelationships of systems and the inherent limitations of any single solution. It is fluent not only in the language of a system, but in its metalanguage – the language it uses to talk about itself and to interact with other systems – and is sensitive to the limitations and the potential uses and abuses of that metalanguage. It is, crucially, capable of both performing and responding to critique.

One of the arguments often made in response to weak public understanding of technology is a call to increase technological education – in its simplest formulation, to learn to code. Such a call is made frequently by politicians, technologists, pundits and business leaders, and it is often advanced in nakedly functional and pro-market terms: the information economy needs more programmers, and young people need jobs in the future. This is a good start, but learning to code is not enough, just as learning to plumb a sink is not enough to understand the complex interactions between water tables, political geography, ageing infrastructure, and social policy that define, shape and produce actual life support systems in society. A simply functional understanding of systems is insufficient; one needs to be able to think about histories and consequences too. Where did these systems come from, who designed them and what for, and which of these intentions still lurk within them today?

The second danger of a purely functional understanding of technology is what I call computational thinking. Computational thinking is an extension of what others have called solutionism: the belief that any given problem can be solved by the application of computation. Whatever the practical or social problem we face, there is an app for it. But solutionism is insufficient too; this is one of the things that our technology is trying to tell us. Beyond this error, computational thinking supposes – often at an unconscious level – that the world really is like the solutionists propose. It internalises solutionism to the degree that it is impossible to think or articulate the world in terms that are not computable. Computational thinking is predominant in the world today, driving the worst trends in our societies and interactions, and must be opposed by a real systemic literacy. If philosophy is that fraction of human thought dealing with that which cannot be explained by the sciences, then systemic literacy is the thinking that deals with a world that is not computable, while acknowledging that it is irrevocably shaped and informed by computation.

The weakness of 'learning to code' alone might be argued in the opposite direction too: you should be able to understand technological systems without having to learn to code at all, just as one should not need to be a plumber to take a shit, nor to live without fear that your plumbing system might be trying to kill you. The possibility that your plumbing system is indeed trying to kill you should not be discounted either: complex computational systems provide much of the infrastructure of contemporary society, and if they are not safe for people to use, no amount of education in just how bad they are will save us in the long run.

In this book, we are going to do some plumbing, but we must bear in mind the needs of the non-plumbers at every stage: the need to understand, and the need to live even when we don't always understand. We often struggle to conceive of and describe the scope and scale of new technologies, meaning that we have trouble even thinking them. What is needed is not new technology, but new metaphors: a metalanguage for describing the world that complex systems have wrought. A new shorthand is required, one that simultaneously acknowledges and addresses the reality of a world in which people, politics, culture and technology are utterly enmeshed. We have always been connected – unequally, illogically, and some more than others – but entirely and inevitably. What changes in the network is that this connection is visible and undeniable. We are confronted at all times by the radical interconnectedness of things and our selves, and we must reckon with this realisation in new ways. It is insufficient to speak of the internet or amorphous technologies, alone and unaccountable, as causing or accelerating the chasm in our understanding and agency. For want of a better term, I use the word 'network' to include us and our technologies in one vast system – to include human and nonhuman agency and understanding, knowing and unknowing, within the same agential soup. The chasm is not between us and our technologies, but within the network itself, and it is through the network that we come to know it.

Finally, systemic literacy permits, performs, and responds to critique. The systems we will be discussing are too critical to be thought, understood, designed and enacted by the few, especially when those few all too easily align themselves with, or are subsumed by, older elites and power structures. There is a concrete and causal relationship between the complexity of the systems we encounter every day; the opacity with which most of those systems are constructed or described; and fundamental, global issues of inequality, violence, populism and fundamentalism. All too often, new technologies are presented as inherently emancipatory. But this is itself an example of computational thinking, of which we are all guilty. Those of us who have been early adopters and cheerleaders of new technologies, who have experienced their manifold pleasures and benefited from their opportunities, and who have consequently argued, often naively, for their wider implementation, are in no less danger from their uncritical deployment. But the argument for critique cannot be made from individual threats, nor from identification with the less fortunate or less knowledgeable. Individualism and empathy are both insufficient in the network. Survival and solidarity must be possible without understanding.

We don't and cannot understand everything, but we are capable of thinking it. The ability to think without claiming, or even seeking, to fully understand is key to survival in a new dark age because, as we shall see, it is often impossible to understand. Technology is and can be a guide and helpmate in this thinking, providing we do not privilege its output: computers are not here to give us answers, but are tools for asking questions. As we will see recur throughout this book, understanding a technology deeply and systemically often allows us to remake its metaphors in the service of other ways of thinking.

Beginning in the 1950s, a new symbol began to creep into the diagrams drawn by electrical engineers to describe the systems that they built. The symbol was a fuzzy circle, or a puffball, or a thought bubble. Eventually, its form settled into the shape of a cloud. Whatever the engineer was working on, it could connect to this cloud, and that's all you needed to know. The other cloud could be a power system, or a data exchange, or another network of computers, or whatever. It didn't matter. The cloud was a way of reducing complexity: it allowed one to focus on the near at hand, and not worry about what was happening over there. Over time, as networks grew larger and more interconnected, the cloud became more and more important. Smaller systems were defined by their relation to the cloud, by how fast they could exchange information with it, by what they could draw down from it. The cloud was becoming weightier, becoming a resource: the cloud could do this, it could do that. The cloud could be powerful and intelligent. It became a business buzzword and a selling point. It became more than engineering shorthand; it became a metaphor.

Today the cloud is the central metaphor of the internet: a global system of great power and energy that nevertheless retains the aura of something noumenal and numinous, something almost impossible to grasp. We connect to the cloud; we work in it; we store and retrieve stuff from it; we think through it. We pay for it and only notice it when it breaks. It is something we experience all the time without really understanding what it is or how it works. It is something we are training ourselves to rely upon with only the haziest of notions about what is being entrusted, and what it is being entrusted to.

Downtime aside, the first criticism of this cloud is that it is a very bad metaphor. The cloud is not weightless; it is not amorphous, or even invisible, if you know where to look for it. The cloud is not some magical faraway place, made of water vapour and radio waves, where everything just works. It is a physical infrastructure consisting of phone lines, fibre

optics, satellites, cables on the ocean floor, and vast warehouses filled with computers, which consume huge amounts of water and energy and reside within national and legal jurisdictions. The cloud is a new kind of industry, and a hungry one. The cloud doesn't just have a shadow; it has a footprint. Absorbed into the cloud are many of the previously weighty edifices of the civic sphere: the places where we shop, bank, socialise, borrow books, and vote. Thus obscured, they are rendered less visible and less amenable to critique, investigation, preservation and regulation.

Another criticism is that this lack of understanding is deliberate. There are good reasons, from national security to corporate secrecy to many kinds of malfeasance, for obscuring what's inside the cloud. What evaporates is agency and ownership: most of your emails, photos, status updates, business documents, library and voting data, health records, credit ratings, likes, memories, experiences, personal preferences and unspoken desires are in the cloud, on somebody else's infrastructure. There's a reason Google and Facebook like to build data centres in Ireland (low taxes) and Scandinavia (cheap energy and cooling). There's a reason global, supposedly post-colonial empires hold onto bits of disputed territory like Diego Garcia and Cyprus, and it's because the cloud touches down in these places, and their ambiguous status can be exploited. The cloud shapes itself to geographies of power and influence, and it serves to reinforce them. The cloud is a power relationship, and most people are not on top of it.

These are valid criticisms, and one way of interrogating the cloud is to look where its shadow falls: to investigate the sites of data centres and undersea cables and see what they tell us about the real disposition of power at work today. We can seed the cloud, condense it, and force it to give up some of its stories. As it fades, certain secrets may be revealed. By understanding the way the figure of the cloud is used to obscure the real operation of technology, we can start to understand the many ways in which technology itself hides its own agency – through opaque machines and inscrutable code, as well as physical distance and legal constructs. And in turn, we may learn something about the operation of power itself, which was doing this sort of thing long before it had clouds and black boxes in which to hide itself.

But beyond this once-again functional vision of the cloud, beyond its re-earthing, can we turn the figure of the cloud over once more in order to produce a new metaphor? Can the cloud absorb not only our failure to understand, but our understanding of that lack of understanding? Can we supplant base computational thinking with cloudy thinking, which

acknowledges an unknowing and makes of it productive rain? In the fourteenth century, an unknown author of Christian mysticism wrote of 'The Cloud of Unknowing' that hangs between mankind and the Godhead: the embodiment of goodness, justice, and right action. This cloud cannot be pierced by thought, but by the letting-go of thought, and through the insistence upon the here and now – not the predicted, computed future – as the domain of agency. 'Go after experience rather than knowledge,' the author urges us. 'On account of pride, knowledge may often deceive you, but this gentle, loving affection will not deceive you. Knowledge tends to breed conceit, but love builds. Knowledge is full of labor, but love, full of rest.'[1] It is this cloud that we have sought to conquer with computation, but that is continually undone by the reality of what we are attempting. Cloudy thinking, the embrace of unknowing, might allow us to revert from computational thinking, and it is what the network itself urges upon us.

The greatest signifying quality of the network is its lack of single, solid intent. Nobody set out to create the network, or its greatest built exemplar, the internet. Over time, system upon system, culture upon culture, were linked together, through public programmes and private investments; through personal relationships and technological protocols; in steel, glass and electrons; through physical space; and in the space of the mind. In turn, the network gave expression to the basest and highest ideals, contained and exulted the most mundane and the most radical desires, almost none of it foreseen by its progenitors – who are all of us. There was and is no problem to solve, only collective enterprise: the emergent, unconscious generation of a tool for unconscious generation. Thinking the network reveals the inadequacy of computational thinking and the interconnectedness of all things, as well as their endlessness; it insists upon the constant need to rethink and reflect upon its weights and balances, its collective intent and failings, its roles, responsibilities, prejudices and possibilities. This is what the network teaches: nothing short of everything will really do.[2]

Our great failing in thinking the network up to now was to presume that its actions were inherent and inevitable. By inherent, I mean the notion that they emerged, ex nihilo, from the things we created rather than involving our own actions as part of that co-creation. By inevitable, I mean a belief in a direct line of technological and historical progress that we are powerless to resist. Such a belief has been repeatedly attacked by thinkers in the social sciences and philosophy for decades, yet it has not been defeated. Rather, it has been reified into technology itself: into machines that are supposed to carry out their own embedded desires. Thus we have

abdicated our objections to linear progress, falling into the chasm of computational thinking.

The greatest carrier wave of progress for the last few centuries has been the central idea of the Enlightenment itself: that more knowledge – more *information* – leads to better decisions. For which one can, of course, substitute any concept of 'better' that one chooses. Despite the assaults of modernity and postmodernity, this core tenet has come to define not merely what is implemented, but what is even considered possible from new technologies. The internet, in its youth, was often referred to as an 'information superhighway', a conduit of knowledge that, in the flickering light of fibre-optic cables, enlightens the world. Any fact, any quantum of information, is available at the tap of a keyboard – or so we have led ourselves to believe.

And so we find ourselves today connected to vast repositories of knowledge, and yet we have not learned to think. In fact, the opposite is true: that which was intended to enlighten the world in practice darkens it. The abundance of information and the plurality of worldviews now accessible to us through the internet are not producing a coherent consensus reality, but one riven by fundamentalist insistence on simplistic narratives, conspiracy theories, and post-factual politics. It is on this contradiction that the idea of a new dark age turns: an age in which the value we have placed upon knowledge is destroyed by the abundance of that profitable commodity, and in which we look about ourselves in search of new ways to understand the world. In 1926, H. P. Lovecraft wrote,

The most merciful thing in the world, I think, is the inability of the human mind to correlate all its contents. We live on a placid island of ignorance in the midst of black seas of infinity, and it was not meant that we should voyage far. The sciences, each straining in its own direction, have hitherto harmed us little; but some day the piecing together of dissociated knowledge will open up such terrifying vistas of reality, and of our frightful position therein, that we shall either go mad from the revelation or flee from the deadly light into the peace and safety of a new dark age.[3]

How we understand and think our place in the world, and our relation to one another and to machines, will ultimately decide if madness or peace is where our technologies will take us. The darkness I write of is not a literal darkness, nor does it represent an absence or occlusion of knowledge, as the popular idea of a dark age holds. It is not an expression of nihilism or hopelessness. Rather, it refers to both the nature and the opportunity of the present crisis: an apparent inability to see clearly what is in front of us, and to act meaningfully, with agency and justice, in the world – and, through acknowledging this darkness, to seek new ways of seeing by another light.

In her private journal of January 18, 1915, in the bleakest hours of the First World War, Virginia Woolf observed that 'the future is dark, which is the best thing the future can be, I think.' As Rebecca Solnit has written, 'It's an extraordinary declaration, asserting that the unknown need not be turned into the known through false divination, or the projection of grim political or ideological narratives; it's a celebration of darkness, willing – as that "*I think*" indicates – to be uncertain even about its own assertion.'[4]

Donna Haraway elaborates further on this thinking,[5] noting that Woolf insisted upon it again in *Three Guineas*, published in 1938:

Think we must. Let us think in offices; in omnibuses; while we are standing in the crowd watching Coronations and Lord Mayor's Shows; let us think as we pass the Cenotaph; and in Whitehall; in the gallery of the House of Commons; in the Law Courts; let us think at baptisms and marriages and funerals. Let us never cease from thinking – what is this 'civilisation' in which we find ourselves? What are these ceremonies and why should we take part in them? What are these professions and why should we make money out of them? Where in short is it leading us, the procession of the sons of educated men?[6]

The class and social conflicts, the historical hierarchies and injustices, that Woolf alludes to in her processions and ceremonies have in no measure abated today, but some of the places to think them may have changed. The crowds that in 1938 lined London's Lord Mayor's and coronation parades are now distributed through the network, and the galleries and places of worship have likewise migrated into data centres and undersea cables. We cannot unthink the network; we can only think through and within it. And we can listen to it, when it tries to speak to us in an emergency.

Nothing here is an argument against technology: to do so would be to argue against ourselves. Rather, it is an argument for a more thoughtful engagement with technology, coupled with a radically different understanding of what it is possible to think and know about the world. Computational systems, as tools, emphasise one of the most powerful aspects of humanity: our ability to act effectively in the world and shape it to our desires. But uncovering and articulating those desires, and ensuring that they do not degrade, overrule, efface, or erase the desires of others, remains our prerogative.

Technology is not mere tool making and tool use: it is the making of metaphors. In making a tool, we instantiate a certain understanding of the world that, thus reified, is capable of achieving certain effects in that world. It thus becomes another moving part of our understanding of the world – if, often, unconsciously. Thus we might say it is a hidden metaphor: a kind of transport or transference is achieved, but at the same

time a kind of disassociation, an offloading of a particular thought or way of thinking into a tool, where it no longer needs thinking to activate. To think again or anew, we need to re-enchant our tools. The present account is merely the first part of such a re-enchantment, an attempt to rethink our tools – not a repurposing or a redefinition, necessarily, but a thoughtfulness of them.

When one has a hammer, goes the saying, everything looks like a nail. But this is to not think the hammer. The hammer, properly conceived, has many uses. It may pull nails as well as drive them; it may forge iron, shape wood and stone, reveal fossils, and fix anchors for climbing ropes. It may pass sentence, call to order, or be thrown in a contest of athletic strength. Wielded by a god, it generates the weather. Thor's hammer, Mjölnir, which created thunder and lightning when it was struck, also gave birth to hammer-shaped amulets intended to provide protection against the god's wrath – or, through their resemblance to crosses, against enforced conversion. Prehistoric hammers and axes, turned up by the ploughs of later generations, were called 'thunderstones' and were believed to have fallen from the sky during storms. These mysterious tools thus became magical objects: when their original purposes passed away, they were capable of taking on new symbolic meaning. We must re-enchant our hammers – all our tools – so they are less like the carpenter's, and more like Thor's. More like thunderstones.

Technology is also not made entirely – ex nihilo – by humans. It depends, as does our own living (bacteria, food crops, building materials, clothes and companion species), on the affordances of nonhuman things. The infrastructure of high-frequency trading (which we will explore in chapter 5), and the economic system it accelerates and characterises, is an accommodation with silicon and steel, with the speed of light through glass, with fog, and birds, and squirrels. Technology can be an excellent lesson in the agency of nonhuman actors, from rocks to bugs, whenever they obstruct or permit, chew through or short out, our lines of communication and power.

This relationship, properly understood, is also a realisation of technology's inherent instability: its temporal and temporary alignment or resonance with certain other uncertain properties of materials and animals that are subject to change. In short, of its cloudiness. The examination, in chapter 3, of the changing affordances of materials for computation in response to environmental stress is an example of this: things do things differently in time. Technology comes with an aura of fixedness: once immurred in things, ideas seem settled and unassailable. Hammers,

properly employed, can crack them open once again. By re-enchanting a few tools, we might see the myriad ways in which this realisation is immanent within multiple modes of contemporary, everyday life. Along the way, what may be presented as 'revelations' about the 'truth' of the world should always be held at arm's length, as mere (or not mere; abject) rethinkings of that world. Indeed, arm's length should be the resonant, representative gesture of the work, as holding something at arm's length has the effect, from another perspective, of pointing at something else in the distance, something beyond the immediate realisation, and promising more.

The argument set out in this book is that, like climate change, the effects of technology are widespread across the globe and are already affecting every area of our lives. These effects are potentially catastrophic, and result from an inability to comprehend the turbulent and networked outputs of our own inventions. As such, they upset what we have naively come to expect as the natural order of things, and they require a radical rethinking of the ways in which we think the world. But the other thrust of this book is that all is not lost: if we really are capable of thinking in new ways, then we are also capable of rethinking the world, and thus understanding and living differently within it. And just as our current understanding of the world proceeds from our scientific discoveries, so our rethinking of it must emerge from and alongside our technological inventions, which are very real manifestations of the contested, complex, and contradictory state of the world itself. Our technologies are extensions of ourselves, codified in machines and infrastructures, in frameworks of knowledge and action; truly thought, they offer a model of a truer world.

We have been conditioned to think of the darkness as a place of danger, even of death. But the darkness can also be a place of freedom and possibility, a place of equality. For many, what is discussed here will be obvious, because they have always lived in this darkness that seems so threatening to the privileged. We have much to learn about unknowing. Uncertainty can be productive, even sublime.

The final and most crucial chasm is the one that opens up between us as individuals when we fail to acknowledge and articulate present conditions. Make no mistake, there are aspects of the new dark age that are real and immediate existential threats, most obviously the planet's warming climate and its crashing ecosystems. There are also the ongoing effects of collapsing consensus, failing sciences, truncated prediction horizons, and public and private paranoia – all of which bespeak discord and violence. Disparities in income and in understanding are both deadly

in the not-so-long term. All of these are connected: all of them are failures to think and speak.

Writing about the new dark age, even if I can leaven it with networked hope, is not pleasant. It requires saying things that we would rather leave unsaid, thinking things that we would rather keep unthought. Doing so often leaves one with a hollow feeling in the gut, a kind of despair. And yet to fail to do so will be to fail to acknowledge the world as it is, to continue to live in fantasy and abstraction. I think of my friends, and the things we say to one another when we are being honest, and, at some level, how frightened it makes us feel. There is a kind of shame in speaking about the exigencies of the present, and a deep vulnerability, but it must not stop us thinking. We cannot fail each other now.