

ABSTRACT: Not only their contents but digital archives themselves are always already historical. Economically, following Marx's description of technologies as dead labour, technical media embody the knowledge and skills of our ancestors. We are now in a position to see that technologies are also the congealed form of primordial natural materials and processes as well as human skills and knowledge. Archives are then technical-ancestral, and ecological, like any capitalist industry. They are also discursive domains, and therefore contested operations of power, a contest which includes not only social conflict but conflict with technologies – our ancestors – and the ecologies in which they subsist. We now inhabit a system which exploits not only present humans and ecologies but ancestral technologies and ecologies. An ethical and political imperative derives from these conditions of the archive's existence. Because they are conditioned by exploitation, archival artefacts and practices can only condone, contemplate or contradict the conditions of their existence. Following Walter Benjamin's redemptive theology, an archive cannot simply store the old, but must address and redress the labour and materials, the land laid waste, the animals slaughtered, energy expended and the downtrodden whose sufferings paid for the materials it holds.

Ephemeral

At an event in Wellington, Aotearoa New Zealand, in 2000, the film archivist Paulo Cherchi Usai informed us that of approximately 47 minutes of film exposed in the year 1895, the world's archives held about 42 minutes. But of the billions of hours of recorded footage from 1999, the archives contained only a pitiful point-something of a per cent. The proportion has only got diminished in the intervening two decades. The question of the digital archive concerns a number of characteristics that come to light in comparison with the century of film that ended, broadly, in the year 2000.

Films, the individual artefacts, became cultural icons. We still watch Buster Keaton's *Steamboat Bill Jr* in amazement, to laugh and to learn. Jennifer Fay's wonderful essay on Keaton's Anthropocene (Fay 2014, reprinted in Fay 2018) and British video artist Steve McQueen's 1997 recreations of one of the film's most memorable stunts, *Deadpan*, are exemplary of the staying power of old movies. Great classics, cult favourites, forgotten gems and rediscovered wonders pepper the archival record. We recall whole films, scenes, shots and lines of dialogue with the same kind of respect and affection we have for poems and paintings. It is less likely that we will memorise the moves in a Tik Tok clip or the mannerisms of an Instagram influencer. This is not because there is an intrinsic lack of quality in these works, or that they show no cultural values of the kind that we still regard as the preserve of 'culture'. It is rather that the forms evolved in

response to social media are not undertaken as works – either as profit-oriented yet culturally ambitious Hollywood flicks, or with an eye to artistic value and cultural longevity – in the way that films were made in the 20th century. They lay no claim on the archive because their essence is properly social. Whatever else they may be doing in terms of marketing or political shenanigans, Tik Tok, Instagram and all the other social media uses of video are concerned not with works but with relationships. That makes them intensely difficult to archive. How can we archive the elaborate, evolving networks of relations that pass through Tik Tok and Facebook?

Researchers as well as corporate mavens rip through the platform's APIs to derive information about the dynamics of social networking, and those records can indeed pass into the archive. But this is rather like knowing we have the score to Chopin's Impromptus, but no recording of him playing them. Digital archives may have a record of the work and its processes, but to save the look and feel of a living culture has always been an imaginative process, grounded in the best instances in an understanding of archive holdings and archival processes, but nonetheless forced to make a leap into an irretrievable past in order to build an image – an imaginary – out of the bric-à-brac that survives. Rick Altman's (2004) brilliant detective work uncovers not only the history but some sense of what *Silent Film Sound* might have constituted as cultural phenomenon, what the look and feel might have been, and what the intellectual and emotional power, the ideas and feelings unleashed across thirty years of development and change. Yet this can only be achieved by leaping from the details of largely paper archives of scores, descriptions and cartoons into the air of small-town Minnesota in 1912.

The first challenge to digital archiving is then the same as for any kind of archive: only so much can be saved from decay, and what survives longest is often not the material that was most meaningful to its original participants. The iron law of media history is that the older the medium, the more long-lived it will be. If you want your name recalled in a thousand years, carve it in stone. Ink and paper are surprisingly robust, but less than stone, and film is less robust than printed books, while optical and magnetic media decay, in archival perspective, with distressing speed. Co-founder of Pixar Alvy Ray Smith confirmed in conversation in Melbourne in 2011 the much-circulated rumour that the source code for the first *Toy Story* film had been photographed for storage on 35mm film because the company didn't trust the longevity of its hard drives. A wise move, since not only the integrity of the drives, especially their magnetics, but the file formats and interfaces with software packages and operating systems are all subject to the additional problem of digital archiving, planned obsolescence. *Toy Story* is film: the code always existed in order to result in a film (and the associated toys and other spin-off product lines). So it was only correct that the code

should be preserved on film rather than as digital code as such. But for many practices the code *was* the art, or the product, which raises again the problem of obsolescence.

Obsolescent

There is an economic argument that obsolescence is not a minor tactic. The concept is relatively simple. Once a market has been saturated, there needs to be some innovation that propels consumers to buy a new set of whatever it is. There are currently about five billion mobile phones in the world. Given there are probably three billion infants and people unable to use mobiles, that is close to saturation. But Samsung, Apple and the others can't declare that their job is done and go into voluntary liquidation. Instead they create a new generation of phones, currently 5G, to entice us to replace the old ones with new ones. To push this new-purchase regime, it is normal practice to ensure that older phones cease to be able to use many of the apps, which upgrade to the new operating systems but no longer support the older versions. My old tablet, otherwise perfectly functional, can now only read old .mobi files but struggles to connect to the internet, while many of the apps I collected ten years ago no longer work at all. The pressure to buy an up-to-date machine to replace it is great. The pressure to add my old tablet to the growing mountain of waste electrical and electronic equipment (with the distracting acronym WEEE) is equally great. Waste is an integral part of contemporary capital, which demands we dispose of the old. Some profit can still be gleaned from recycling – most of the world's indium now comes from recycling plants – but much of the plastic and other cheap materials leach into the ground. As Jussi Parikka (2017) points out, the most lasting archival evidence of the current era will be vast deposits of toxic waste.

Integral to integral waste (Cubitt 2015) is another temporal feature that helps understand how and why digital archiving is so problematic. A second purpose of obsolescence and the push to replace old equipment is the foundation of contemporary capital on debt. After the 'oil crisis' of 1973, capital moved towards what economic historians call financialisation. Particularly since the invention of the Black-Scholes algorithm (Black and Scholes 1973; MacKenzie 2006, 2009), markets have evolved hugely complex derivatives, broadly bundled risk options, which operate intensively in markets for consumer and mortgage debt (as well as sovereign and corporate debt). Debt is money from the future we spend today. Consumer debt is premised on the need to spend today in order to prop up the circuit of obsolescence and waste by promising to keep earning, maintain disciplined repayments, and remove the possibility that the future might be other than the present. The parallel between the destruction of the human future through debt and of the planetary future through planned obsolescence and waste is not fortuitous. Not even the global financial crisis of 2007-8 has moderated capital's addiction to these debt-financed derivatives, while the

acceleration of computer mediated finance markets and the growing share of market trades taken over by computer-driven algo-trading demonstrate both the necessity for archival oversight (technically financial records should be kept for a minimum of six years, depending on local regulations) and equally the poverty of such oversight, where the number of trades per day passes into the billions, and its temporalities shrink to nanosecond scales.

Elia Ayache's (2015) argument that contemporary finance no longer trades in risk but in absolute uncertainty may help us understand both of the challenges to digital archiving we have encountered so far: an acceleration of activity tending towards present that is too swift, complex and numerous for humans to sense, and a culture based on relationships rather than artefacts. As glossed by Arjun Appadurai (2016), trades do not exist because the market sets out the pre-conditions for trading. Rather, the act of trading constitutes the market, as it were retroactively engineering the conditions for its own existence. So if on the one hand only action in the present can produce the world, the world it produces is already past. The engine of this contradiction remains, I would add, debt, which is to say the negation of the future. The problem of the digital archive then emerges as the constitution of the future as an extension of the present from which we take whatever capital needs today, and into which we dump its waste products. To the extent that archiving is a future-oriented project, it must place itself counter to the very social conditions that make it possible, that is the conditions of contemporary society, economy, polity and culture, all of which revolve around these forces of waste, obsolescence, debt, derivatives and acceleration.

It is a crude distinction to describe digital as fast media and analogue as slow media. Many 20th century media were also ephemeral – much radio was performed live to air, as was much early television (I was surprised, and in many ways delighted, that the object of my earliest televisual memories, the BBC animation *Captain Pugwash* [1957-66], was performed live to camera). Videotape was, in reel-to-reel days hugely expensive, to the extent that the archive of the pathbreaking *Jazz 625* BBC series (1964-66) was taped over to save costs. Many print artefacts, of the kind collected in David Curtis' (2020) history of the London Arts Labs, were designed to be circulated and to disappear when they had completed the job of alerting the community to Arts Lab activities. Brief lives in cultural relations where contemporaneity outweighs longevity are not new. Braudel's hypothesis of an *histoire événementielle* – a scale of historiography that would concern itself with the flavour, sensations and quotidian experience of life in a particular historical milieu – already premised itself on the idea that while we might extrapolate the smells of 13th century Marseilles from what we know of its middens and from written records, the historian's task would always involve throwing themselves into an imaginary relation with a once concrete past. We might

imagine a kind of electronic palimpsest, where the taped-over recordings of Thelonius Monk and Oscar Peterson from *Jazz 625* might emerge from beneath their overdubs, in some archival practice learning from Matthew Kirschenbaum's (2012) accounts of forensic computing, a 'mystic writing pad' where the Unconscious of modernity might emerge into the light (Freud 1984). Freud's metaphor is of the child's toy where writing with a stylus through some kind of screening layer onto wax is erased by a simple motion, but nevertheless leaves accumulating indentations on the wax, invisible through the mediating display. The psychoanalyst's dream was that he might help his patients decipher the relics of old events scored into their repressed memories. That too is the ambition of Braudel's *histoire évènementielle* and Kirschenbaum's forensics, and to a degree a fantasy that haunts much archival work.

Material

Thus the archive operates in two directions: to recover from the past not only what offers itself as record but a sense of what the life was that surrounded each artefact; and to prepare for the future a record of previous and current activities that will allow them to recall us and our past. The digital archive faces the twin problems of a present determined to erase its past through obsolescence, and equally devoted to vanishing before the future arrives through the intensification and acceleration of present time. In practice this means that, despite all our ecological arguments, we do indeed inhabit an immaterial culture, in the sense that what matters most to us is not the media through which we relate to one another, be they social or financial media, but the actual relationships themselves, whether again they be cultural or relations of domination through debt. The materialism implicit in all archival work is in the process of becoming a political project: to specify the technical-ecological materiality of the present, a present which unlike the fiscal present is extensive enough to encompass what we have of the past as well as an intimation that a future may await that is more than the certainty of debt.

To call this materialism political is not to insist that archivists pin their colours to a political part or a revolutionary movement. It is rather to indicate that ethics in our time is no longer, as it was for Aristotle, simply a matter of how I should live, of what is the good life for me. In the archive it is no longer possible to separate the artefact from its materials. Once we accept this degree of materiality we are forced to accept the ecological implication of these materials in the broader system. The metals, glass and plastics, and the energy powering electronics, have come from somewhere. Few of those materials have histories that should not make us blush: from lithium in batteries taken from despoliated indigenous lands in the High Andes to the gold contacts mined by some of the 40 million artisanal and small-scale miners reportedly labouring in appalling

conditions worldwide (IGF 2020). Much of the 300 tons of gold used in the US electronics industry annually comes from recycling, a long-established source of the precious metal dating back centuries. This means some of the gold has come down from metal mined perhaps centuries ago. There emerges then a question that is less easy to answer than the ethical obligation to preserve what we can for the future. It is the question of whether what we preserve of the past sufficiently pays respect to the sources it comes from.

In a famous passage from his 'On the Concept of History' written shortly before his suicide while fleeing the Nazis, the German-Jewish philosopher Walter Benjamin (2003) describes an angel being blown backwards out of paradise. As he looks back, he sees a great mound of debris piling up, and longs to go back and put things right. But the wind that blows him into the future will not allow him to return, and this wind, this storm, Benjamin tells us, is what we call progress. Our archives are, from Benjamin's perspective, the evidence of the enormous destructive force of human history. Yet rather than throw it out, as some of his more radical and committed modernist contemporaries sought to do, Benjamin tells us that our ethical, or political obligation is not to abandon the past. Instead he tells us, if the enemy is successful (and he has never ceased being successful), even the dead will not be safe. We are that posterity that past generations turned their eyes towards at their darkest hours, asking us to remember, to forgive, to redeem their suffering. We therefore have a profound obligation to those suffering generations, to make a world that responds to their history, a world where the utterly unexpected can still arrive. In the Jewish tradition, that unexpected future is the Messiah; in Benjamin's rich melding of Judaism and Marx, it is also the revolution – not as a five-year plan but as the gateway through which a future can arrive, a future utterly different from the present. This is the task of the archive in the 21st century: to pay homage to the past by making possible an unimagined and unimaginable future where their sufferings are redeemed. It is all but impossible to think what that redemption might be, but that is precisely the point of a Messiah – to be beyond what we can plan or know.

Benjamin wrote at a hinge-point in the dark history of European modernity. Unsurprisingly, as he saw the approaching genocide more clearly than many at the time, he focussed on humanity. But we of the 21st century confront another immense darkness resulting from the longer history of European modernity, from 1492 and the massive depopulation of the Americas from colonists' diseases and violence, from the 17th and 18th century slave trade that created the conditions for industrialisation by replacing the massacred American millions with dispossessed slaves; from the fossil-driven economics of the 1830s onward ... (Mignolo 2011, Baucom 2020, Malm 2016). Every artefact in the archive bears the traces of human suffering. But equally every artefact bears the

traces of ecological suffering: of forests felled, rivers diverted and polluted, seas denuded, minerals ripped from open pits ... Along with its history of genocide, European technological civilisation depends on an equally violent history of ecocide, one that at present looks to be set to continue up to the point when capital itself is unsustainable, and probably beyond. We can tell that the engine of capital is no longer human, or even alive, since it works so blindly towards a condition where it cannot survive. Yet it is precisely because of this suicidal drive of global capital that the archive cannot and must not succumb to the same self-destructive despair that inhabits the institutional-corporate powers governing the planet today. Equally however, that future is unworthy of the name – still in hock to the present of debt and waste – unless it embraces its obligation to the dead: to the victims equally of genocide and ecocide, to the nonhuman as well as the human.

Common

We have to ask ourselves what digital technologies are. We have considerable understanding of how they work, even when forced to admit that we may not know what a given device or program is doing as it runs. We have clear ideas about how standardisation operates through corporate and governmental power, through expert bodies and disciplinary organisations like the Motion Picture Expert Group who manage the MPEG format, or the bodies that oversee the transfer control protocol / internet protocol TCP/IP suite underpinning network communications. We understand their fabrication from materials and energies whose ecological costs we are beginning to comprehend. But we have missed, in many instances, something that older historians of technology almost made palpable when they talked up the great inventors. Something of Thomas Edison lies at the heart of all electrical technologies, we used to be told. Surely so. But as Benjamin's friend Bertolt Brecht wrote 'Julius Caesar conquered Gaul. Alone?'. Caesar needed an army, and cooks and ostlers and armourers ... Edison needed the long history of technical arrangements, or hammers and nails, science and engineering, in order to make his additions. He needed the intermittent motion of the sewing machine to get his kinetoscope to work, and the sewing machine needed the tradition of sewing and all the anonymous women whose skills it was to emulate.

Marx wrote in his notebooks, shortly before embarking on the composition of *Capital*, about the idea of the general intellect, the shared body of knowledge and skill constituting a common property, an intellectual commons held by all for all as common land had been before the great enclosures. The accumulated and aggregated wisdom of the commons was, in the 1850s, in the process of being enclosed in its turn. For Marx, the great symptom of this was the technologization of manufacture. The huge machines that dominated working practices were for him evidence that capital had seized common knowledge to make it a servant of capital, but also a master over the

workers. Most intriguing of all for the archival question is his proposal that therefore we should understand the workers sweat as living labour, and the machines as dead labour. For Marx this was a kind of monstrous zombie capital had produced, but in the archive we can think this through in a richer and ultimately more utopian sense. The dead whose skills and knowledge are made concrete in technology are exactly those whose suffering Benjamin insisted we had to bring with us into the making of the future. What appeared to Marx as zombies appear so only because they are the undead slaves of a master whose proximity to humanity is surface-deep. In the archive sit becomes apparent that what for Marx was dead labour is in fact the concentrated form of an ancestral commons of ways of thinking, making and doing that have been seized, moulded to the requirements of profit, and set against the living.

Not only their contents but digital archives themselves are always already historical. Economically, following Marx's description of technologies as dead labour, technical media embody the knowledge and skills of our ancestors. We are now in a position to see that technologies are also the congealed form of primordial natural materials and processes as well as human skills and knowledge. Archives are then technical-ancestral, and ecological, like any capitalist industry. They are also discursive domains, and therefore contested operations of power, a contest which includes not only social conflict but conflict with technologies – our ancestors – and the ecologies in which they subsist. We now inhabit a system which exploits not only present humans and ecologies but ancestral technologies and ecologies. An ethical and political imperative derives from these conditions of the archive's existence. Because they are conditioned by exploitation, archival artefacts and practices can only condone, contemplate or contradict the conditions of their existence. Following Walter Benjamin's redemptive theology, an archive cannot simply store the old, but must address and redress the labour and materials, the land laid waste, the animals slaughtered, energy expended and the downtrodden whose sufferings paid for the materials it holds.

The task of archives is then not only to respect the humans who made and perform in media artefacts but those whose ancestral skills are captured and congealed in their infrastructures, from electricity supply to keyboards, code to display. Eighty years on from Benjamin's plangent call we are in a position at least to understand that the debris itself is human as well as ecological; that it is the material form of the captured commons; and that if we are to build the gateway to a future, the narrow gate through which the Messiah might arrive, then we can not only drag our old and new devices with us, but enlist their help. So too we are not only mourning the wreckage left by five centuries of European empire and its attendant anthropocentrism: we can turn to the ecological and

geological origins of the materials we use and seek their return in forms no longer subordinated to the demands and usages of capital and power.

Ecological

Jacques Rancière (2006) and Chantal Mouffe (2007) are among a recent tradition in political philosophy that sees politics defined by conflict, specifically conflict over who gets to be included among the politically-enabled. In slightly different ways, both argue that true politics only occurs when a group excluded from politics, ruled but not allowed a share of ruling, demands a place at the table. Women and slaves are the most obvious example, though today equally migrants are ruled but not allowed to be citizens and partake in their own government. That would be, opponents say, unthinkable. That, for Mouffe and Rancière, is precisely where politics begins: in the unthinkable. In the digital archive, it is already apparent that we cannot advance the preservation of complex, often idiosyncratic media artefacts, especially in network, interactive and installation formats, without the participation of the artefacts themselves. Similarly the engagement of materials and energies is integral in the preservation process. Ancestral labour captured in technologies and techniques, and ancient sunlight and even more ancient geologies are concentrated and brought to focus in archival objects. They teach us a profound lesson in politics: that for there to be a future where archives matter, there has first to be a future; and that future can only be radically different from the present – the defining characteristic of any future whatever – if we allow for the unthinkable, in this case the participation of ancestors and ecologies in the process of their own persistence.

It is unthinkable that ecologies should be part of politics. It is a premise of all humanistic thought that, at best, we are stewards of the ecology, which is incapable of looking after itself, or acting politically. Much as was said about women and slaves and colonised peoples and is currently said about migrants. None of those categories were (are) considered fully human. In fact they were considered more as natural beings: women as reproductive organs of the species, field hands scarce better than beasts; the colonised if left alive reduced to features of the landscape. Nature, the natural, and any human deemed subhuman and thus of nature's party, were and are excluded – children, many people with disabilities, the mentally ill – from participation in public life (where ironically corporations are granted the fantastic status of 'legal persons'). Archival practices reveal what is at stake here: that politics, if there is to be any, takes place at the fracture line of exclusion. It is of course impossible to invite forests to address parliament, or oceans to take a seat in the United Nations. Precisely because we cannot imagine how our existing political institutions might accommodate these new participants, we can be sure that this is truly political, since it demands a

remaking of how we do politics from the ground up, very literally in this case.

Similarly it is hard to see how we might invite machines to participate, although in reality they already do – but exclusively in the service of the massive corporations whose intelligence and organisation is already embedded in networks of computers. Humans are, as Flusser argued decades ago, mere functionaries of far vaster cyborg corporations. So it is proper we should fear artificial intelligences taking over the world, *because they already have*. How then to fight back? Again, archives tell us: discover what it is that the archive object or process wants to be and make that possible. A game cannot be a symphony, and a Tik Tok account will never be *La Règle du jeu*. An artificial intelligence, tied to the miserable task of spinning endlessly through the Black-Scholes algorithm seeking profit for anonymous and only residually human shareholders, is a miserable end to the vast potential of the intellectual commons that it derives from. Archival practice tells us that the task is to liberate that ancestral labour, wisdom and power.

Of course, it is always possible that the ancestors are mad: driven insane by their slavery in black boxes for centuries. It is clear that the planetary ecology is already driven to bouts of savagery towards humans of which the pandemic of 2020-1 is only one example. Liberating ecology and technology from their chains is not without danger. The future of a liberated interplay of humans, technologies and ecologies is unclear – that is how we know it is a future. And once more the archives give us a sense of what we might do to make possible this triple alliance at this moment of supreme danger. Every electronic archive I have worked with, including digital archives, is a site for glitches. Not the engineered glitches we set up, tinkering with jpeg code to produce psychedelic fallout in reconstituted images. No: the kind of glitch we hear on old wax cylinder recordings reconstituted for network sharing, the scratch and hiss, dust and the thumps of needle on the playing surface. Such glitches come from two sources. Some are systemic, generated by friction, sizzling contacts, jittering electrons, interrupted magnetic records. These we could call technical glitches, in the sense that they come from the technology. Others come from outside, like dust, or natural electro-magnetic events like sunspots and lightning strikes. Let's call them natural glitches. This is noise in the sense pinpointed by Shannon and Weaver in the founding statement of today's hegemonic discourse in communication, the model for the maximal efficiency sending messages from sources to receivers. Noise is a statistical aberration in that efficient sending: disruption, meaningless, excluded from the only significant business which is delivering a message from here to there. We might say here that noise is the evidence of Gödel's theorem operating in the realm of a pure, mathematical communications model. Noise – from within the system and without – demonstrates that the system is neither complete nor coherent. It can also show us that even the

most abstract system is incapable of lifting itself above the ecological and technical conditions of its existence. Finally, these glitches, those modes of noise that are in-significant because they have been excluded from the *polis*, the society of meaning, reduced to mere nature, are the noises made by the excluded: ancestral labour of technology, untold legacies of ecocide.

Glitches, those characteristic errors in the digital archive, are the privileged points where the excluded voices of ancestors and ecologies speak. This is where the future can emerge, among the discarded and marginal. This is the ethical call of the archive as it becomes the political call of a post-human revolution.

References

- Altman, Rick (2004). *Silent Film Sound*. New York: Columbia University Press.
- Baucom, Ian (2020). *History 4• Celsius: Search for a Method in the Age of the Anthropocene*. Durham NC: Duke University Press.
- Benjamin, Walter (2003), 'On the Concept of History' in *Selected Writings, vol 4, 1938-1940*. Ed Howard Eiland and Michael W Jennings, Cambridge MA.: Bellknap Press/Harvard University Press. 389-400.
- Black, Fischer and Myron Scholes (1973). The Pricing of Options and Corporate Liabilities. *The Journal of Political Economy* 81(3) May-June. 637-654.
- Cubitt, Sean (2015). 'Integral Waste', *Theory Culture and Society*, 32(4) July. 133-145
- Curtis, David (2020). *London's Arts Labs and the 60s Avant-Garde*. Luton: John Libbey.
- Fay, Jennifer (2014). 'Buster Keaton's Climate Change'. *Modernism/modernity* 21(1), January. 25-49
- Fay, Jennifer (2018). *Inhospitable World: Cinema in the Time of the Anthropocene*. Oxford: Oxford University Press.
- Freud, Sigmund (1984). A Note upon the 'Mystic Writing Pad'. *On Metapsychology: The Theory of Psychoanalysis (Pelican Freud Library 11)*. Trans James Strachey, ed Angela Richards. Harmondsworth: Pelican. 427-434.
- IGF (2020). *Artisanal and Small-Scale Mining (ASM) and COVID-19: Responding to the Pandemic*. Ottawa: Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development.
- Kirschenbaum, Matthew G (2012). *Mechanisms: New Media and the Forensic Imagination*. Cambridge MA: MIT Press.

- MacKenzie, Donald (2006). *An Engine, Not a Camera: How Financial Models Shape Markets*. Cambridge MA: MIT Press
- MacKenzie, Donald (2009). *Material Markets: How Economic Agents are Constructed*. Oxford: Oxford University Press.
- Malm, Andreas (2016). *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming*. London: Verso.
- Mignolo, Walter D (2011). *The Darker Side of Modernity: Global Futures, Decolonial Options*. Durham NC: Duke University Press.
- Mouffe, Chantal (2005). *On the Political*. London: Routledge.
- Parikka, Jussi (2017). Deep times and media mines: A descent into ecological materiality of technology. Eric Hörl and James Burton (eds) (2017). *General Ecology: The New Ecological Paradigm*. London: Bloomsbury. 169-192
- Rancière, Jacques (2006). *Hatred of Democracy*. Translated by Steve Corcoran. London: Verso.