Truth

Truth

Aesthetic Politics 1

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Dedication

In memoriam G.T.C.

Preamble

Be not forgetful to entertain strangers: for thereby some have entertained angels unawares.

Paul, Epistle to the Hebrews, 13:2

What is truth today? A century of relativism has come back to bite us in what is widely understood to be a post-truth era. Politicians espouse what was once the credo of radical cultural critique – the idea that science, the state, media, education, health services, civil services and all forms of social and political institutions are engines of ideology. Where pure greed and naked force have not been sufficient, a sect of ageing punk, post-Situationist anarcho-capitalists has allied with a global network of kleptocrats to turn distrust into a means to power and profit. Their success comes from their ability to repurpose an old radicalism (from the 1960s that they cunningly deride) and spread an abstract doctrine of freedom to disguise the avarice of the 'free' market. They can be recognised by their reluctance to criticise the obscene wealth of the billionaire class. The liberal temptation is to reassert an older, pre-critical notion of truth: to defend institutions like the free press and independent judiciaries. Not only does this strategy risk slipping into the market anarchism of the new populists ('the marketplace of ideas'). It fails to question whether it is either possible or desirable to restore forms of truth undercut by critiques from Right and Left. I take as axiom Aristotle's belief that politics is the pursuit of the common good. Ecocritique adds that the common good must not be restricted to humans, still less to only some humans. This book gambles that paying close

attention to the mediation and communication of truth and untruth, while it may not reveal how the wells of truth were poisoned, may help us understand the practice of truth in this expanded commons.

There is no fixed truth to return to. Nor can we return to or recreate neutrality – scientific, political or philosophical. Truth was always ecological – always situated, always relational, always caught up in who was saying what to whom, about what, how, for what purposes and with what effects. The problem with this statement is that it presumes that the inner state of someone about to say something is the most important factor in what they say, how, why, where, when, to whom and with what result. Not only are those inner states never completely (and perhaps not even partially) knowable, even by the speaker, but they are only part of the situation that gives rise to someone saying or doing what they do. Feminist, anti-racist and decolonising struggles have taught us – especially white, Western men – to distrust ourselves, our attitudes and our ability to enforce our will, not necessarily for good reason but just for the hell of it. This book proposes an ecocritical account of truth. It is already clear that ecocritique must learn from anti-sexism and anti-imperialism, at least as much as from the critiques of wealth and power. The first purpose of critique is to bring all its terms, including the act of criticism, into crisis.

We can only infer what motivates other people, animals and natural events (at which point motivation has already dissipated into a vague pathetic fallacy ascribing human values to non-human processes), and scarcely understand our own motivations when we speak or act. There is no viable truth to be found inside, in psychology or an inner life. It is also the case that neither the commons nor truth exist prior to their production: there is no truth 'out there', only the truth we produce, in common and as commons, together with our

non-human partners. The challenge of thinking about truth only becomes harder as we contend with the sociological observation that lies, once in circulation, become performative, changing the nature of the world, and operating with the force of truth despite having no basis other than blind repetition. Truth is a practice, but so is untruth, and they cannot be distinguished by the fact that they are successful, by whatever measure we apply. The natural, social and human sciences no longer pretend to possess absolute truth. It is in general a hallmark of neo-populist, not to say neo-fascist politicians and political movements to claim that they do. They proclaim their one true God, the alternative fact, to trump the collective wisdom that says there is no single truth and no single place to interpret it from.

The brutality of faith has nothing to do with being truthful, and is scarcely mentioned in this book, which instead looks at practices that have tried and still try to be truthful about the human condition and about which aspects of the world can be understood and what can be communicated about those that cannot. The wager of this book is that close attention to practices can help unpick the interplay of observation, categorisation and responsibility, and so understand how truth works in and as an aesthetic politics today, and how, if it works at all, it might work in future.

The first step in remaking truth is to recognise that it is neither given nor goal: indeed, that it is not an object of any kind. Neither the object of knowledge nor an object of veneration, truth is a job of work. Ideally, the work of truth is the cultural work that the dispersed members of a commons undertake in order to become a commons. In actuality, the truth we fear we are losing takes two forms, depending on whether their goal is power or economics. As instruments of power, individual truths may be coagulated into a single

Truth identified with a unique institution (the Crown, the Church, a political party), or discrete discursive elements (narratives, anecdotes, codes and symbols) organised into a system and hidden from all but those true believers who have proved their conformity with the secret's sectaries. Such truths become privileged means to interpret and act on the world, whether in intelligence agencies or among conspiracy theorists. These secret truths are invariably associated with power. This is as much the case with QAnon as with scientific classifications open only to those who have acquired the correct numeracy and literacy from the correct perspective validated by the correct institutional authority. A critical element in the centralisation of scientific knowledge in colonial and imperial capitals in the eighteenth and nineteenth centuries, the perpetuation of privileged, normative and Eurocentric rationalist truth retains its power as a mode of colonial rule in the twenty-first.

The second, economic practice of truth today is intricately involved with intellectual property, such as patents and copyrights, that converts ideas into owned objects. Like all property law, intellectual property is designed to deny the possibility of collective ownership of ideas, reducing truth to a commodity. The economic fiction that corporations are 'legal persons' in ways that, for example, a tribe is not, allies the economics of intellectual property to institutional individualism as instrument of power. The truth-objects owned and operated by corporations and institutions – texts and regulations, taxonomies and in-group folksonomies, statistics, diagrams and patents – are media techniques. They mediate raw materials, not only materials and processes extracted from the natural world but mathematics and language inherited from the past and the collective working of systems like the internet and the law that they expropriate for their own uses. Thus, whether as power or

economy, contemporary truth-making cannot be considered an exclusively human activity. It consists of

1. humans in salaried employment in the information and creative industries and the freely donated work of uploaders and viewers that processes captured data into copyrightable and exchangeable units;
2. the freely given work of the ecosystem: energy, materials and process from within and beyond the planet, and techniques for capturing them; and
3. the legacy of ancestral skills and knowledges, purloined as forced labour in the form of taxonomies, discourses, archives and machinery.

The ecocritical approach to politics and aesthetics obviously stresses the implication of humans in their ecologies and the environmental impacts of human activities, but it also embraces the oddity of the human as a discrete historical condition, constantly evolving in relation to the ecology it strives to exploit, escape or conserve. The author and readers of this book are human, after all. The third party here is technology. For reasons that will become apparent, technology, aesthetic technologies in particular, are considered here as the concrete presence of ancestral ways of thinking and doing. Whatever truth is, ecocritique insists that it emerges in the changing historical relations between humans, technology and nature. *Truth* investigates these relations through four types of truth practice: realism, which I take to aim for truth to perception; data visualisations, aimed at truth to the world; glitch as truth to materials; and abstraction as truth to subjectivity. Four major fields of philosophy order the chapters: realism and phenomenology, data and epistemology, glitch and ontology and abstraction and anthropology (which I take to be the attempt to understand the place of humans in the cosmos).

In succession, they treat of aesthetics in the senses, knowledge, things and subjectivity.

Though Chapter 2 argues that data visualisation is the dominant medium of truth today, Chapter 1 starts with realism, which continues to thrive, not least in journalism which, since Defoe, has depended on eye-witness perspectives. A camera on one side of a line sees one event, a camera on the other, another. To understand an event, we need multiple perspectives. Journalists cannot but take sides, depending on where they stand when they record their report. Even deliberate falsification becomes evidence, a tool for deciphering the event it falsifies. Listeners, readers and viewers only have to take sides, if at all, once all reports are in. Truth can only be assembled from multiple sources and may never be whole. There is always more to be discovered at other scales: as the Eames Office's *Powers of Ten* shows us in Chapter 1, Section 1.1.

In Section 1.2, Robert Paul's Blackfriars film exemplifies the difficulty of objectivity. At the dawn of the scientific revolution, the dominant European taxonomy of phenomena was based on the relations they expressed between matter, form and spirit. In the later nineteenth century, objectivity emerged based on an equally dynamic and irreconcilable triad of certainty, precision and replicability which expressed itself in a dialectic of subjectivity, proper to the arts, and objectivity, which abandoned perfect archetypes in favour of empirically observable deviations from them. Even restricted to the Western tradition, truth has its history. The persistence of the uncanny suggests that older paradigms still influence. Western truth is historically and geographically specific but also plural and unstable. Nowhere is that more apparent than in the conflicted negotiations of colonial and decolonial epistemologies, explored in Section 1.3 through the dialectic of classroom and oral traditions in *Rue Cases-Nègres*.

Chapter 2's analysis of data visualisation begins with seismography, a realist practice that once responded directly to the trembling Earth, but which moved to numerical transcriptions from arrays of instruments in lockstep with other scientific observation from astronomy to quantum interactions. Similar multiple and synchronous observations are critical to the much-prized 'objectivity' of finance software, shaped by a theological belief that the market, which produces so much inequality, is objectively equitable. Where realism was truth to human observation, data claim to describe the truth of the world without human intervention. That claim is undercut once we recognise the ecology of noise, which Chapter 3 argues is integral to the ideal communicative efficiency of data, and inseparable from it. Once seen as radical breaks in the communications empire, glitches today have been colonised in capital's quest to create profit even from contingency. Drawing on ideas about memory, the chapter argues that glitches are work undertaken by technologies themselves, understood as 'dead labour', that is as repressed and imprisoned ancestors, that disrupts the perpetual present that contemporary capital strives to produce. Glitches produce truths about the media in the same way that remembering produces the memories it recalls.

It seems more than an accident that, just as science lay claim to objective knowledge of an object world, art moved, in abstraction, to an account of the world as subject, the theme of the final chapter. Three digressions on mermaids, angels and cats show that mediating or communicating truth always involves oppositions to truth: disgust, trauma and the uncanny. Abstraction offers some resolution of this cosmic dialectic, but only in forms that feel somehow unsatisfactory. Chapter 4 unpicks a hundred years in the history of abstraction, claiming that abstract art sought expression for a cosmic

subject that informed any subjectivity, but that contemporary abstracts, exemplified by QR codes, demonstrate another subjectivity, the master subject of computer code. In the incomprehensible strangeness of code, the chapter seeks out the beginnings of a new ethics and a new politics.

The Coda starts from my mother's admonition: 'Show some consideration!' That is what I have tried to do here, in two senses. First, I have tried to consider the agencies working in specific instances and their unique constellations of aesthetic and political outcomes. By collating, co-locating and collaborating with a variety of cases and discourses, I have tried to discover frictions and analogies that illuminate each case and the wider arguments evolved from them, a method I derive from John Durham Peters and developed in an earlier book. Second, I trace the ethical consequences of these constellations, to see whether they (and I) *care* for the implications of what they do. Any aesthetics or politics today must engage with media. To the extent that media belong to the world they give an account of, any understanding of media must also be ecological. Aesthetics concerns art but also the senses as they are educated by art, including the popular arts, while politics today concerns the good life for all, including, it should now be clear, ecologies and technologies. This book has been written in the earnest hope that thinking about truth-practices as unique actions in a complex array of forces may help create the aesthetic politics it sets out to describe.

1

Realism

1.1 Cosmic Zoom

From Hardy to Spielberg

One evening of late summer, before the nineteenth century had reached one-third of its span, a young man and woman, the latter carrying a child, were approaching the large village of Weydon-Priors, in Upper Wessex, on foot. They were plainly but not ill clad, though the thick hoar of dust which had accumulated on their shoes and garments from an obviously long journey lent a disadvantageous shabbiness to their appearance just now.

I am not the first to note that this opening paragraph from Thomas Hardy's realist novel *The Mayor of Casterbridge* zooms in from extreme long shot to extreme close-up. The following paragraph continues at this level of detail, reminiscent of Courbet's painting *The Stonebreakers* of 1849, noting the equipment sticking out of the wicker back-pack the man is carrying ('At his back he carried by a looped strap a rush basket, from which protruded at one end the crutch of a hay-knife, a wimble for hay-bonds being also visible in the aperture'), followed by a more curious movement, like a dolly out followed by a zoom in:

His measured, springless walk was the walk of the skilled countryman as distinct from the desultory shamble of the general labourer; while

in the turn and plant of each foot there was, further, a dogged and cynical indifference personal to himself.

The prose pulls back to shows us a type – a discrete class of working man identifiable by his gait – before taking us back in, from the appeal to our ability to recognise (and share the author's recognition of) types, to an opportunity to identify the idiosyncratic footfall of an individual. Only after this assertion of distinct personality does Hardy pull back again, to a medium close shot, to observe the relation between the couple as they walk. Film theorist John Fell notes a later passage in the novel's fourth chapter

> To birds of the more soaring kind Casterbridge must have appeared on this fine evening as a mosaic-work of subdued reds, browns, greys, and crystals, held together by a rectangular frame of deep green. To the level eye of humanity it stood as an indistinct mass behind a dense stockade of limes and chestnuts

characterised by a quasi-cinematic montage of aerial and horizontal views. These passages might suggest either Hardy's prescience, or that cinema was an invention that the late Victorian era required to fulfil the realist obligations the period had set itself in literature and painting. Film pioneers Robert Paul in England and the Lumières in France would place cinema at realism's disposal less than a decade later. Two features of Hardy's zoom are worth noting. There needs no forcing of attention to make the man the immediate centre of the literary gaze – because of his gender, but also because of his species. The novelist's gaze naturally flies to the figure in the landscape rather than its geology, flora or fauna. The eye of imagination travels through space, using effects of distance and proximity, but also through time. Hardy is describing a day 'before the nineteenth century had reached one-third of its span', fifty years before the publication

of his book. He moves his time-telescope in to the carefully annotated rhythm of this specific man's 'turn and plant of each foot … personal to himself'. Even though, as we shall see, zoom lenses are extremely artificial devices, zooming in has long been a characteristic – perhaps the dominant characteristic – of literary and pictorial realism, so it is worth bearing in mind that even before its technical invention, zooms were always temporal as well as spatial phenomena.

Coincidentally, the Oxford English Dictionary dates the first use of the verb 'zoom' in print to *The Century Illustrated Monthly Magazine* in 1886, the same year as Hardy's novel, citing as its first use the onomatopoeic (and, reft of context, mysterious) sentence 'The crystal went zooming into the fence-corner', a rendering of the sound of swift motion from one of the most popular turn-of-the-century New York monthlies. The same source tells us that the noun 'zoom' only appears in 1917, well into the cinematic era, when it seems to have been restricted to a steep climb in a small plane, again possibly with onomatopoeic intent. The first mentions of a cinematic zoom come with scare quotes, as if the word was too slangy for even the readers of the *Sheboygan Express* in 1934, which reviewed a 'mystery thriller' containing 'one of the baffling "zoom" shots', suggesting the practice was unfamiliar enough to be unsettling as well as requiring specialist jargon. (It is difficult not to recall here Georges Méliès' disorientation in front of scenes where heads 'suddenly grow big', even though he would use a dolly to achieve such an effect as a trick in *The Man with the India Rubber Head*. The title suggests why the zoom was experienced as 'baffling' in 1934. Film historian Donald Crafton notes that *The Big House*, MGM's 1930 hard-boiled prison story directed by George W. Hill, features 'an astonishing zoom lens point-of-view shot – one of the earliest (if not the first) in a Hollywood movie', though confusingly Crafton also suggests, citing industry paper *Film Daily* from 8

May 1932, that 'Practical zoom lenses were not available until 1932'). By 1948, the American *Journal of the Society of Motion Picture Engineers* was using the word unencumbered by quotation marks, and by the early 1960s, if not before, the word had entered everyday film reviewing – film historian David Bordwell suggests that zoom lenses were improved for TV sports coverage in the 1940s and entered film production in the 1950s and 60s. The notion of an optical zoom, on the evidence of this dictionary etymology, seems to come from the period between the two World Wars, but only to settle into the ordinary vocabulary when the effect was used less for shock than for moving into telephoto detail from what began as a wide shot.

The first patent for a zoom lens (US696788) was lodged in 1902 by Clile Allen of Chicago for use 'in connection with stereopticons and similar apparatus', that is, for projection rather than as a camera attachment. The design remained fundamentally unchanged when adapted for camera lenses, although there are more groups of lens elements in a contemporary zoom lens, and glass technology, coatings and the use of cement for compound elements have changed their construction and capabilities radically. In modern lenses, there are four clusters of components, a focus group common to most cameras, the variator group which effects the zoom, a compensator group that adjusts focus as the variator group changes the focal length, and the master group that corrects chromatic and spherical aberrations introduced by movement of the previous groups prior to the light's arrival at the camera's focal plane. For still photography, zooms allow clear images from a distance, and their function is entirely spatial. In the movies, on the other hand, zooms are temporal as well. This is obvious: the effect of zooming in requires a certain duration so it can be experienced as motion. A still photographer with a zoom lens mounted on an SLR experiences the same

thing: the work of adjusting focus and focal length, and the time it takes to settle in on an optimal view. But the resulting photograph, being still, has absorbed that work as its invisible infrastructure, in the same way that glass and coating technologies vanish into the finished image, so that it can still appear automatic, in line with mid-twentieth-century media theory. This automatism is challenged by movie zooms.

An intriguing feature of zooming in film practice is its frequent combination with other camera moves. Some years earlier than *The Big House*, the opening shot of Clarence Badger's 1927 *It* zooms out from the sign atop a department store, pans down its facade and zooms in to the street outside its entrance, the first confirmed zoom shot in cinema. The iconic shot framing Chief Martin Brody (Roy Scheider) on the beach hearing the first shark attack in Spielberg's *Jaws* (1975) combines a zoom-in with a dolly-out. Like Hitchcock's similar vertical zoom-and-dolly in *Vertigo* (1958), Spielberg's condenses time while extruding it, giving the audience precious seconds to savour an intense emotion over a duration longer than it would take to experience. Spielberg's zoom conveys Brody's awareness that his deepest fear is coming true, and though the shot covers Scheider's reaction in real time, lasting scarcely more than two or three seconds, its work, unlike Hardy's, is not one of material, everyday realism but of extreme, not to say fantastic emotion. The hypothesis that realism has much to do with (human) perception is borne out by the observation that the distinction between material and affective realism has never been easy to maintain, any more than the space-time distinction, least of all in zooms. The time of the zoom reflects the labour-time it takes to perform the shot, but may also embrace the emotional time demanded to experience a psychological effect. In an influential essay from 1980, film historian John Belton remarks of Rossellini's use of zooms, 'The camera, in effect, becomes a consciousness roving

over the action', later refining his point by adding that although 'the vari-focal nature of the zoom lens … gives it a resemblance, in terms of its operations, to the human eye, … It is a bionic, not a human, eye', concluding, somewhat unexpectedly, that 'The zoom reflects a way of seeing the world not as it appears to the human eye, but, perhaps, as it really is'. Belton's struggle shows his commitment to the conflicting demands of realism: to show the world, to show the world as it appears to human perception, and to show the world as it appears to consciousness, which cannot be assumed to be exclusively human.

The Powers of Ten

What is intriguingly consistent among these conflicting claims, apparent in the instances from *Jaws* and *The Mayor of Casterbridge*, is their common interest in the Now. Hardy, from the distance of half a century, guides us to imagine 'their appearance just now', while Spielberg's dolly-zoom hails us into Brody's instant of realisation. It is not only that a more (in Hardy's case) or less distant time (in Spielberg's) is being observed, but that the reader and viewer alike are being inveigled into inhabiting a remote time as their own Now. The significance of this Now extends beyond the moral purpose of Hardy's novel or the psychology of film drama. The classic instructional film *Powers of Ten* commissioned from the Eames design agency by IBM in 1977, gives a powerful instance of the Now in action in a far broader field. The Eames Office itself describes the film thus:

Powers of Ten illustrates the universe as an arena of both continuity and change, of everyday picnics and cosmic mystery. It begins with a close-up shot of a man sleeping near the lakeside in Chicago,

viewed from one meter away. The landscape steadily moves out until it reveals the edge of the known universe. Then, at a rate of 10-to-the-tenth meters per second, the film takes us towards Earth again, continuing back to the sleeping man's hand and eventually down to the level of a carbon atom.

The Eames Office adds that this is 'a film investigating the relative size of things' that 'visualize[s] the importance of scale and the significance of adding a zero to any number'. Taking a metre as the ground measure, *Powers of Ten* zooms out to ten to the twenty-fourth power before zooming back in beneath the skin of a man in the picnic scene to ten to the minus sixteenth power. Although the distances – on the way out – are frequently given in terms of duration ('how far a jet plane can fly in ten seconds', for example), it is striking that the Eames film gives no other clue as to the temporal dimensions of its journey to 'the edge of present understanding' as the voiceover has it. Instead, the film presents the universe as stable and knowable between these limits, and to offer the numerical scale between 100 million light years and 0.000001 Ångströms as the measure and foundation of that knowledge.

As the zoom passes through a vista of the Milky Way, the commentary notes that the film adopts a specific axis of travel that permits the best view of the galactic spiral. It is a moment of honesty about the film's construction of space as an effect of a determined point of view. If this constructed vision were to keep going to some imagined edge of the universe, it would have to confront space-time curvature and the wreck of its linear scale. With even minimal temporal realism, the nine minutes that the film takes to complete its trajectory would see the man, his hand and the carbon nucleus within it moved significantly from their starting points. Given the admission that the film is a construct, the construct nonetheless contains

in itself the seed of its own destruction, as the inward zoom into the negative powers of ten already reveals that *any* point in the cosmos treated the same way would reveal the same vector towards the infinitesimal. The 'new scales of vision made possible by intensive military technological research' made it possible for the Eameses to present a commensurable universe, one whose largest and smallest dimensions can be measured in the same units, and where effects of scale can be appreciated without fundamental changes in perspective. But the investigation of the sub-atomic domain makes it apparent that there are at least two potential infinities available. One is the infinity of the Natural or counting numbers. The other is the infinity of the Real numbers, the much larger infinity of numbers to the right of a decimal point, the 'infinity in a grain of sand' of Blake's poem, larger because the space between successive integers (5, 6, 7 …) is always one, but the gap between any two decimals (0.12121212 and 0.12121213 for example) contains multiple infinities, including infinitely recurrent decimals, irrational numbers like pi and any decimal that begins with an indefinite number of zeroes before it reaches the first digit (0.0000000000…0001), each additional nought one step closer to a complete zero that it never reaches: in short an infinite number of infinite decimals. It is not the case that we have learnt other or wiser things since the film was made: the science of 2020 does not necessarily know any better than the science of 1977 (though the popular communication of science has made at least the basic ideas of cosmology and mathematics available to a far wider audience). It is not even a question of what can be an object of knowledge, contested since the days of Kant and Hume. It is rather that the Eames film promotes the idea that there is a singular universe, where the film's own mathematics indicates that there are at least two incommensurable infinities.

With its explicit grounding in the principle that the universe is fundamentally mathematical, the film therefore establishes two ontological scales, Natural and Real that, while they may be connectable, operate in ways sufficiently discrete to baffle attempts to understand their coordination or cooperation. As philosopher Alain Badiou might put it, these incommensurable scales describe two worlds where the rule is 'that *this* world is never *the* world'.

The Eames film remains inspiring *because* of this error, which makes possible the wonderful illusion that it might be possible to see everything – according to film-philosopher Stanley Cavell the founding desire that powers cinema in the first instance. Cavell writes that film satisfies

> the wish for the magical reproduction of the world by enabling us to see it unseen. What we wish to see in this way is the world itself – that is to say, everything … Our condition has become one in which our natural mode of perception is to view, feeling unseen. We do not so much look at the world as look *out at* it from behind the self. It is our fantasies, now all but completely thwarted and out of hand, which are unseen and must be kept unseen. As if we could no longer hope that anyone might share them … So we are less than ever in a position to marry them to the world.

This surely is the primal fantasy of the zoom lens: an ever more intrusive view into the intimate details of an investigated world, a fantasy enacted in the Esper scene in *Blade Runner* (1982), where the hero magnifies the detail of a photograph until he discovers the tiny figure of a female replicant reflected in a mirror in the background of the original image – a sequence whose technical and philosophical interplay between still and moving images Barnaby Dicker teases out in forensic detail, noting the stop-frame – actual or fictitious – as a meeting-place of still and moving images, the

basic technique of the Eames film. The trope of the undiscovered detail waiting to be disclosed is an extreme variant of Cavell's magical power of unobserved and (imaginarily) impersonal enquiry. Like it, it rests on an imagined power of photography, to act as perfect analogy of the scene it depicts, containing as much detail as the world. It is an analogy that crumbles, twice over, in the course of *Powers of Ten*. Though both the opening and the centre of the film emphasise human scale, the human vanishes swiftly in the passage outward to galactic scales; and again as the zoom-in takes us to the oscillation of sub-atomic particles, proposing and disposing of the human as measure, but equally, as hinted at by the sleep of the central human figure, underlining the fact that this spectacle of 'everything', like all scientific objectivity, is conditional on the absence of a human spectator. The film then pushes Cavell's hypothesis on film magic: the view of everything requires not only that we be unseen, but that we should be absent – though Cavell is correct that this is a historical condition, and therefore one of loss rather than lack.

The particularity of that loss should be sought in the production of *Powers of Ten*, a year-long process of assembling, re-photographing and combining high-resolution still images and graphical overlays on a rostrum camera that could convert their stillness into apparent continuous motion. Zach Horton notes of the film's source, Kees Boeke's 1957 book *Cosmic View*, that it offers 'a universal overview that is nonetheless fragmented, discontinuous, and mediated'. The Eames film replicates the 'jumps' of Boeke's book by deploying a related technique of stop-motion animation, reliant on the phi-effect: that human eyes overlook gaps between images if they occur swiftly enough – around the twenty-four frames per second of film projection. Unlike the words, sentences, pages or chapters of a book, however, where the potentially

distracting separation of one unit from the next is carried by language – which predates and exceeds book technology – the gaps between film frames make possible the appearance of a continuum. Film depends on there being a picnoleptic moment, to use Virilio's term, a fragmentary and repeated loss of consciousness, a kind of sleep, during those fractions of a second when the shutter falls to hide the blur of the film transport mechanism, and there is nothing to see. In such moments, Cavell's unseen seers become invisible to themselves. Since Laura Mulvey's pioneering work on gendered viewing, it has been clear that narrative cinema has techniques that mobilise desire to cross over these ellipses, much as linguistic expectation carries us over to the next words in a sentence or the next page of a book. Mulvey's thesis is grounded in a theory of desire as the product of lack (although this might be repositioned as historically lost rather than eternally absent). Film's ability to carry us across the gaps between frames and over edits depends, she argues, on techniques that mobilise desire as unconscious, an unconsciousness which orchestrates the interweave of the historical (or at the very least biographical) generation of unconscious desire, the repetitious pulse of consciousness and unconsciousness invoked by film technology, and the steps from scale to scale erased by the apparent continuum (which appears but does not exist) of the zoom in *Powers of Ten.* These modes of unconsciousness produce the possibility of observing the or a world, or several worlds, whose incommensurability is overridden in the sleep of consciousness, a sleep that seems in the Eames film to extend to the unconscious universe itself, which only pops back into coherent existence between moments of absence.

If it is the case, as suggested earlier, that the universe imagined by the film is co-temporaneous, so that each of the scales we see is supposed to exist simultaneously with all the

others in a single Now, then the film depicts three kinds of time – cosmic simultaneity, pulse and history – contained in a fourth, the duration of the film itself. A major question then, for scientific, emotional or everyday material realism, is *when* is reality? Within each of these domains lie further questions about time. *Jaws* extends the duration of a *psychological* world in the present of emotional realism: the reality of the emotion we are invited to share requires us to zoom in to Chief Brody's psyche, emblematised in changing posture and facial expression. In the zoom and pan in *It* in 1927, the world is *sociological*, zooming us in on social interplay where emotion is not the property of or proper to a brain (and a singular body that acts as its medium of expression) but a flow between people. An *ecological* world appears historically in the pathetic fallacy, the poetic ascription of emotions to environments. Shakespeare's Hotspur for example talks of

> swift Severn's flood,
> Who then afrighted with their bloody looks,
> Ran fearfully among the trembling reeds
> (*Henry IV Part1*, I, iii. ll.106–9)

Thunder and rain matched to character moods in film serve the same purpose. The pathetic fallacy derives from an older belief in the doctrine of sympathy, the shared resonances of humans and their environments; but in its post-mediaeval modes it is markedly anthropocentric. Far less so are the older traditions it derives from that see no difference between human and ecological processes, from Anaxagoras in the West to the history of Chinese landscape thought, and the recurrence of both in deep ecology.

In this light, Cavell's looking out at the world from behind the self undermines philosopher Maurice Merleau-Ponty's

contract of vision, 'that the look is itself incorporation of the seer into the visible' – that the condition of seeing is that I must also be visible, that the field of the visible includes seer and seen alike. Merleau-Ponty's position is ecological in this sense, that it is not necessarily only humans that see but any creature with light-sensitive organs. By extension anything that senses can sense us, which implies that incorporation – having a body – is incorporation *into* the body of the world. However, while this view evades the anthropocentrism of the pathetic fallacy, it grounds perception on the principle of co-temporality: that a sensory and sensible world where the human-environmental distinction does not hold exists in a single Now. Investigation of the dependence of cinematic apparatus on loss makes clear that such co-temporality can only exist through the shared temporality of desire as lack and cinema as a technology of loss and repetition. As lack and loss, the unseen and invisible are not limits but the conditions under which the world becomes observable, extending Cavell's insight to suggest that, for the world to appear, we must disappear; and that realism implies that the world be present and the observer absent – simultaneously. The kind of present that Hardy and Spielberg invite us into requires an observer who, paradoxically, not only disappears but was never there. This implicit absence is particularly poignant in astronomical realism.

NGC 4889

The elliptical galaxy NGC 4889 – 308 million light years from here – was first observed in 1785 by Frederick William Herschel, assisted by his sister, Caroline Lucretia, and is still a common goal for amateur astronomers with powerful optical

telescopes on moonless nights. Hubble trained its faint-object camera on the area for a different, indeed almost the opposite reason. According to a 2011 paper published in *Nature* by Nicholas McConnell and his team,

> NGC 3842, the brightest galaxy in a cluster at a distance from Earth of 98 megaparsecs, has a central black hole with a mass of 9.7 billion solar masses, and … a black hole of comparable or greater mass is present in NGC 4889.

What is most important in the Hubble Space Telescope's 2011 image of NGC 4889 in front of hundreds of background galaxies deep within the Coma galaxy cluster is what cannot be seen. This too seems to break Merleau-Ponty's contract of visibility.

Yet it is also the case, as Lisa Parks writes in an essay on 'The Cosmic Zoom', that Hubble images propose

> a mode of distant observation that gazes afar only to see what is near anew, a time machine that locates the brink of history only to more clearly mark the present. … As Hubble images become cosmic events and cosmic sonograms, they place us more forcefully in our own historical moment and in our own bodies. Indeed, the very purpose of deep space viewing seems to be to affirm the centrality of the Western humanist subject while disguising it as a process of searching for something other.

This search for an 'other' opens onto a psychoanalytic conception of desire, which is constant because it is desire for something lacking, beyond what we already enjoy, an 'other' – psychoanalyst Jacques Lacan's *objet petit 'a'*, where 'a' stands for 'autre', other. The other in Hubble images does not respond to the human desire to see. This refusal to be viewed reverses Cavell's magical relation of the unobserved observer. Now – in the reinforced Now produced by the invisibility of the black

hole's 'brink of history' – the human viewer is forced back into their own desire, no longer able to disappear into the act of viewing. It is not only the Romantic psychological world of emotional realism but technoscience that returns us to the human privilege, the psyche as centre.

Paradoxically, the black hole in the Hubble image makes apparent the fact that all realisms return at last to perception, all too often human perception and, even in the Hardy quote that we began with, a human visual perception (it is striking how silent Hardy's description is). From narrative identifications in *Jaws* via *The Powers of Ten* to the NGC 4889 image, we come back to the centrality of the human observer and the eternal Now of its desire. This subjective desire produces the apparent contemporaneity of the observer and the image, and thus of the observer and what the image represents. The observer wants to feel that its desire is wholly incorporated in its own body but also in the body of the observing apparatus, with the object of observation its ever-vanishing object of desire. Far from overwhelming the subject, the astronomical sublime ends up shaping the most remote and inexplicable processes in distant galaxies to conform with desire, indeed with desire that has learned to become cinematic.

Against this backdrop, it becomes possible to understand just how radical was another black hole image, the 2017 observation of the M87 singularity. This image was produced from between seven and twenty-five scans per night over four nights by an array of VLBI (very large baseline interferometry) observatories in Antarctica, Chile, Mexico, Arizona, Hawai'i and Spain, covering an entire hemisphere, synchronised to nanosecond accuracy via GPS and employing masers (coherent microwave radiation) to ensure frequency standardisation. The Event Horizon Telescope image of the M87 black hole is the product of intense technical work, and the image

that circulated in the world press was described by the team that produced it as 'a representative example of the images collected in the 2017 campaign. The image is the average of three different imaging methods after convolving each with a circular Gaussian kernel to give matched resolutions', judged against similar images generated on other days from different but also multiple observations, and provided with colour indicating temperature rather than chroma values. The Event Horizon team don't mention Earth's rotation but note that shifting atmospheric conditions had to be corrected for in the observations. The point of these annotations is not to claim that the images do not communicate some kind of truth. Rather it is to claim that technical images, images made with lens-based media, which for the better part of a century have been constantly described as 'automatic', have always been products of work, collectively conducted by non-human agencies as much as by human operators, but nonetheless work, and therefore time-consuming. Though it appears still, the M87 image contains time.

For most of its viewers, this image is reproduced on screens as a digital file. Unlike the frames of the Eames film, computer images are never static. A film frame is present whole and entire for the twenty-fourth of a second it flashes up on screen, but a video image is a scan that has to be redrawn at the refresh rate set by the file and the device it displays on. The top lines of the image already fading before the bottom lines have been re-scanned, there is never a complete video image. At the same time, a .jpeg or .tiff is typically delivered as a complete file to the end-user. Although it undergoes a cyclical rescan on screen, the file itself is finite, with a beginning and an end written into its code, even though the cycles of the scan continue indefinitely within its defined perimeter. The duration of the image is thus unclear.

As scan, it repeats, potentially to infinity, while as file it has a discrete and bordered existence (there is only one file, not an infinite number). Phenomenologically, it appears unchanging as we view it, but its production and display employ time-bound and time-governed technologies, in ways that have little to do with the persistence of a physical photograph and even less with the pulse of appearance and disappearance in traditional movie projection – there being no shutter, no black strip between frames, and no plunge into darkness and invisibility. We often trace moving image technologies back to chronophotography, multiple exposures of an action on a single photographic plate, originally as a scientific experiment and later as the basis for modelling maximally efficient use of factory labour. Video scanning is different again: although it assembles temporally dispersed moments into a single image, it does not spatialise time like chronophotography.

When Crutzen and Stoermer introduced the spatio-temporal concept of the Anthropocene, they wrote of the need for 'the global research and engineering community to guide mankind towards global, sustainable, environmental management'. Media historian Zach Horton notes of this concluding statement that: 'Humanity, according to this view, has fouled its nest not so much from arrogance or overreach as from under ambition: it has not sufficiently claimed its rightful role as monarch of creation, overseer in both the perspectival and managerial senses.' We can add that anthropocentrism not only oversees but overlooks, not least overlooks its own existence, until forced to acknowledge it by the recalcitrance of the universe. A contract can be broken by two parties, after all. In her commentary on *The Powers of Ten*, Janet Harbord finds a different relation: 'The use of a backwards zoom animates the images to produce a smooth line

of motion, and yet we are pulled towards something while being denied a view of what we are approaching.' Also citing Hitchcock's *Vertigo* zoom, Harbord emphasises the loss of control in this acceleration away from any human scale towards a goal that is always invisible because it is behind us. Noting the ambiguity of the voiceover when, at the furthest reach, it intones 'this emptiness is normal', Harbord comments, 'It is unclear whether this emptiness belongs to the galaxies or to the viewer.'

To travel to the ends of the universe not only takes time: it takes all the time in the world. Any return would postdate not only your own death but the extinction of the human species. When Parks writes that 'Hubble images … place us more forcefully in our own historical moment and in our own bodies', the first of her statements is the more persuasive. We are indeed placed in the time of our observing, and the history that frames its technical possibility and the desire to undertake it. But it is less clear that we are placed in our individual bodies; rather that, like the zoom in Clarence Badger's *It*, we are placed socially, as embodied, certainly, but in a planetary community which may be anthropocentric, as Horton argues, but may also be ecologically embedded in Merleau-Ponty's field of the visible. Confusingly, however, cosmic images invite us to contemplate a posthumous universe, the unthinkable, unperceivable world that persists after my own death and the extinction of my species, my planet, even my region of space. Harbord's ambivalence over the emptiness at the cosmic extreme of *Powers of Ten* belongs to this vertiginous intimation of extinction. A similar ambivalence infuses our miscellaneous realisms' attempts to reconcile the worlds of psychology and sociology, ontology and epistemology, and the process of history that emerges from their dialectic.

El Presente no Existe

One of the telescopes making up the array that completed the M87 observations was the ALMA (Atacama Large Millimeter/submillimeter Array) telescope in the Atacama desert, five thousand metres up in the Chilean Altiplano. Comprising sixty-six movable radio-telescope antennae, each capable of displacements of up to sixteen kilometres, ALMA is capable of zooms in the radio spectrum between thirty-one and one thousand Gigahertz that make it the most powerful of all ground-based observatories, explaining its US$1.4 billion price tag and the participation of the European Union, USA, Canada, Japan, Taiwan and Korea along with Chile in its funding, design and construction. Its appearance in Patricio Guzman's 2010 essay film *Nostalgia for the Light* connects it to a history of telescopes making the most of the altitude and lack of humidity in the Atacama. The same features contribute to the intensely salt soil conditions, which act as preservatives for the mummified bodies of high-plains traders who traversed the desert over a period of ten thousand years. 'This vast, open book of memory', as Guzman calls it in the voiceover, is also the burial site for uncounted *desaparecidos*, victims murdered by the fascist Pinochet regime whose bodies were initially dumped, then exhumed, crushed, dispersed, mixed and reburied. A section of the film contains testimonies of bereaved family members, women who decades after the assassinations, still seek their loved ones' remains in the rock, sand and salt of the Atacama, in sight of the telescopes.

'El presente no existe', says one informant, Victor, astronomer and son of exiled parents, who has come 'back' to Chile to pursue his calling: 'the present does not exist'. The statement seems at first to contradict a line Guzman speaks in voiceover early in the film, concerning his childhood in Chile before

Pinochet, a time when 'Only the present moment existed'. For a child growing up 'before history', in the form of the coup d'état, destroyed its slumber, Chile was removed from the world and from time. Time intersects living, cuts through it, breaks its symmetry. In place of this remembered timelessness, Guzman opts instead to emphasise the long continuity of the indigenous history, and to contrast it, once with the shorter tragic history of the Junta's victims, and again with the immensity of astronomical time-scales. Linking Chile's history of colonialism to its history of astronomy, Guzman also provides evidence, some autobiographical, of amateur astronomer groups learning to observe the stars during their incarceration in regime concentration camps. Playing between the modes of astronomical, archaeological, historical and remembered time, *Nostalgia* rhymes middens with meteorites, spiral galaxies with pebbles brought by traders returning from the coast, the meticulously preserved mummies in a climate-controlled museum vault with fragments of bone sifted from mass graves by mourning women. The film is replete not only with archive footage but footage of archives, echoing Victor's assertion: the present does not exist. There is no single Now, and the now we do experience is haunted by loss, echoing through the secular eternity of space. In Guzman's film, loss is the condition of existence and knowing alike, every bit as much as the co-presence imagined and celebrated in *The Powers of Ten*, or indeed the future orientation of desire at the psychological level or hope at the social. The technology of the M87 Event Horizon image, combining physical installations on Earth with quantum effects in black holes in distant galaxies, tells us that every point in the universe vanishes into the endless infinitesimals of subatomic space. The human condition of permanent loss is soothed but not reconciled in the endless cavern of the night and its stupendous spectacles.

In his voiceover for *The Powers of Ten*, physicist Philip Morrison emphasises that emptiness is a normal condition at any scale. Implicit in this notion is the idea that where nothing occurs, there is no chronology: to the extent that it operates at all, time moves in every direction simultaneously, an ontological approach to time that emphasises its symmetry in all dimensions and directions, its wholly scalar rather than vectoral quality. In my limited understanding, quantum entanglement may imply that, whatever has occurred around M87 over the millions of years since it was as it appears in this image, what is happening there Now may have an effect in our region of space, or even right here on Earth – that there is, in the entangled principle of action at a distance, the possibility of a universal Now, other than the appearance of M87 as it was in my present today. This may explain the fascination it is still possible to feel with the hay-knife and wimble poking out of the basket carried by Hardy's protagonist, that difference still making a difference across a hundred and fifty years.

Yet such small details are insignificant in the universal scale. They blink into existence in Hardy's fabulation and his reader's scarcely legible reaction to it. The existence of this wimble approaches zero, the ideal styleless style that semiotician Roland Barthes embraced when, in *Writing Degree Zero*, he called for a language which 'reaches the state of a pure equation'. The secret non-existence of the present depends on just such an equation. The mathematical philosopher Gottlob Frege observed that in logic, the rule of self-identity says that anything that exists must be identical to itself: this apple is this apple; A equals A. It follows that anything that fails to be identical with itself does not exist. If the present does not exist, then, it is because it is not self-identical. Frege asked himself how to define zero. If whatever exists obeys the law of self-identity, and by definition zero does *not* exist, then zero must be defined as

the non-identical. This mode of non-existence as zero, non-identity, is the power of the black strip between film frames, the falling shutter, the invisible moment of darkness in the cinema, as it is also the invisibility of stellar singularities, the NGC 4889 and M87 black holes where light goes to die. Both Guzman's *Nostalgia* and the Eames Office's *Powers* address time from this necessarily vacant present of the non-identical zero, which alone is exempt from time. Whatever exists, exists because of its difference from zero (leading Frege to argue that every number can be expressed as 0+1, 0+2, 0+3 …: every number, starting from unity, contains the memory of non-existence). This quality of whole numbers makes the Eameses' statement that their film concerns 'the significance of adding a zero to any number' deeply traumatising if taken literally. Every film frame marks itself off as difference from the loss that nonetheless it must include if it is to be able to succeed or precede other images. In cinema, there is no moving image, only a succession of still frames. Video constructs visual impressions by blending the past image fading and the future image coming into existence: every point in the image, every picture-element (pixel), tends from and towards zero. The loss of the eternal present that Guzman recalls from childhood can be thought of as lack. Cinema's presence, and its present, depends on absence and non-existence. Video, on the other hand, is a process of losing and pursuing. Film references eternity, video ephemerality.

In this sense, *The Powers of Ten* approximates the condition of video while still tied to the condition of film. *Powers* was the second attempt the Eameses made to create a film from Boeke's book. Their first experiment in 1968 made clear jumps from scale to scale. Producing the zoom effect required more time, more skill, and a deeper understanding of the film medium. It required a kind of shot that abandoned the completion of the full frame, in favour of one that is radically

incomplete, that understands that its smoothness depends on the seething void of non-identity. From Méliès' *Man with the India Rubber Head* to *Jaws*, the zoom contains in itself the reason why it is otherwise, and not so: why film is above all a durational art. It records reality on condition that, as Guzman's interlocutor explains, it captures it after its existence. Because film depends on the non-existent present, it gravitates towards the zoom as logical outcome of its necessarily incomplete grasp. The backward flight into space that Harbord observes is a flight into our future, but the universe's past. The glory of film is that its zooms through space-time, hinged as they are about a non-existent because non-identical Now, are always ambivalently records of futurity.

It is because it is also an art grounded in whole numbers that cinema can be, as Godard says in *Le Petit soldat* (1963), truth twenty-four times a second, where that truth is not exclusively the property of its frames but also of the gap between them, the dark zero underpinning counting and measurement. The M87 image, in its embrace of video, embraces the infinitesimals that the Eames film discounts as nothing, the empty intervals between frames. Because it involves the illumination and fading of every pixel, video can never reach zero, approximating it but never achieving it. There is no such thing, in electronic devices, as an absolute absence of charge. It is a matter of convenience to account low charge as 'zero' for digital purposes, and to pretend there is an instantaneous and complete leap from zero to one, where in reality there is an incline, a Real curve. Thus, despite the image picturing an event horizon, where existence and time blink out into nothingness, M87 is a durational image, a zoom comprising the changing focal length of those mobile antennae in the Atacama array and all the other antennae in the Event Horizon Telescope as they adjust their angle of vision while the world turns.

As Guzman zooms out to the Big Bang origins of the calcium in the bones of the disappeared and in to the physical memory of the architect who recalls the precise geometry of the camps because he counted his steps from hut wall to barbed-wire fence, just so the M87 image asks us to look simultaneously at this fabulously remote object and the telescopic fingers that point at it. Realism asks us to make this connection, to understand that the triple scaling of a reading on a sunlit winter's evening in Melbourne in 2020 of Hardy's recall of a hay hook in the southwest of England sometime before 1833 depends on three modes of time: the non-existence that excludes time, but which time cannot exist without; the insurmountable lapses of time between the three events; and the entanglement of language, memory, imagination and history that makes this time-tunnel possible. Literary, photographic, cinematic or video, like the present it depends on, realism is non-identical. The dust on the walker's boots, the spangles of mica disturbed by Guzman's camera crew, and the tremulous radio emissions of a cosmic event hundreds of millions of light years distant in space and time tell us that distance is the condition of sensing; that the stars watch us, and every other vanishing point in the cosmos. The loss that founds human desire is not ours alone. Cinema humanises desire in its mobilisation of lack; video ecologises desire in its mobilisation of loss. Zooms are realist in that they accommodate lack of a present in the production of loss, not purely as nostalgia, but as the loss of a definite future, even the empty pages of a calendar. Only as loss can the future be free of anthropocentrism, the despotism of planning and risk management, the ruins of hope in the actuality of debt. Only by abandoning claims to know it in advance can the future become real. Only by abandoning the fatalist ideology of the heat death of the universe can the generative power of Nothing become real. M87 is an image of hope.

Software Zooms and Zoom Software

Since the first decades of the twenty-first century, digital point-and-shoot cameras and the cameras aboard mobile phones increasingly offer 'digital zooms' as an alternative to bulky lenses. A software zoom is not typically produced 'optically' by the lens but by cropping out the edges of the image area and increasing the size of the remainder by interpolating pixels into the picture. The greater the magnification – my phone will increase scale up to around ten times – the more pixels are added by the camera's software, and the more blocky and blurred the picture becomes. Since there is no lens involved, zooming does not produce more detail but less per unit of screen area. The software struggles to add more pixels of the same colour as their neighbours or on a sliding scale between adjacent colours, say a brilliantly light flower and the shadow below it, so the crisp edge dissolves into a gradient. Professional software can help rescue this kind of image and make it look as if it had been taken with an optical zoom, expending more energy, cost and labour adding data that was not in the original zoom file. The Event Horizon scientists mention 'a circular Gaussian kernel' to the M87 image, where a Gaussian is a function designed to graph the probable density of some variable's random distributions. In the imaging software applied to digital zooms, these probability functions can be added to or subtracted from over-amplified images to engineer something closer to the appearance of an optical zoom, but whether deliberated and hand-crafted or added by computer-generated probable-density functions, the result is a drift from actual data towards modelling patterns and probabilities.

Telescopic and microscopic zooms, manual and automatic, are work: they need energy to turn diminished data into

ordered and usable information. All of this work goes on in the real time of the video stream, approaching the threshold where its artifices become apparent to human users. The challenge, the labour and the energy involved grow more intense when the system deals with live streams. At least streamed events can be delayed for a few seconds to allow for all this work to go on, and for correcting errors when it does not. But with interactive video, videoconferencing, the tasks become more time-critical, and more demanding.

Like all internet traffic, videoconferencing depends on packet-switching. Everything transported through the internet is split up into small packets. The packets are wrapped in envelopes that describe where they are from, where they are going, and which part of the message is inside the envelope. Each packet sets out to find its way across the network of networks, hopping from server to server until it finds its way to its destination, where the packets are assembled in the correct order for reading. Sometimes packets are damaged in transit, and sections of the message are missing or garbled. Audiovisual messages are especially vulnerable if they are sent in real time, and we see stuttering images, hear gaps in the soundtrack, experience echoes, dropouts and delays. The internet is governed by electronic clocks that synchronise the steps that packets make. The packet-switching infrastructure operates like film by interruption, chopping audiovisuals into chunks and replaying them at just enough speed and resolution for humans to perceive the end display as continuous.

No system is perfect, including the clock governing the switching of packets. Jitter is one kind of damage: it happens when the clock signal is interrupted, often by electromagnetic radiation or by 'crosstalk', interference coming from multiple messages travelling on the same cables. Any pre-recorded media, including streaming video, can be buffered at the user

end, compiling packets on the user's hard drive prior to playback. Live videoconferencing platforms use a number of techniques to cope with jitter and the inevitable delay attending transmission, while striving to give the illusion that all participants are closely synchronous, relying on the picnoleptic principle to overcome any punctuations in transmission. In place of the more robust TCP (transport control protocol) that governs less data-heavy forms of message like email, video conferencing uses the lightweight alternative UDP (user datagram protocol) to detect and correct errors in transmission. Sitting on top of UDP is RTP (real-time transport protocol) which monitors the quality of video service and helps synchronise multiple channels, especially important in interactive services like video conversations. On top of that is SVC (scalable video coding), which encodes the video signal twice (sometimes more), with one high-definition stream for high-bandwidth users, and a lower subset of the bitstream for low bandwidth, small screens or heritage computers. This lower subset usually drops packets from the high-definition version, an effect you can see on unstable links that skip between sharp and blurry images, interrupted or slower frame rate, or diminished resolution showing as blocks of pixels or a narrower range of colour reproduction. In some variants, the low-bandwidth subset is the preferred option and additional information is generated on the fly to fill in gaps and produce the illusion of a high-definition capture. The positive side is that poor equipment and shonky network connections can still receive and send video; the downside is that there is a two-tier service, one for the well-connected and one for everyone else. In either case, the end-user's display is a complex artefact, actively assembled at the point of reception.

This is the new world of Zoom, the videoconferencing software that came to prominence in the 2020 coronavirus

pandemic and changed the meaning of the once unfamiliar word once more. Because it is so much in the public eye (including great interest in its security and privacy policies and its stock market performance), Zoom has also received interesting coverage on its energy use. A typical text email uses about 5 kilobytes. A high-definition Zoom call with multiple participants uses 3 megabytes upload and 2.5 download. Though one-to-one calling gets this down to 600 kilobytes per second, when multiplied by the estimated three hundred million Zoom participants daily in April 2020, the infrastructure – including all the protocols listed above but also the physical cables and computers hidden under apparently weightless 'cloud services' – the energy requirements of this new condition are far from negligible. Like Napster, the once-popular peer-to-peer (P2P) file-sharing network closed down for copyright breaches, and like Skype, the voice over internet protocol (VOIP) platform for video calling initially built by Napster's engineers on the same principle, Zoom uses a P2P architecture, but without relying on the processing power of connected users, instead establishing the platform on its own cloud-based servers. Even so, one reviewer noted that Zoom used about 50 per cent of central processing on an end-user's reasonably powerful desktop computer, implying significant energy use at the point of interaction. Pandemic-inspired remote working and lockdowns have only increased the amount of power used on Zoom and cloud computing.

Zoom video calling seems to have returned to onomatopoeia for its name, and to have reached back to a predecessor platform to define itself as 'YouTube on steroids' in a 2013 pitch on CNBC 2013. At that point the company's unique selling proposition was a live option for one-to-many delivery of live content and the capacity for screen-sharing rich content. The visuals accompanying the pitch emphasised conferences

and lectures: one-way delivery. Participation and live video interaction only arrived later, in April 2014, and the service became notorious for sex scandals. As a conference application, Zoom would seem an odd choice for a surreptitious affair or sexting, surely more suited to one-to-one media like Skype or Facetime than to an interpersonal but still broadcast platform. But the idea of double dealing, of putting on a face, of hiding something from the group gaze, is such a constant of Zoom jokes where the visible jacket and tie distract from the shorts and novelty slippers off-screen, that the use of virtual backgrounds that the platform affords can now seem neither modest nor humorous but, especially added to background blurring and backdrop options, closing in on deceitful. Not quite telescopic even though they bring distant scenes into apparent proximity, Zoom calls cannot zoom in to the grain of skin, the glint in the eye. Seen on handhelds and laptops, they only fill a fraction of the visible field, yet they are gravity wells for attention. Every screen is a wormhole into another world, some distant, some past, some fictional and some, like Zoom screens, ambivalent. Real-time realism on ubiquitous screens is an ecology that multiplies worlds.

Microscopy at the Movies

Microscopes sit at another edge of the ambition of realism. Beyond the scale observable with the naked eye or single lens technologies like eyeglasses and magnifying glasses, the invention of compound microscopes (using more than one lens) attributed to Antonie van Leeuwenhoek in the 1670s would ultimately butt up against the limits of optical investigation at the wavelength of visible light. Around 1500× magnification, the interference between light waves begins to break

the representational power of optics. Even at less ambitious levels of magnification, optical microscopes need to have light pumped into the field of view, frequently in contemporary microscopes not a broad field of illumination but a point light source scanned over the field of view, synchronised to a digital clock. Supplementing available light and arithmetic methods have been a stock in trade of photography and cinematography for well over a century. But the scanning principle, the governing principle of scanning electron microscopy which allows it to go beyond the limitations of optics, unsettles the border between picturing and data visualisation, the topic of Chapter 2. Suffice it here to say that at or near the 1500× magnification limit, realism's claim to approximate to or extend human perception begins to lose traction as picturing gives way to measurement.

These limits were the themes of two movies that came out four years either side of Rachel Carson's *Silent Spring*, a founding text of modern environmentalism: *The Incredible Shrinking Man* (1957) and *Fantastic Voyage* (1966). The hero of *Shrinking Man* is caught in a radioactive mist that causes the eponymous shrinkage, taking him through a Robinsonade of survival in the basement of his suburban home before his remarkable final speech, when he accepts that he will continue to shrink into the unknown, visible only to God. Eight years later, Fleischer's *Fantastic Voyage* shrank Raquel Welch and the crew of the experimental submarine Proteus to inject them into the comatose body of a scientist injured in a Cold War assassination attempt. The crew perform nanosurgery and escape through a tear duct just in time to return to their normal size. *Shrinking Man* takes place almost entirely in a recognisable American suburbia; *Fantastic Voyage* in a scenario dominated by comic-book computers and military uniforms. Both use double-printing to secure their effects,

Shrinking Man shooting foreground action against black velvet, substituting macrophotography of the cat and spider that give the hero his climactic action scenes, plus oversize domestic props to give the impression of scale. *Fantastic Voyage*, shot in colour, plays its borderline psychedelic backgrounds over green-screen, giving the Cinemascope film a theatrical quality veering on Brechtian estrangement. In themes and delivery, *Fantastic Voyage* is much the lesser film, but it remains a constant reference for scientists involved in communicating the powers of robotics, nanosurgery and related technologies, as a search on Google Scholar reveals. The imagined power, now being realised, to see inside blood vessels while performing subcutaneous operations, has become, in retrospect, a prediction, the film's theme of control vindicated, and its cinematic realism proven by the actual effectiveness of twenty-first-century surgical technology.

The Incredible Shrinking Man, on the other hand, deprives its ordinary man of any control. Someone else, anonymously, has loosed the radioactive mist, its effects are unpredictable and his end unforeseeable, even in the final and triumphal seconds of the movie. Not only are its visuals more convincing, but the sounds too. *Fantastic Voyage* supplements a banal score with some electronic effects synchronised with images of computers and the device that shrinks the submarine; *Shrinking Man* has a sound palette closer to *musique concrète*, whose founder, Pierre Schaeffer, describes its purpose in the period (1950–55) immediately preceding Arnold's film as

> a reversal of the way musical work is done. Instead of notating musical ideas using the symbols of music theory, and leaving it to known instruments to realize them, the aim was to gather concrete sound, wherever it came from, and to abstract the musical values it potentially contained.

These found sounds, realist as few previous sonic materials had been, are accompanied by a voiceover, its anomalous position between storyworld and auditorium justified when the hero lays claim to a kind of existential immortality beyond the threshold of his vanishing. Even if his existence still needs, in his last line, a God to testify to it, that God is as much a testament to the expansion of his sense of self at the moment of its dissolution as it is to the prior and external existence of the Deity. The two films perform between them two poles of microscopy's claim to truth: that it works, and that it reveals marvels.

These films might exemplify Cavell's theory that films observe from behind the self, or Parks' triumphant Western technoscientific subject. The positions are reconcilable if what stands behind Cavell's self is Parks' technoscientific subject. The pantomime of terror in *Fantastic Voyage* only demonstrates the reassuring stability of scientific and military control, subordinating Cavell's phenomenology to Parks' sociology of objectivity. *The Incredible Shrinking Man*, meanwhile, plays through a range of conflicts, concerning desire and its frustration, control and its frustration, and the isolation of the frustrated self from the rationalism that, Parks senses, organises its interplay with the world. The hero speaks from off-screen, unsettling the presumption that the self is an autonomous whole, implying that it is instead a domain of conflict. Both films reach their limits at the limits of the optical, but *Fantastic Voyage* returns from that boundary with its psychic and social orders unchanged, while *Shrinking Man* (almost, but in a substantially different register, a pre-echo of the Eames Office's *Powers of Ten*) touches on mystery, an other-than-human order of imaging. To evoke it, *Shrinking Man* turns to astronomical images, as if to tie together macro and micro in an enclosed loop ('God') where the Eameses, twenty years later,

have the resources of electronic microscopy to aid them in imaging and imagining the infinitesimal.

At this threshold, *Shrinking Man*'s fear of the infinite real meets Jean Baudrillard's fear of simulation, the image without an original that undercuts all claims to truth. Archaeologically, Parks' technoscientific subject derives from God in the Western tradition: the plenum at the end of the world. Cavell on the other hand hints at a Russian doll of consciousness: behind the self lies an observer, but behind them lies a potentially infinite regression into both observation and self-camouflage – an absence. What brings the fullness of God and the emptiness of the Self together is that both Cavell and Parks, and in their ways *The Incredible Shrinking Man* and *Fantastic Voyage*, place *a* subject, individual or collective, at the centre of their ontological and communicative universes.

Continuing the opening chapter of *The Mayor of Casterbridge,* Thomas Hardy pulls back from the minutiae of footfall and backpack to observe his couple's relation, and

> the perfect silence they preserved. They walked side by side in such a way as to suggest afar off the low, easy, confidential chat of people full of reciprocity; but on closer view it could be discerned that … his taciturnity was unbroken, and the woman enjoyed no society whatever from his presence. … That the man and woman were husband and wife, and the parents of the girl in arms there could be little doubt. No other than such relationship would have accounted for the atmosphere of stale familiarity which the trio carried along with them

As the couple move towards the opening chapter's shocking dénouement, Hardy pre-empts Schaeffer's discovery of the sonic universe waiting to be discovered and John Cage's simultaneous discovery of the sonic environment in his 'silent' composition *4'33"* of 1952. Their 'total absence of conversation',

Hardy notes, 'allowed every extraneous sound to be heard'. Their relationship, and the absence at the heart of it, pre-empts the social (which will first puncture then overwhelm it as they enter the fair at Weydon-Priors) with environmental noise. At the same time, Hardy plants their child as witness that they once were far closer than now, so that the familiarity that has staled marks not a lack but a loss.

A Zoom conference zooms in on the face, much as the MPEG codec does, as the privileged zone of communication. Hardy observes the whole body, its motions and environment. Zoom zooms in on and synchronises the speaking face and the speaking voice: *Shrinking Man* disassociates them. The etiquette of curtaining off or blurring the domestic background or using a backdrop image to discipline domestic mess only emphasises the joy everyone feels when a serious meeting is disrupted by pets and children; but we mostly treat domestic sounds, along with echoes and feedback, as noise, and the smart professional user increases their communicative efficiency with a lapel mic and sound filter settings. Share Screen prioritises voice even more. Hardy's ethnographic observation of environments and body language is curtailed to the point of disappearance while encouraging self-conscious performance of self. The gain in real-time, always Zoom's unique selling proposition, is paid for in the lack of bandwidth for all these other, especially unconscious avenues of mediation. Zoom's prioritising of voice is efficient, not realist.

The Powers of Ten and *The Incredible Shrinking Man*, each in their way, tell us that reality is a matter of infinite bandwidth. Hardy's leisurely description as he moves towards the opening chapter's melodramatic climax, like the breath-taking detail of these films, constantly persuades us that what media representations lack is bandwidth. A photo or filmstrip magnified will ultimately only show molecules of silver halides, but

reality goes on forever into the sub-atomic or outward to M87. This is what Zoom sacrifices in pursuit of real time. The dolly-zoom shot in *Jaws* tells us that presence is not instantaneous. *Nostalgia for the Light* and *The Incredible Shrinking Man*, in their different ways, tell us not only that time is intrinsic to the telescopic or microscopic voyage, but that the present is an illusion. The Now camouflages the ideological assertion that *The Powers of Ten* and *Fantastic Voyage* make, that synchrony is real where recording is not, and that Zoom zooms into the present, as if it presents a more real presence than the people and objects it represents. That present itself must be filled: there is no room for comfortable silence any more than for Hardy's stale familiarity, and certainly not for a transcendental end of communication. The ideological work of Zoom is to manufacture out of compulsory dialogue a universal present whose termini are no longer macro and micro but You and Me, each produced as an effect of the erasure of time, points travelling in parallel through a shared Now, no longer in time or of time but as time, reduced to this travelling spot, this scan. The Eameses' scientific and Hardy's fictive Now are no longer special effects but an infrastructure. Real-time usurps realism.

1.2 Blackfriars Bridge, 1896

The shared Now of a Zoom conference is a fiction. Literary, cinematic, journalistic and all the other realisms, even so-called real-time, necessarily straddle different times: the now of the sign, the then of what it references. The Zapruder film of John F. Kennedy's assassination zooms in on a historical scene, a tiny, eight-millimetre, chronoscopic portal onto an unchangeable event, a fragment of time divorced from the event that gave it birth. A picture *is*: what it depicts *was*. The event

dissolves while its picture continues its journey through time. Any image persists; the realist image insists – that it has a truth to convey, insistently zooming in on some event it believes can convey it. The proximity of (social) realism and unrelentingness (as Eliza Cubitt reminded me via email) is witness to what we do not want to see, to hear, to read or to know. The unrelenting quality of Karl Ove Knausgård's prose or Ken Loach's films is only strengthened by the way the recording of film – even hand-cranked – defines and determines how it is to be shown, synchronising future screenings with the timing of the recordist. Nineteenth-century schools of Realism consistently evoked then-present sufferings. They often pledged their portraits of squalor to political or ethical projects of reform, but there is no doubting their devotion to ordinary ugliness and to life (and death) as banal and painful. Realist efforts to redeem the present constantly risked falling into the sentimentalism that Walter Benjamin accused the *Neue Sachlichkeit* photographer Renger-Patzsch of when he 'succeeded in transforming even abject poverty – by apprehending it in a fashionably perfected manner – into an object of enjoyment'. Beautifying destitution on one side, on the other rubbing our noses in the dirt as a means to moral superiority, realism is damned either way when it devotes itself to the only thing that can truly be called real: whatever exists in the present. Since the future by definition does not exist, there only remains the possibility of realisms devoted to the past.

Ancestors

Even here, however, realism risks rose-tinting nostalgia, apologies for and celebrations of selected highlights from the catalogue of history, or glorifications of past suffering as sacrifice

'necessary' for the glory of the present. At the same time, however, that unrelenting quality can instead recall Benjamin's assertion that '*even the dead will not be safe* if the enemy is victorious'. Realisms – both literary and pictorial, but perhaps most of all moving-image realism – insist because they produce a co-presence of text and audience. These 'present' realisms must somehow also include not only depictions (which would be sentimental to the extent that they take no responsibility for the past) but redemption. Historical fiction like Hilary Mantel's *Wolf Hall* (2009) and its TV adaptations reconstruct in order to understand and empathise. Archival photography and film destabilise our expectations of the orders of reality depicted in old movies and photos. They are more difficult to empathise with than dramatisations. And they force us to consider what will be preserved in images and videos recorded today, how the future might empathise with us and how we and the ancestors we struggle to understand will appear to the future.

Take the thirty-six surviving seconds of a view of Blackfriars Bridge taken by Robert W. Paul in April of 1896. Film historian Ian Christie (from whom many of the following details are taken) quotes Paul's story of how 'In our first trial [of the camera he designed with Birt Acres], we failed to get a picture on Blackfriars Bridge, only because we forgot, in our excitement, to attach the lens'. Already the surviving film is a double of a lost film. How different might that film have been? The world as it was when they thought they had recorded it neither passed into the ordinary oblivion nor held in these seconds of remembrance, a world just missed, like the river traffic below and the southern end of the bridge off-frame to the left. Equally unseen is the source and destination of much of the foot and cart traffic passing the lens: the Victoria Embankment at the northern end, completed sixteen years earlier in 1870,

built over Joseph Bazalgette's great London sewer, which carried effluvia past the tidal limit to heal London's endless struggle with cholera, works that in turn demanded the building of the new bridge that Paul stood on.

The new Blackfriars Bridge replaced one demolished during the Embankment works in 1860. It was designed as a deck arch bridge in five spans of wrought iron by railway engineer Joseph Cubitt, son of William, also a railway engineer – no relation to the MP who founded Cubitt Town or, to the best of my knowledge, to the author, though father and son were born and raised on the Norfolk Broads, the probable origin of our shared surname. Joseph died in 1870, just after the bridge's completion in 1869. Standing at the tidal turning point, the bridge's ornamental ironwork, designed by the sculptor John Birnie Philip, features marine life and seabirds on the eastern, downstream side and freshwater birds on the western, upstream side. There is a portrait photograph, probably from the 1860s, of Joseph Cubitt donated to Wikipedia, seated, arms folded, in a morning coat and cavalry twill trousers with polished boots. Some other mode of realism ascends from the possibility of genealogical connection, like incense at an ancestral shrine, as it does from the match between Paul's film and the historical record.

As unanswerable as the ongoing reality of the bridge itself, equally unknown genealogies connect the living – today or in another generation – with the anonymous figures who nonetheless in many cases would have been direct ancestors of someone in successive audiences of the film. DNA is not destiny, and family lineage is not authenticity; but the living do seek out connection with ancestors, as the popularity of genealogical TV shows and web ancestry services demonstrates. In this instance, the chance connection of surnames suggests something about the ancestral nature not only of humans

but of technical artefacts. Genealogy is not our only connection with the past: in the title of Paul's film lies a link to the thirteenth-century Dominican friars who established a priory nearby that gave the area the name Blackfriars. Similarly, there is no need for biological descent to link Blackfriars Bridge with the Paul-Acres camera, built with much of the same engineering spirit, using many of the same materials and, like it, heir to hidden ancestral skills like iron smelting, recalled in the wrought-iron bookshelf in Wikipedia's Joseph Cubitt portrait. For thousands of people, traversing Blackfriars Bridge is a daily routine, a routine only nascent in 1896 but, as we can see from the disinterest of some passers-by and readiness for distraction of others, already gaining traction. This quotidian routine is only slightly more conscious than the experience of being filmed, constantly, in public spaces, something Paul was among the first to undertake. Like every moment in technological and media history, Paul's view of the bridge is both an ancestor of the contemporary world, and the fruit of prior ancestral labour.

This ancestral realism extends from the Edison kinetoscope which, Paul discovered, was not covered by European patents and was therefore free to copy, to the metallurgy of the bridge. It knots in the Maltese cross – borrowed from the sewing machine's automation of hand-stitching – that Paul employed for his intermittent motion. The Maltese order of the Knights of St John links it to the history of freemasonry and to P2, the masonic lodge (whose members called each other '*frati neri*', black friars) implicated in the death of Roberto Calvi, the Italian banker found hung in 1982 under the northern end of the bridge where J.P. Morgan Banking, now occupies the site of Robert Paul's old school. Christie also cites early film historian Will Day's typed note from 1932 according to which Georges Méliès bought a half dozen Paul

theatrograph projectors, converting one of them into a camera, perhaps (as Pasi Valiäho suggested via email) the very one that jammed with such consequence for the history of cinema when Méliès 'saw a Madeleine-Bastille trolley change into a hearse and men changed into women'. The modes of truth in realism do not depend on feedback, for at least two reasons. First, because the ripples from an instance of realist recording like Paul's *Blackfriars Bridge* spread geographically and historically, at least as far as Calvi's demise. And second, because the complex intrigue of re-presenting reality so often leads us back towards death, Calvi's, the future-anterior deaths of the people crossing the bridge, and the ancestors whose dead labour made their images possible. Recognition and respect for ancestors is not a communication that can ever be reciprocated or closed. In the presence of sewing machines and intermittent motion we should be respectful of the ancestral labour congealed in them even if no one is listening, which is to say, in the absence of feedback, which does not recognise this terminal moment at the centre of recording.

But in reality, to coin a phrase, we are not respectful: we are by and large far less interested in the machine behind the image than we are in the faces and the animation of their movements, just like our Victorian ancestors marvelling at Paul's first shows. We too observe the individuals or their class, but rarely the collective, and even less frequently the collective invention that Christie does so much to emphasise. We note the activity, not the bridge. One order of reality – ancestral labour, as the historical legacy Marx called the 'general intellect', congealed into architecture, machines, language, symbols and techniques – is so much our reality that we no longer see, hear or sense it. Philosopher Bernard Stiegler asserts that humans have always been technological and that today, even more than in the past, we are embedded and embodied in

media, and more forgetful of them. As little cognisant of our milieu as the crowd flowing across the river, so unaware of the bridge itself, it seems, even though it was scarcely fifteen years old. Once the object of public fascination, the Embankment sewer, like the bridge, disappeared into the infrastructure So deeply do technologies disappear into the fabric of living.

Disappearing media infrastructures include those we see through – such as the writing on two of the carts that pass the camera, one at the beginning with the words 'GLEN' and perhaps 'VESTRY' painted on it, and one at the end with bold letters C and P. Perhaps if we had been Londoners of 1896 we might have known or guessed the hidden continuation of 'glen' under the tarpaulin that covers it, or known what 'vestry' might have referred to (Oswestry? – the image is insufficiently clear to read with certainty, and perhaps the paintwork was damaged or obscured). On the other hand, the young man who, unusually among those passing nearest the camera, does not look up from his newspaper, ignites recognition of the absorptive powers of handheld media a century apart, a behaviour we still find as amusing as Socrates' self-absorption was to Aristophanes twenty-five centuries ago. It is not simply, as Marshall McLuhan noted, that the content of any new medium is an older medium, but that the social operations of a new medium consume the power-base of an older formation. As another media historian, Régis Debray, puts it, 'Each new medium short-circuits the class of mediators that emerged from the preceding medium'. The printed Bible, for example, short-circuited the power of the pulpit as mediator of the Divine Word. Hidden beyond the north end of Blackfriars Bridge, under the Embankment, beside the sewer, Bazalgette also installed the East-West tunnel of the District Line underground railway. This invisible carrier is already short-circuiting not only the carters but the policing of road transport, replacing

it with telegraphy and automatic mechanical systems. Media transformation includes the transformation of the hierarchies that manage them.

Hierarchies

This may explain the disapproving glance of the well-dressed gentleman in the top hat as he approaches the camera's position. His laborious acquisition of numeracy and literacy (itself threatened by the popular literacy of the daily press consumed by the avidly reading young man who follows him across the bridge) not only serviced his wealth but distinguished him from the illiterate poor. That hard-won ascendancy is devalued and bypassed by the camera. Even if he did not know it was catching 'living pictures', he knew photography was more than after-dinner entertainment, especially photos seized on the fly in the open air and in public spaces. The returned gaze so assiduously avoided in subsequent cinema is a constant in the early years, a clause in the contract of portraiture which, however, was voided or at least betrayed when Paul collected his likenesses without the permission or participation of his subjects.

Portrait realism is a matter not only of what is represented but how, and the 'how' concerns, among other technicalities, assimilating the sitter into the means of representation, including not only the technical, economic and ecological apparatus, but the portraitist, the sitter and their social relation. Without this contract, the 'what' is merely content, and worse: excluded from the act of picturing or describing. That this has occurred over and over in the history of journalism (and has been long critiqued in anthropology) is as undeniable as it is unethical and, in many instances, exploitative. Ecocritical study of

realism in the twenty-first century demands that we acknowledge the participation of the observed, to the point that it can no longer be thought of as observed but as collaborating in the production of pictures. In practice it is common enough to note the reluctance of situations to be pictured or to participate, and we have devised all sorts of technologies and techniques to deal with excessive or inadequate light and sound, restless movement or apparent immobility – to record what resists recording. Ethically and politically, however, technical solutions pose other challenges. Hidden cameras are not merely matters of paranoia; and intrusions into private moments are increasingly contentious in the age of ubiquitous lenses. Slowly we are beginning to learn that it is not okay to show the battered body and the distraught reaction. We have still to learn to be concerned about the way we picture landscapes, oceans and animals in pain and suffering.

But a cat may look at a king, and a street photographer may look at a promenading toff, even if that poisons the observer–observed contract. The gentleman has the right to object. In his world, the camera's gaze is insolent and he looks indignant because his dignity has been infringed in a social order that depended on class hierarchy. When the Lumières filmed the workers leaving the factory, they were looking at *their* employees leaving *their* factory, using their privilege of looking at their factory hands, and perhaps taking paternalist enjoyment in watching them trotting off for their lunch break. Paul's gaze, on the other hand, is politically as well as mechanically democratic, frank to the point of indecency and radicalism from the standpoint of the gentleman in the topper. We can contrast here the equally frank look of the man with the cap on the back of his head who asserts his right to look in exactly the way that Paul does. But then consider the older, bearded man. His look appears to be triggered by observing the City gent in the

bowler who has been looking down at the river before noticing the camera, and who keeps looking at it without raising his head, his eyes shaded. The bearded man turns to look over his shoulder at the camera as the bowler-hat passes, stooped and breathing through his mouth rather than gaping in awe, looking old or prematurely aged, and weighed down. He gives the camera a fraction of a second's attention before turning back to the direction of his walk. The glance is fleeting, and we can wonder whether he ever recalled that glimpse of the animatograph, or just confirmed the experimental apparatus had nothing to do with him and carried on. Unlike the gent, he had no reason to expect to be recorded. If he knew of photography, he might have imagined a daguerreotype of the fine new buildings, not the life on the bridge, not, surely, his life at the bottom of the London pile. If he knew a little more about the still-new art, he might have guessed that long exposure would erase all fleeting movements, too fast to be caught on the plate, and record only the unmoving architecture of a depopulated scene. He might, if that were so, have already imagined himself as a photographic ghost.

Two women appear in the scene. One walks on her own, hatted and dark-clothed, hand on hip, with something of a sashay, paying no attention to the camera. Perhaps she is used to being stared at. She and the woman accompanying the Gent both carry umbrellas, which none of the men seem to. The first woman seems young, self-confident, independent, perhaps employed in the City. The other woman holds her escort's arm, and looks with him towards the photographers. Older and of a 'better' class, like her escort she ranks herself above the journeyman photographer, even though her position, we might infer, as any passer-by might, comes from the privileges of birth and marriage. Further from the lens, one man crosses the road, briskly avoiding the traffic. A male cyclist passes northbound,

but no women seem to be braving the city on wheels despite this being the height of the cycling craze, just as they do not number among the cyclists leaving the Lumière plant, despite, on the one hand, film's love affair with gender, and, on the other, its intense and complex relation with the bicycle that came into prominence at the time of cinema's invention (two, three and five cyclists respectively leave the factory on bikes in the three extant versions of the Lumières' film). Like the bicycle, cinema converts rotary motion into linear, projecting new, linear trajectories through the circuit of time. Like Paul's cinema, the bicycle was an instrument of democracy, and already a transport of freedom such as cinema would later become.

At this point, however, cinema still had that ahead of it. In the same way that the Lumières' *Workers Leaving the Factory* can be reread as a patronising view of workers from the bosses' point of view, so Paul's view of Blackfriars may also be seen as democratic in the specific sense that it operates as a precursor to CCTV. In a passage reflecting on literary and cinematic accounts of bicycles, including Bartolini's novel and de Sica's movie *Bicycle Thieves*, Gerald Raunig observes that

> it is not a matter of saying 'the bicycle *is* …' – a machine for instance, but rather the bicycle *and* the person riding it, the bicycle and the person *and* the person and the bicycle mutually supporting one another, the bicycles *and* the bicycle thieves, etc.

Just so we can reimagine the cyclist as a man-bicycle machine, *and* an already complex element in a greater and more complex transport system. Paul's view of busy traffic on the bridge is an early intimation of the transport/surveillance media complex that now governs such busy interchanges. Like accounts of twenty-first-century cities lacking automated traffic monitoring and management systems, we can be amazed that the

traffic crossing Blackfriars Bridge doesn't descend into chaos, crashes or stasis. (Judy Wajcman notes, citing a 2010 Transport for London report, that 'riding a Victorian technology in central London – the bicycle – during peak hours is faster than traveling by car'.) One reason the film distinguishes itself from surveillance is that at this point it is not causally connected to what it observes, unlike CCTV tied to traffic signals and emergency services. Instead, like the Lumières' film, it leaves us to enjoy the spectacle of a segment of the world that, for its short duration at least – if only because it is a segment whose framing excludes all the confluent ancestries governing its activity – can appear as if it were free.

Not least free from the muck that must have covered the road behind all those horses. The carter walking beside his horse in the very first few frames is the only person treading through it: the cart-and-two, the carriages and the heavy omnibuses all let the horses do the walking, probably wearing tail bags to collect the valuable manure to freight out to the market gardens of Essex and Kent. The preponderance of animals in the city is striking. In the Lumières' *Sortie des usines* there is only a horse-drawn diligence in two versions and a playful dog, possibly a watchdog but clearly a favourite of at least one employee. On Paul's *Bridge*, a dozen or more horses pass, blinkered, harnessed and at work. The intensity of that work – in the service not only of hansoms and broughams but of omnibuses taking the clerks to the new offices north of the river and carts sufficiently laden for the walking carter to have avoided adding to the weight – may explain the distinction Marx made only twenty or so years earlier between work and labour, the sweat that produces something useful and the paid labour that produces profit. The barrier between city and country is more porous than it would become when the motor car took over the bridge.

Cavell cites a passage from the closing lines of Baudelaire's *The Painter of Modern Life*: 'a carriage, like a ship, is lent by its movement a mysterious and complex grace'. Cavell notes that

> Baudelaire's carriages carry the weight of all those conveyances and machines whose movements are so lovingly studied in the film … [which] returns to us and extends our first fascination with objects, with their inner and fixed lives, and it studies what is done in and with them … where they are placed and why.

Baudelaire's praise of the painter he identifies only as M.G. distinguishes his meticulous depictions of harnesses and individual horses from views of exotic locales and epic narratives. Cavell notes that while photography, certainly round 1863 when Baudelaire was writing, had yet to escape from the landscape and portrait genres of painting, film would instantly take up the work of picturing and celebrating the detail of the everyday. Paul's film catches the trot of ponies drawing lightweight hansoms, the ambling nags of the carters, and the distinctive sway and bounce the shafts convey back to the vehicles they pull. This commitment is the more unusual in comparison with sound recording, which retained a more or less exclusive commitment to the speaking voice and the concert setting until the advent of radio, with no interest in capturing the equivalent ordinary soundscape of the urban world. Sound recording first focused on the voice, the equivalent of photography's focus on portraits, while the equivalent of landscape photography, birdsong and other natural sounds, had been recorded at least since 1888. Only in the electrical recording era, after about 1925, would city sound enter the technologically mediated universe. Studies of the Noise Abatement Commission and its precursors, and of architectural and engineering responses to what acoustic historian Emily Thompson

calls the soundscape of modernity indicate something of the chaos and its gendering in the USA after 1900. Patricia Pye's account of the changing sounds of London in the same period, immediately after Paul's Blackfriars film, had to rely on literary descriptions – the precise practice that Baudelaire belittled as *sténographie*, and whose incapacity to capture the peculiar motion of horse-drawn cabs and carriages made him such an amateur of painterly observation of modern (though perhaps a more accurate translation might be 'contemporary') life. Sonic stenography, instantaneous transcription from life, would have to wait a few decades more for sound to catch up with the metropolitan ambition of film.

Victorian Anthropocene

London was indeed a metropolis. Among the humans, all the faces we see appear to be European. Though London was riven by distrust and hatred of Irish, Jews and German immigrants, we have no way of identifying these people's ethnicity in the ways that were so meaningful to Paul's contemporaries. Notable by their absence, there appear no members of the still small Chinese and Afro-Caribbean communities based respectively an hour's walk away in Limehouse and two hours away on foot in Canning Town. By demographic statistics, this is unsurprising. But considering London's role as world city – heart of the greatest empire the world had ever known, the port to which the trade of the world made its way, directly or indirectly – the monocultural everyday captured on Blackfriars Bridge is retrospectively shocking in this exclusion. The bridge, in all its banality, is the still eye of a hurricane. An entirely unique moment, for its denizens, the scene was already replicable, typical, ordinary, but around its ordinary

bustle hurtles an empire of extreme violence. The bridge and everything on it, from the money that built it to the beaver hat and silk dress of the wealthy couple and the woollen suits of the poorer sorts, all the way to the news in the paper so assiduously read by the last youth we see, depended on goods and labour extracted from London's invisible colonised territories. The freight in the carts in all likelihood came from Royal Docks at Canning Town, opened in 1855. They embodied the labour of invisible sweated millions we can only read, displaced and allegorised, in the equally sweated labour of the carthorses, and as inhuman. Such allegories are the enemy of realism, yet this ordinary realism, this fascination with the surfaces of the contemporary everyday, and for us of the vanished mundane past, depends on what is replicated there but cannot be shown, because of the movie camera's love affair with surfaces.

As invisible as the lighters and ferries under or downstream (behind Paul's camera) from the bridge, is the Thames itself. Every bridge is an act against nature: overcoming the environment given to its inhabitants, creating an earthen road in the place of water, a rigid iron structure instead of ferry boats seized by the current. Paul's camera identifies itself with this anti-natural project by ignoring the water below. Given the fascination of nineteenth-century realist and Impressionist painters and early cinema with water (Paul's collaborator Birt Acres had shot his own *Rough Sea at Dover* the year before), the omission is suggestive. The tide of life overlays the tide flowing under it. The tidal river itself was already understood as what we now, brutally, call an 'environmental service', a self-renewing resource. This was Huxley's position in 1883 when he announced that 'the great sea fisheries, are inexhaustible; that is to say, that nothing we do seriously affects the number of the fish', implying that humans could take as much from the ocean and dump as much into it as they wished. We do not know

better now: we know worse. The success of the Bazalgette sewer was all the worse for the river, obliquely visible in the Fauvist painter Derain's 1906 canvas of the forgotten mudflats under the arches of Blackfriars Bridge. Derain sees in the discarded river a medium no longer for the great sea-faring ships (since the early nineteenth-century construction of deep-water docks downriver) but only for lighters bringing goods up to Town. Remnants of the old trades, among the poorest of the poor, mudlarks and scavengers would have scoured these flats at the turn of the tide. Meanwhile the waste of this mighty city churned its way under the busy street towards discharge, always on the high tide, at Crossness and Becton, untreated until 1900, to be distributed into the Channel and the North Sea along coasts like the one Birt Acres filmed in *Rough Sea at Dover*. All this passes invisibly in Paul's film.

What we can see is architecture fading into the smog. London's fogs were legendary by 1896. The fumes from coal fires, domestic, industrial and maritime, shattered the daylight Paul's film exposure demanded. The evidence is there in Monet's nineteen views of the Houses of Parliament from his studio on the South Bank near St Thomas' Hospital, and nudging eighty of Waterloo Bridge and Charing Cross Bridge from the Savoy on the North side, painted between 1899 and 1904, an Anthropocene sublime antipathetic to Derain's desolate view from below. Not only the things in front of the camera – the bridge's metal was once a hillside – or the camera itself – perhaps bringing more metal from the same mine to this cinematic encounter – but the very light that allows one to become visible to the other was as packed with particulate matter as it was with noise and filtered Spring sunshine.

It feels impudent to implicate the airborne and aqueous waste of the city in Paul's film. Like the bridge, the film wants to haul itself out of the mire, out of nature. But as a technology

implicated in its world, like the bridge it cannot wholly disassociate itself from the reasons it has come to be and the world it depends on for its existence. What may grip us now, as it almost certainly did not grip its first audiences, is the murk that it strives to escape from. Equally, however, we can share the camera's fascination with the foreground figures, and to some extent the surprise of temporal dislocation. At those first screenings, on peep-show kinetoscope or projected, the scene was already past recall: film proved its realism by exceeding any possible capacity of human memory. An imperial city of bustle and trade never repeats. Though like the Thames' diurnal tides, the rush hours and slack periods might be reduced to statistical likelihoods, this precise configuration will never occur again, and though we watch, quite probably as our Victorian forebears might, a *typical* scene, we are still aware, as they no doubt were too, that this, unfolding in our present, is already undone by time, a repeatable record of an unrepeatable actuality of animals, carts, weather and Londoners.

Whatever else it was, Paul's testimony that he and Acres forgot the lens at the first attempt shows that this was a machine test, and its one undoubted truth is that the machine worked. There was no viewfinder, certainly no reflex viewfinder. Paul and Acres would not have known exactly what was framed in the shot, any more than they could be sure that the machine they had built would work. The proof, for them, was their recollection of the scene that unfolded as they wound the crank. They could judge the mundane realism of their footage by its truth to their previous perception. What it revealed was that perception takes time, that time is not the enemy of the ephemeral moment but its condition, and that time is a property of perception. There is no image of this scene other than this image, which was already delayed, so that the image has never been present in the scene it shows, which in turn means

that the scene as we see it appears to us as if it were not present to itself. Not even photography had made this subjunctive, not-quite-existent quality so clear (it would become a property of photography only with Kodak's Box Brownie of 1900, more or less at the same time as the widespread adoption of the movie camera). There was no photograph that motion was added to. There is, however, the gap between the profilmic event in front of the camera and its filmic image; as there are the gaps between images. Like the machine gun pioneered by Paul's Hatton Garden neighbour Hiram Maxim, the secret of cinematic movement is that its momentum rests on moments of empty time, empty perception, a void. The difference between frames that (analogue) apparent motion depends on depends in turn on instants of darkness repeated over and over in every screening. But this darkness only appears still because the kind of time it occupies is not the same as the time of the frames it separates. It does not repeat, but rather subsists, always there, the same dark screen, between the bright pictures, a sort of eternity rhythmically interrupting the onward flow of the action on screen.

Following Frege's definition of zero as non-identity, the 'eternal' time of the black strip between frames is not so much an interruption of existence as its condition. Each frame leaps out of the dark that differentiates it from the frames before and after. The non-identity of the dark is the primal difference that makes all other differences possible, indeed necessary. Appearing depends on the difference between event and observer. Perspective set that difference up as spatial. The cinema added temporal difference. These differences proliferate inward into lens and camera design, and outward to the endlessly multiplying observers of the film's observation and observers of the observers of the observation … As 'philosophical toy' (a genre of optical devices stretching back to

seventeenth-century camera obscura), the Paul-Acres camera realises Frege's 0+1, 0+2… foundations of arithmetic.

The Paul-Acres hand-cranked camera was not yet an accurate time-keeper. Clockwork ciné-cameras would not come into widespread use until the arrival of synchronised sound film in the later 1920s. But already the splitting of time into discrete frames modelled Frege's arithmetic onto the action of the Maltese cross. The gap between exposures when the film transport mechanism is in action – the hidden moment of movement – has a fundamentally clock-like structure, and raises once again questions raised in the previous section: when is realism? And when is reality? One excessively obvious way of asking this is to ask what time of day the film was exposed. Digital video automatically imprints a date and time stamp on everything it captures: not so the Paul-Acres camera. The smog-filtered sunlight is sufficiently diffuse for us not to be able to read the time from cast shadows. But we intuit that the shot began and ended at two specific times. The year 1896, fortuitously, saw the bankruptcy of the ill-fated Standard Time Company, a firm that had tried, with varying success, to supply by telegraph the correct time as measured by the chronometers at the Greenwich Royal Observatory. The company suffered in competition with a more trusted because more comprehensible service offered by the Belville family over a period of nearly a century which involved family members carrying a chronometer corrected to Greenwich Mean Time to businesses all the way from the docks to Mayfair. The last of the family, Ruth, finally retired in 1940 after bombing led to the Greenwich time-service being relocated to Surrey (at her death in 1943, she possessed the sum of £185 6*s*. 10*d*. – a small accumulation for a century in service to time). The physical transport of time, like the film transport mechanism in the camera, sets a puzzle for us, since the film, as time-capsule,

has also transported its precious 35 seconds not just from Greenwich to Mayfair but across more than twelve decades. Like *Powers of Ten* and Hardy's elaborate zoom in and out from the road to Weydon-Priors, the view of Blackfriars Bridge combines the still frame's aspiration to wholeness, its necessary dependence on the void subtending its motion, and the transport of time, in time, and through space. This fundamental contradiction in the concept of succession also underpins Einstein's conception of space-time. Cinematic realism's ontological claim to both belong to and transcribe reality depends on this contradiction.

Ontology and Oblivion

But it is also clear that filmic realism is phenomenological. It requires its viewers to leap out of the dark into perception, specifically the perception of motion, without which film cannot exist. As media historian Wolfgang Ernst notes, 'People are addressed through media in their existential (not historical) sense of time', and though viewing Paul's film seems to contradict Ernst's view that audiences do not see media (at least archival media) as historical, he is undoubtedly correct to dispute the determinist view of media 'as a history-making power'. In his book on Paul, whose scholarship makes this writing possible, Ian Christie opines that electric light had a far greater impact on London and the world than cinema, an opinion shared by technological historians. While this is true, it is also the case that moving images and network video, their current dominant form, are realisations of electric light, with the significant difference that electric power remains centralised while the production of movies has, since Paul, been distributed and to that extent democratised. This has its own

effect on the phenomenology of modernity. Electric light is the stripped back, minimal form of cinema/video: illumination and duration without direction – no realisation of the past, no virtualisation of the present, save only the imperceptible flicker of lamps that would, if we could only perceive it, undermine the illusion of solid constancy with the actuality of non-identity. Besides, electric light illuminates only where you are right now. Paul had already made the conceptual leap with his Time Machine patent application: cinema could illuminate, and in a certain sense could only illuminate, the past, in itself a properly photographic trick, as Benjamin recognised. But with its cyclical-linear conversion, cinema could demonstrate a new trick: picturing the future.

Cinematic motion is a form of consciousness and, as media philosopher Jonathan Beller maintains, 'a visual economy, and finally an economy of the senses and cognition' which expels the primal void it rests on into unconsciousness in order to prioritise the leap out of the eternity of silent darkness into propulsion, the forward projection of the Maxim gun, the bicycle and film. Films like Paul's view of Blackfriars Bridge discovered, uncovered and made possible the future as it was first conceptualised in nineteenth-century ideologies of progress, as it appears in the 'and so on…' of Frege's number theory. Every time the screen goes dark, we can imagine something utterly new appearing next. This indefatigable hope enables narrative and mobilises desire. The intermittent darkness also recalls the one future we can always be assured of: mortality, the triumph of the blank. The contradiction of desire and death, *eros* and *thanatos*, drives all cinema, another echo of the Maxim gun. After their invention, the future also threatened disaster, as in H.G. Wells' 1895 novella that inspired Paul's patent. In the video era, when desire has morphed into consumption and death into the Anthropocene, video's constantly

fading and refreshing images make The End not only thinkable but the ubiquitous condition of desire. Seen on digital video, Paul's film reveals anonymous ancestors marching, strolling and trudging towards oblivion on Blackfriars Bridge. The job of aesthetic politics is to turn that oblivion into redemption.

Cavell has good reason to argue 'that objects participate in the photographic presence of themselves' but it must be added that, in cinema, they also participate in their own disappearance. Their vanishing from the edges of the frame records both their quondam reality and their passing. Among the time-based arts, neither theatre nor music have this close a relation with death, because they are arts, in the supreme instance of dance, of the enduring present. Film is the art of the ephemeral, and it is so to the precise degree that it has a claim to truth. As the philosopher Gilles Deleuze noted, sometimes the frame simply excludes what is beside or behind the camera, but sometimes 'the out-of-field testifies to a more disturbing presence, one which cannot even be said to exist, but rather to "insist" or "subsist", a more radical Elsewhere, outside of homogenous space and time'. Film-philosopher David Rodowick glosses Deleuze's observation, suggesting that

> there is no longer a continuous action unfolding across images, but rather each image is defined in terms of series where each displacement in the chain can swerve or derail the current line of development, or produce unexpected and unpredictable variations in or of it.

In film, the apparatus and its objects have been co-present, to the extent that objects, as Cavell noted, become parts of the film apparatus; but appearance in and as image is also a testimony to the disappearance of those phenomena that once presented themselves to the act of filming. At the same time, the flicker of non-existence also propels that uncertainty that

Deleuze and Rodowick are concerned with, the uncertainty which marks the emergence of a future that is future precisely because it cannot be accounted for simply as an extension of the present and its immediate past. This uncertain future, a future that escapes planning and probabilistic prediction, the only kind of future worth calling by that name, depends on cinema's commitment to the disappearance of what it shows into the act of showing and its oblivion, twenty-four times a second.

The knowledge that everything we see in this film is past – even the film itself, at least in the condition preserved in the digital files available for viewing – that the figures on Blackfriars Bridge are gone, and their animals and carts and buses, only the bridge remains, and the invisible, eternal but un-self-similar river: this knowledge is tragic. But it is so because it is cathartic, in Aristotle's sense as analysed by philosopher Martha Nussbaum: it cleanses the mind, clarifies the situation, illuminates what is essential in it. For Victorians like Henry Mayhew, author of *London Labour and the London Poor* of 1851, that essence was made up of types, like Hardy's first view of the typical walk of the agricultural labourer. This typology has its origins in older allegorical forms, as Thackeray's *Vanity Fair* shows, with its titular quotation from John Bunyan's seventeenth-century allegory of the Christian life, *Pilgrim's Progress*. Nineteenth-century realism all too easily ascends into the god-like vision of Balzac's sprawling *Comédie Humaine*. The same may well be true of the masterpieces of nineteenth-century realist painting: of Courbet's 1849 *Stonebreakers* or Millet's *The Sower* of 1850, painted at a critical moment in French political and cultural history, both drawing the gaze away from the individual face towards labouring bodies, their tools and, implicitly, their social class. John Thompson's daguerreotypes (the basis for the illustrations to

Mayhew's book) and Jacob Riis' documentary photographs of New York slums collected in his 1890 book *How the Other Half Lives* show the same disinterest in the particular in favour of common conditions, their typical causes and effects. The faster photographic stock became, the more individualised the moments they could catch: perhaps none more so than Robert Capa's photograph *Loyalist Militiaman at the Moment of Death, Cerro Muriano, September 7, 1936*, where, however, even in the unrepeatably unique instant of his death, his face and identity remain obscure, and the event reverts to the common lot of humanity. Specificity can itself become a fetish, a risk run in the readings offered here of Paul's Blackfriars Bridge. Appearance is not experience, but we can experience his film, can hardly fail to once it screens in front of us, in however displaced and partial a manner. The contradictions inherent in realism's dialectics of presence and appearance, past and future, evocation and oblivion, particular and typical, extend to the antinomy of technology and nature. Nothing in Paul's film is natural, not the river, not its banks, not the sky, not even the sunlight. Film too is unnatural, but because it is also inhuman, certainly in 1896: it can exceed the boundaries of human perception that first defined it, travelling towards a general intellect in which land, air and water, the urban and the nascent cinema apparatus all combine as a mode of common presentation. Though film was tailored in 1896 to wavelengths and frame-rates tuned to human eyes, it has continued to collect light, dust and events, even in the most cautious of archives, whose accidental appearance seem to mock any pretence of the presence of the artwork to itself.

The aesthetic ideal of the absolute presence of the artwork celebrated by high modernist critics like Clement Greenberg arrives suspiciously promptly after Shannon and Weaver's mathematical theory of communication. Appearing, as we have seen,

embraces human, technical and natural processes. Presence is the product of hypostasis: of lifting some process out of the flux of the everyday to imbue it with an independent existence, elevated above time or causality. The free-standing artwork has no need of the proper names that once, alongside genealogies, supplied the guarantees of reality required by the collective authors of the Old Testament: it stands free of the networks of socialisation and habitation that would make it possible for it to bear witness. Paul's film is not autonomous: it shows us the moment when the faces in the crowd lose their proper names; when both the type and the individual are fading from existence, but without leaving an autonomous artwork as their legacy because their roots are so tightly knotted into their social, technical and ecological soil. Instead the film carries into the twenty-first century its incompletion, its demand that we, in our turn, take up responsibility for the shades of our ancestors, the shades of their suffering horses and exploited colonies, poisoned river, ruinous mines and toxic air. We are the uncertain future implicit in the travel of the film; we are the Elsewhere where the past comes for fulfilment and justice. Squeezing every first drop of interpretation from these scant seconds only opens the Pandora's box of the ethical and political demands that ecological aesthetics place on the act of interpretation.

1.3 The Remaining Tasks of Realism: *Rue Cases-Nègres*

Reality can be defined as the arena where actions take place. But equally, actions make reality: what we do changes things. What we say, if it is said in the appropriate place and time by someone with the authority to speak, changes reality too. Pronounced by the right person, performative speech acts like

'I find you guilty' or 'I pronounce you married' change the status of the people involved. Such authoritative statements come typically from patriarchal or colonial authorities that alter the world in ways those whose reality they shape cannot equal. Some people change the world simply by speaking. Reality is a matter of power.

Film scholar Noël Carroll suggests that we cannot truly be said to identify with fictional characters because 'Our emotions are disengaged from action; the characters' are not'; that is, characters' emotions lead to action, but the reader's or spectator's emotions lead nowhere. It may be true that, as film-philosopher Berys Gaut responds, 'An imagined emotion is not an actual emotion, any more than imagined money is real money', but we know that imagined money is real when it is magicked into existence by reserve banks, and that the emotions we feel in relation to fictional characters and situations are tangible: pulse racing, pupils dilating, heart thumping. Yet here too a kind of authority is in play: we can identify with the characters: they cannot identify with us. We have the privilege of watching: they can only be seen. The privilege of Western realism belongs to the history of colonial difference that marks the dominant concept of truth as the concept of the dominators. But reality is a conflicted construct, and realism can construct conflict as well as succumbing to dominance.

Scientific and Embodied Realism

The moment of Western science's foundation was also a founding moment of autobiography. Modern autobiography had to wait for the founding philosopher of the scientific method, René Descartes, to assert the principle of methodical doubt before the possibility of a self free from, and potentially opposed to, the

world, in the famous phrase *cogito ergo sum*, I think therefore I am. In 1950, Martiniquais novelist Joseph Zobel published, at the age of thirty-five, an autobiographical coming of age story called *Rue Cases-Nègres*. Originally rejected by respected publishing house Albin Michel because of its Créole dialect, that embrace of Caribbean French endeared it to generations after Alioune Diop published it in his *Présence Africaine* series. In 1983 almost 350 years after Descartes' *Discours*, Euzhan Palcy's film, also known as *Sugar Cane Alley*, adapted Zobel's book to international acclaim. Whatever they owed to the autobiographical subject enabled by Descartes and proclaimed in Rousseau's *Confessions* of 1769, Zobel's book and Palcy's film also spoke from and to a wholly different pan-African tradition. The story – of a novelist remembering his childhood in the 1920s twenty-five or so years before he wrote it – remade as a film another thirty years after the book came out and viewed now a century after the events that inspired it – raises poignant questions about the tangle of pasts realism contends with in the first quarter of the twenty-first century.

Descartes' *cogito* established the base of European truth in the separation of mind from body. Since he did not take into account that the language of his thinking was a social creation, Descartes' thinking mind, capable of knowing truth, is asocial. Deprived of commons and body, this Mind is autonomous, setting its own laws – 'the imposition of a mathematical model founded on the principle that only logic, with its forms and categories, was capable of deciphering the world' as decolonial scholar Javier Sanjinés C. describes it. European truth would be subservient to the individual mind as an autonomous agent. Contrast the Caribbean tradition observed in Palcy's film, where truth is voiced in call-and-response, as a story, reinforced by gesture, tone of voice and eye-contact, an embodied and social collaboration. In his *Discourse on Colonialism*,

published five years after Zobel's book, the poet Aimé Césaire, also from Martinique, called Descartes' *Discourse on Method* 'the charter of universalism'. For Aníbal Quijano, 'with Descartes came a radical separation between reason/subject and body' that enabled first the reduction of bodies to objects of knowledge, and then the racial theories of colonial reason that reduced colonised peoples to bodies, objects of European knowledge of which they could never become subjects (the ones who know). Since the colonised were excluded from the sovereignty of the putatively universal European Mind, they were reduced to labour power to be exploited without limit. The imposition of the European model (Quijano uses the word *patrón*, pattern, with a residual echo of the word for 'boss') is the foundation of colonialism's political oppression and economic exploitation. Even as it works with universalised film technologies and techniques (35mm stock, standard lenses, norms of representation and storytelling) the Zobel/Palcy *Rue Cases-Nègres* challenges this universality, traversing its *patrón* with patterns of its own traditions. The African-American writer Audrey Lorde argued that 'The Master's Tools Will Never Dismantle the Master's House': Zobel and Palcy affirm that the master never made his tools: he stole them from our common ancestors. They set out to steal them back. The first remaining task of realism is to dispute the universality, singleness and unity of truth claimed by the European-colonial *patrón*. The Cartesian foundation is already either self-contradictory (thinking takes time; being does not) or multiple (thinking demands language, a social creation, thus I think therefore we are). Its lack of consistency, which logically would debar it from being true, has never stopped it being efficacious: from having the performative power to make things happen.

Descartes instigated a split between scientific method and autobiography, and thus almost inadvertently enabled realism.

Even as he grounded objectivity on what he regarded as the indubitable foundation of self-knowledge, he was forced to distrust the evidence of his own body, that is, the truth of perception. Human senses had confirmed that the sun comes up in the morning and goes down in the evening from time immemorial. Copernicus and Galileo's theorising and demonstration proved human senses wrong. Descartes found a way to ground the self even after its faith in direct perception of the world had been uprooted. At the beginning of the twentieth century, relativity definitively separated knowledge from perception. Descartes' dichotomy of self and world made it possible, even necessary, to recognise that the autonomy of the Self required a new philosophy. Phenomenology reversed his judgement, placing its faith in perception, the interface between subject and world, grounded not in scientific objectivity but in experience, the only thing that could, under conditions of methodical doubt, be entirely trusted to exist. The new philosophy would swiftly spawn another, existentialism, strongly informed by yet another Martiniquais thinker and anti-colonial activist, Franz Fanon, at that time working in the French colony of Algeria. Cast adrift from their home in the world, the founders of alienated phenomenology took their revenge by alienating the world. Learning from the colonial experience, the existentialists would alienate the alienator. The problem of artistic realism, especially in the twentieth century, has been to reconcile these two possible alienations, objective and subjective.

The historian of science Alexandre Koyré expresses the gulf between scientific objectivity and phenomenological subjectivity in the distinction between experience and experiment:

> Experiment – in contradistinction to mere experience – is a question we put to Nature. In order to receive an answer we must formulate it in some definite language. The Galilean revolution can be boiled

down to the discovery of that language, to the discovery of the fact that mathematics is the grammar of science.

To communicate across the gap between subjective and objective worlds we must find a channel, and Galileo's great contribution to the development of science was to discover it in mathematics, another ancestral technique, promulgated in his *Dialogue Concerning Two New Sciences* of 1632, five years before Descartes' treatise. The same issue bedevilled the aesthetic forms of realism as they began to emerge in the later eighteenth century in Europe. Literary critic Ian Watt located a key moment of the history of literary realism in the opening lines of Daniel Defoe's *Robinson Crusoe*:

> I was born in the year 1632, in the city of York, of a good family, though not of that country, my father being a foreigner of Bremen, who settled first at Hull. He got a good estate by merchandise, and leaving off his trade, lived afterwards at York, from whence he had married my mother, whose relations were named Robinson, a very good family in that country, and from whom I was called Robinson Kreutznaer; but, by the usual corruption of words in England, we are now called – nay we call ourselves and write our name – Crusoe; and so my companions always called me.

Defoe's first task is to establish a precise, credible reality in which a credible, even banal character can be placed, which already demanded a shared language – not only English, but a shared set of knowledge about the existence of real places called Bremen, Hull and York. Second, the reality being constructed requires a shared evaluation of what constitutes 'a good family'. Today's readers can only reach that evaluation through an act of imagination not all that far removed from those required when the romances that preceded *Crusoe* invited their readers to picture to themselves Circe's cave or

the sea-coast of Bohemia. Nestled inside that evaluation is the assumption that 'merchandise' would necessarily have meant trade with the colonies, setting the scene for Crusoe's adventure where, as the Irish novelist James Joyce noted in a lecture on Defoe in 1912, he would become 'the true prototype of the British colonist'. With the calculated irony of the colonised (the lecture was given ten years before Ireland's independence from Britain), Joyce reveals the obverse of the shared understanding that Watt discovers in Defoe: 'All the Anglo-Saxon soul is in Crusoe: virile independence, unthinking cruelty, persistence, slow but effective intelligence, sexual apathy, practical and well-balanced religiosity, calculating dourness.' Yet Watt is right that, when we read *Robinson Crusoe* with Defoe rather than against him, we do assimilate the same assumptions and values.

This shared vocabulary would create new problems in the sciences and the arts. For the arts the question arose, if so much depends on shared knowledge and values, and the self is a repository of them, then the self may not be as autonomous as first supposed. A peculiar crux arises in Palcy's adaptation of Zobel's *Rue Cases-Nègres*, and not only in the 'correcting' and sweetening of the French ('Black-breaker Street' is a more literal translation than the *Sugar Cane Alley* that the US distributors adopted). Zobel portrays his formation as a writer occurring between the cane fields where he was brought up by his grandmother and the colonial schools system. Haseenah Ebrahim notes that in the novel, young José's progress comes about through assimilation into the coloniser's language and institutions, where, in Palcy's film, which gives a more central role to his grandmother Ma Tine, it is the culture of the cane fields that shapes him, and that gives the story more than personal significance. Similarly, by giving much more attention than the novel to the story of how José's mulatto friend

Léopold is rejected by his white father, Palcy gives greater depth to the racism structuring both colonial Martinique and the growing writer's imagination. In a key scene in the movie, José hears from an old ex-slave named Médouze the story of his father's capture in Africa through to the day slavery ended in Martinique, in a traditional call-and-response form. This third way of telling historicises both the novel and the film adaptation. The film's realism is plural, a sign of its many social and historical origins.

The social origins and underpinnings of the self and its perceptions met Descartes' self-doubt head on in the Freudian Unconscious. In the sciences, a parallel but distinct crisis would emerge in the realisation that how questions were posed determined the kinds of answer that nature would give back, and that an unwelcome but unavoidable uncertainty crept into the bastion of objective knowledge. The crisis persists. As a reader, how can I tell whether I should read Defoe with Watt or Joyce, and where, in those twentieth-century readings, is Defoe's intent? How do I know, as audience, what Zobel's or Palcy's intentions were? Perhaps more alarmingly how can Palcy tell me anything? If I presume that she can communicate because there is a channel between us, the problem doesn't go away. If we share adequately similar languages, histories and social formations for me to be able to understand the film, how can she tell me anything I do not know already? For half the twentieth century or more, modernism in the literary, visual and media arts shifted much of its focus away from the reality of the world and its depiction, in favour of enquiring into the nature of the channel connecting maker and audience. That strategy – a source of immense cultural renovation for many, a blind alley for many more – remains a resource, or a problem, today, when we are forced to accept that there are not only makers and audiences but a third party, the medium that

enables their connection. Albin Michel's rejection of Zobel's Créole dialogue only clarifies that a focus on the channel can as readily end communication as facilitate it.

Aesthetic modes of realism have flirted, worked and argued with the irreducible reality of the media that not only convey and depict realities but are realities themselves. Ecocritique similarly demands we pay attention to the material conditions of a work's making, existence and circulation. From the modernists' perspective, any work that failed to confront its own materiality was not only doomed but reactionary, serving the ideology of the selfish subject, the building block of capitalist ideology. But the demand for pictures of reality remained, and the word 'realism' in everyday speech retains its sense of verisimilitude: looking and sounding like, being the same shape and duration as, the familiar surroundings bound by familiar expectations, separate from fantasy, where people leap over buildings in a single bound. There has always been the possibility, since Plato and the Buddha, that everyday perception masks a more profound and transcendent reality. Such beliefs did not puncture the actuality of perception and its identity with what it perceives. It is this ordinary sense of realism as depictions of everyday reality in written or pictorial form that is the centre of this chapter. Sciences, starting from Galileo's geometry, would find their own written form in mathematics and visual form in data visualisation, the topic of Chapter 2. They would also create alliances with more perceptual forms of realism, notably photography, which would reinforce the idea that picturing could give reliable accounts of the world in humanly perceptible forms.

Yet there remains the question of the social. If we can only share impressions of reality because we share a social formation, then are the depictions we look at not just quasi-autonomous realities in themselves, but quasi-social

formations, shaped like us by common attitudes and values? And if so, then are realist depictions always depictions of social relations first, and pictures of objective reality or the material ecological conditions of their existence only second, or possibly not at all? But if that is the case, we struggle to find a vocabulary for understanding how perception might be anything other than individual, and how it might be shared. Yet it is clearly the case that old man Médouze's story, mediated through Zobel, Palcy and the screening conditions framing it today, is an act of sharing, and not only formally. Perhaps a European viewer can feel only a distant intellectual echo of the horror of the events described, and to some extent their 'calculating dourness' is a stronger explanation than to claim that giving form always tempers the otherwise unbearable truth. Yet the horror remains, and will remain, no matter whether it can be communicated, or whether there is a receptive receiver at the other end of the communiqué.

Considered socially, perception is mediation. The physiological apparatus of eyes, ears and sense organs already mediate radiations, vibrations and chemicals into sensations. Socialisation shapes how we use those organs. Media technologies are shaped by and in return shape the senses. Media are not devices for ferrying impressions from here to there but participants in the production of perception, in the same way that language participates when we speak, and perhaps more so. At the same time, just as Galileo's telescope revealed the independence of the world from human senses, media technologies revealed their own autonomy from human perception. When we say a film tells a story, or the camera shows a scene, we place film and camera in the grammatical position of a subject – the one who does the action of the sentence – and even though we don't ascribe will or emotion to cameras and films, we do already imply that they are active participants

in showing and telling; and that, in psychoanalyst Jacques Lacan's phrase, language speaks us, just as much as we speak it. In realism, with its trust in the transparency of media, the human-subjective and worldly-objective can exchange places, and the technical can be either subject or object. This confusion of roles suggests that thinking of the human as subject, the world as object and the medium as something in between no longer works. The phrase 'no longer' indicates that the problem is historical. The intertwined histories of subjects, objects and in-betweens are better served by thinking through historical formations of the social, the ecological and the technological, how they have fit together and how they have fallen apart. Individuation is a social, ecological and technical process, one that since Descartes has involved a withdrawal from the world. But that withdrawal was triggered by, and has amplified, the integration of individual bodies into a various eco-techno-social commons.

When we talk about intentions, we think of the individual as a sender; when we talk about eyes as receptors, we place the senses in a communicative system based on the existence of senders and receivers prior to the establishment of communicative connections. But when we say that bodies and media mediate, we emphasise the priority of mediation: processes, flows and alterations of energy come before the establishment of the terminals they pulse between. From mediation's point of view, human perception is only a phase it goes through. In this perspective, the distinction between one body and another, or between a body, a machine and a world, is only a fleeting constellation of the ever-changing life of mediation. For all that, the human exception – the belief that we are apart from and other than the world and have some degree of freedom from it – is not mere illusion. The configuration of flux into the divided states of subjects and objects may be mere historical

accident when viewed from the standpoint of universal and foundational mediation. But in history, where we humans find ourselves, social formations have the performative power of actuality, and the divisions that start from the subject/object, sender/receiver split do not stop at severing one human from another and all humans from their environs. They extend into the social structuring of the senses.

When we talk about vision and visualities, about the spectrum of visible light or about audible sounds, we concentrate on the organs of vision and hearing, eyes and ears. We tend to think of subjectivity as something mental, going on in our brains. The shared breakthrough of phenomenology and psychoanalysis was the discovery that our whole bodies are involved in sense perception. Our skins perceive electromagnetic radiation, especially sunlight, but also non-visible ultraviolet and infrared radiation. Hiroshima proved indelibly bodies' sensitivity to other orders of radiant energy. Our ears are far from the only organs of hearing: the soles of our feet, the long bones and the chest cavity vibrate in sympathy with a sounding, shaking world. In the same way that we teach ourselves to localise sex drive in the genitals, we localise perception in the mask, the front of the head where the mouth and nose add taste and scent receptors. Even the word 'receptor' suppresses the generative power of our bodies to produce sounds, sights, smells and tastes. This segregation of external sensory stimuli from bodily generated sensory experience is a kind of environmentalisation. It promotes sensing as a human activity, and demotes being sensed to the passive quality of the world that environs us, outside the hallowed boundary of a sensing body that has retreated so far inside itself that it occupies only the front of the head.

Realism, in the first instance, confirms this retreat from the senses and their localisation in the governable regions of

eyes and ears. Realism tries to give an impression of the world as it would appear to someone who shares this architecture of suppression. This has been its specific calling and its specific truth: it is true to perception in the historically socialised form that governs discourses, visualities and the construction of sounds that the ears are attuned to. It is to the credit of Palcy's film that she constantly makes us aware, through the performances of Ma Tine and Médouze, that speaking, storytelling, caring, are all physical, full-body acts, unlike the admirable but deracinated modernity of the schoolmaster who speaks only with face and hands. When we see Médouze and Ma Tine at work in the cane fields, in claustrophobic shots excluding their work from wide expanses of landscape and sky, their integration into the boss's field and the machete as prosthetic cutting arm, demonstrate at once their ontological union with the island and their economic and political alienation. The first task of twenty-first-century realism is eco-social embodiment: to expand perception to include the whole body, and to integrate that body into both the exploitative actuality and the utopian potential of the commons linking humans, tools and land.

The Raw Materials of History Are Not Raw

Realism records words, sounds and images, technically, in order to create a record. For individuals, recordings evoke memories. Socially, they constitute history. In life, the personal and social traverse each other, in the same way that time and space do: recordings are not only preserved attention to the past; they are eminently transportable objects. In Palcy's film, Léopold's mother, light-skinned mistress of a colonial dignitary, plays a record of Josephine Baker, the orientalised African-American

star of the Paris cabarets, on her Victrola. Born in St Louis, Baker's mother had been adopted by former slaves. While it is possible that Baker may have had a white father, her first showbiz jobs were in blackface until she fled the segregation and racism of the USA for Paris in 1926. A cosmopolitan Black feminism ties director, character and cabaret star together across the uncanny valley of Zobel's once-autobiographical fiction, a silken thread of solidarity linking Baker, Palcy and Léopold's mother in ultimately fragile (even if temporarily enviable) positions. Linear ideas about the historical transmission of truth do not do justice to this nexus in the history of Black women's struggles and creativity. The mother's pleasure in the recording links her present perception to the disk's past recording, the temporal dimension of recording to the spatial dimension of its distribution as far as Martinique, and both mother's and Baker's biographies with the history of African diaspora.

The 78 rpm record we see would have been made of shellac, the dominant material for manufacturing phonogram discs until the 1940s. Up to 20,000 tonnes per year of this hardened resin are still harvested from lac insects, down from a pre-war peak of around 50,000 tonnes, mostly in India and South-East Asia. Lac farming was never free from exploitation by exporters, but the replacement of shellac with oil-based plastics has helped drive down the loss of Indian biodiversity and forest cover, once prized as a source of lac. Cycles of colonialism extend outwards from Léopold's mother's boudoir to ecological exploitation. Culturally, the materials of history appear to us as a concatenation of things marked as human artefacts. Technically, those artefacts comprise ancestral cultures. Ecologically they concentrate naturally occurring raw materials that social systems have selected, isolated and processed into service. We do not have cultural or technical means to restore them. We can no more return the lac to the insects

that exuded it than we can return ancient vellum to the calf it came from. Nor can we go back to mend the pain that makes Josephine Baker's singing so poignant, even, and especially, when her songs are at their happiest. As James Baldwin wrote in 1962, 'In all jazz, and especially in the blues, there is something tart and ironic, authoritative and double-edged' deriving from centuries of slavery and oppression. Although aesthetic politics cannot promise that such suffering never happens again, and cannot rescind or even mitigate what has already been perpetrated, it has the obligation to recognise and recall the pain of history. Baker's song '*J'ai deux amours*' says 'I have two loves, my country and Paris'. There is – as it appears in the film – a sense that for the mother '*pays*' means Martinique, but she yearns for Paris, both as a cultural ideal, and for the relatively relaxed attitudes to race. Baker might have felt something similar. Her childhood and teens were marked by exploitation and oppression; and even on her return to the States in 1951 she was denied a room at thirty-six hotels, and received death threats from the Ku Klux Klan. Those events are in the mother's future, as she plays her Victrola, but already in Palcy's past, and ours. Realism not only recalls: it has the task of lifting experiences from the timeless immortality of natural cycles to place them in history, which is to give them a constant place in the present which, ecocritically, implies recognising that '*pays*' also refers to land and ecology. The scene tangles together sociological, technological and ecological migrations.

Alphabets and languages, film techniques and genres, all contribute to a concentrated apparatus, an assembly of knowledges and practices honed over millennia. The realist apparatus is technological because it is ancestral. In his 1850s notebooks written in the run-up to *Capital*, Marx describes machinery as 'dead labour'. Machines are the congealed form of all the knowledge and skills of previous workers, extracted

from their bodies to become automated processes that succeeding generations of workers experience as the deadening force of factory discipline. We can unpack Marx's insight by emphasising the legacies of the dead, our ancestors whose ways of making have been expropriated as the property of the factory owner. At least languages and genres recall the names of many speakers and writers whose 'dead labour' contributed to the tongues we speak and write today. Machines, however, embody and imprison the knowledge and skills of our ancestors anonymously. Media technologies specifically are ancestral capabilities, anonymised and locked into the black boxes of proprietary hard and software. Where we recall a name at all, it is the name of the entrepreneurs like Edison and Paul who claimed personal ownership of collective inventions. Ecocriticism must admit that technologies are also the congealed form of primordial natural materials and processes as well as human skills and knowledge. Media are thus both technical-ancestral, and ecological-technical, and to that extent indistinguishable from any capitalist industry. But they are also discursive domains. Discourse, as the historian and philosopher Michel Foucault taught, is a material site of power but not of absolute control (a writer or filmmaker or painter is not subjected to factory discipline, and no speaker is wholly constrained by grammatical rules or what has been said previously in that language). Discourse is a place where power is contested, speaking ecocritically, between human, social technologies – our ancestors – and the ecologies that make it possible for them to function. Capital is a system that exploits not only humans and ecologies but technologies and, in those technologies, the ancestral presence of all those who went before. Capitalism asserts self-identity of the kind Defoe gave us in Robinson Crusoe, and presence, the co-present of Zoom calls. The realism of *Rue Cases-Nègres* counters by

asserting the non-identity of Paris and Martinique, the non-identical times of shellac, song and playback. It aches to mediate human commons, technologised ancestors and estranged nature, struggling to undermine the capitalist-colonial model of the sovereign self by articulating oral culture, the novel and cinema in order to liberate human, ecological and ancestral processes from the *patrón*'s dream of control.

As long as creatives treat realism as a generic discourse, they are limited to attempts to render their social, technological and ecological conditions either palatable or redundant. They have the choice either to work with or on those conditions. Today, when capital has already colonised leisure time as well as work time, there is a permanent risk that any resistant or radical creative practice might be subsumed into the endlessly exploitative and extractive functioning of the profit motive. If realism pursues truth to perception, it must also question its own conditions of existence, that is, the existence of perception.

When Merleau-Ponty asserted that to see implies to be seen in a common field of visibility, he was describing ordinary experience, untouched by technical media: the kind of experience that acknowledges that I cannot see the back of my own head but others can. Again, ecocriticism needs to add more. First, as Merleau-Ponty already indicates, humans are not the only creatures with vision; and for 'vision' we should not think exclusively of the narrow band of the electromagnetic spectrum humans sense with their eyes. And second, whatever primal visibility might have been in an imagined world without visual media, we now inhabit culturally, psychologically, technically, industrially and creatively organised forms of the visible. When we speak about realism as realistic, that is to say confirming to our expectations of what an ordinary human observer might perceive if they were at the scene, we are actually talking about a 'visuality': an organised and conditioned construction of

vision. However, the notion of 'ordinary' perception hitches its wagon to another form of universalism. Who exactly is this human? The description already implicitly excludes differently abled humans, but it also assumes that vision, hearing and the other senses conform to a particular pattern, inscribed in visual techniques like perspective, in engineering standards for media technologies, in the design of interfaces, and in the presumption of hierarchies, notably the sovereignty of vision, that have evolved from the initial Cartesian assertion that only the mind can access truth, and the eyes are the major portals that sensory data travel through (and sit lower in the hierarchy than writing as medium for measurement and administration). Ecocritical expansion of sensing to non-human agencies implies questioning the historical formation of the human as a discrete category. It throws into doubt the supremacy of human sight, the communicative hierarchy and its implicit restriction of what the human is and who can be or become human.

Perception is a socially and historically, technically and ecologically shaped, concrete moment of living, always tied up with ethics and politics. Discourses and visualities organise perception and meanings through technologies extracted from the long histories of language, picturing and administering things and events. They are inseparable from the planet that gave them birth, provides their energy and materials and permeates their operation. Because they are conditional on histories of exploitation, media artefacts and practices can only condone, contemplate or contradict the conditions of their existence. The historical construction of sensory perception is as colonial as the European Mind that Descartes founded on alienation from the world it was destined to rule. Real change requires changing these conditions.

But if media invariably structure the human on colonial lines using imprisoned ancestral forms and expropriated

materials and energies, how can real change occur? Realism has often in its history served progressive ideas and movements. There is, however, a radical philosophy of media that denies that progress is the only politics. In the theses *On the Concept of History* he wrote shortly before his suicide in 1940 as he fled Nazi persecution, the tragic essayist Walter Benjamin, brought together a radical rethinking of Marxism with the redemptive theology of the Jewish tradition. For Benjamin, now is a unique moment, not because the present glides endlessly on, changing in perpetuity, nor simply because those of us who are alive now are the only ones among all humans past and to come who can do anything. Now-time (*Jetzseit*) implies, for Benjamin's Jewish mystical tradition, that every moment is the narrow gate that the Messiah might arrive through. Even though we have been endlessly disappointed by that Event never occurring, we should live every moment as if it were the last before that history-ending arrival. For this reason every generation is endowed with a 'weak messianic power': the capacity to act, to bring about a world worthy of the Messiah. Much of Benjamin's short collection of theses and aphorisms is taken up with criticisms of the idea of progress. Orientated exclusively towards the future, political parties promising progress turn their backs on the ancestors whose labour allows them to exist at all. The Messiah comes not only to save the living but to redeem the dead; and our weak messianic power is to commemorate and, as best we can, make a world that pays the dead back for all they suffered.

The upshot of Benjamin's thinking is that a realism that revolutionises the relation between humans and reality cannot spurn 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 paintings, symphonies and palaces, and whose lives and deaths formed the aesthetic objects of triumphal arches and realist

novels. Realism's unrelenting connection to the suffering of the past gives it a critical role in an aesthetic politics that refuses to abandon our ancestors. It tells us that there can be no future which is not also a redemption of the past. Equally, Benjamin is adamant that 'progress' should not provide an alibi for abandoning the present. We who are alive now, with our weak but nonetheless messianic power, cannot accept the downtrodden state we find ourselves in, and defer truth, happiness or beauty to an indefinite future. A realism that boldly confronts the ignominies of the past by bringing them into the present also demands that the future should start right here: paradise now. *Rue Cases-Nègres* like most realist productions, is a recording; and like many it is set in the past. It delves into the conditions that brought the world it shows into existence through the memories of Médouze and the aged body of Ma Tine, tracking their experiences as unique conjunctures in geographies of exile and histories of colonialism. Displaced in time and space, the film, like the shellac record of Josephine Baker, produces simultaneous effects of aesthetic distance and proximity, clarifying the irreducible specificity of their past experience while placing present audiences in the position of the posterity they invoked to justify their sacrifices. The film has not abdicated responsibility for the past or geographically distant: it has fulfilled Benjamin's requirement that any politics of hope must also redeem the uncounted millions who died to make this present. This is the second remaining task of realism in the twenty-first century.

Realism and Communication

The problem of realism today is tied to the ascendancy of Claude Shannon's mathematical theory of communication, whose explanatory power and extensive implementation

makes it the dominant ideology of the present moment. Dominant, not necessarily in the sense that everyone knows and believes that the efficiency of communication can be measured by the relation between noise and signal in transmissions between senders and receivers and the accuracy of feedback from receivers to senders. Dominant rather because this is the theoretical model that dominant forces use when they dominate. It has shaped the theory and practice of computer and network engineering, and the often-unspoken models governing everything from risk management to email. It is ideological not because it is necessarily untrue but because of its claim to universality. Shannon's mathematical theory of communication and its development in cybernetics responded in the first instance to Bell Telephone's need to supply services to post-war suburbs. Swiftly applied to everything from intra-cellular chemical messaging to black holes, the cybernetic model developed from Shannon's foundations offered to calculate every relation in the cosmos. Today, it not only describes the world but draws what is described and the act of description into a single overarching explanatory theory. It is powerful, practical and so deeply worn in we scarcely notice. It fulfils the project of Galileo's mathematics and Descartes' logic. It can legitimately claim to be universal, which marks it out as the dominant ideology, the most recent and most complete version of the European Mind.

If everything is computable, as Shannon's mathematical theory suggests, including the human behaviours captured by streaming and social media, then mathematical description no longer needs any reality beyond the mathematical self-inscription of systems. Foucault described discourses attached to institutions like clinics, prisons and asylums. Cybernetics describes systems that occur naturally with no need for institutional support. Not only physical reality but social behaviour

could be reduced to probabilistic communicative models. For prophet of simulation Jean Baudrillard, cybernetics had created a nightmare, 'the generation by models of a real without origin or reality'. Humans had become cybernetic organisms assimilated into total social systems. Aesthetic politics tells us otherwise. Not all humans have been assimilated and no humans have been assimilated wholly. On the other hand, the world is now run by cyborg corporations, vast agglomerations of computers with humans implanted. The rest of us are left with the residue of cybernetic systems: experience is what is left over from the conversion of events, processes and behaviours into data. It seems as if phenomenology arrived just at the moment when perception was about to be replaced by data-gathering, and narratives by systems. Any residual reality is not evenly shared: everyone suffers, but the poor suffer most and have the least stake in universal computation, for which they are either statistics waiting to be gathered or unaccountable and supernumerary – beyond the arithmetic of digital capture. The quality of experience, of perception and affect, is of no account to the new accountancy of information capital other than as data, potential data, or unpaid processing power. Universal computation has no need of any reality other than its own.

While there are powerful realist principles in play in the Communist Party of China, unlike number-crunching democracies, the second principle of Xi Jinping Thought respects the circularity of Shannon's feedback loop demonstrating the etymological connection between cybernetics and governing:

> The people are the creators of history as well as the fundamental forces that determine the future and destiny of the party and the country. We must adhere to the principal position of the people, adhere to building a party that serves the interests of the public and to governing the country for the people.

Like Xi's 'principal position of the people', Shannon's mathematics neither represents nor depicts. Corporate and governmental data capture is deliberately and necessarily incomplete, interested only in quantities and selective in what it disregards. At the same time, totalitarian and corporate government both aspire to universalise themselves as twenty-first-century *patrón*. Government by cybernetic systems has a long history, from the colonial logic that accounted living beings captured in Africa as pure quantities in the American colonies to IBM's involvement in the Holocaust. Elaborating systems to translate emotion into numbers accounts for some qualitative factors, but always as 'factors', both the mathematical function of factoring that splits entities into their component parts and commercial 'factors' like Robinson Crusoe, extracting a living from receiving and selling-on in the Atlantic slave trade. As Shannon wrote, 'semantic aspects of communication are irrelevant to the engineering problem'. The flavour of living, the complex of human or other sensations, the immiseration of European Jews, the suffering of slaves or the dense thickets of meaning accruing to a word like 'forest', are external to this mathematics. Folkloric taxonomies of ethnicity or skin tones become preliminary steps towards census: quantification, capture, extraction and exploitation. Alternative taxonomies of kinship and totem that support mutual survival have constantly to guard their semantic commons against similar enclosure by colonial enumeration.

In the age of data capture, realism, the historical endeavour to re-present reality, has been both achieved and overshadowed. Databases categorise and enclose the often otherwise realist photos we share on social media as soon as they emerge, like indigenous lands cursed by the discovery of valuable metals. We do not have databases, they have us. We have been had. The unexploitable remainder – human misery,

technological detritus, toxic ecologies – is abandoned for 'history' to take care of, postponed into a future that is decreasingly likely to arrive. The dominance of the mathematical theory in communications is not anthropocentric.

Excluded from universal mathematisation, the *anthropos* in 'anthropocentrism' is marginal at best, and from the standpoint of databases no more than an external environment whose ecology can be economically ignored. Realism must recognise the reduction of humanity to an apparatus for producing pictures ready for processing. Facing this diminution, realism's third remaining task is to describe what fails to exist, whatever has an inadequate existence, whatever – like meaning, humanity and sensory perception – requires the supplement of re-presentation. Power was very visual: ostentation and oversight, managing appearances, looking down on, overseeing and overlooking. No more so. Cyborg corporations rule through information, which has no particular visual form, and is only rendered visually to help their human components to function properly. Pictorial realism and its textual and sonic variants have little or no functional role in the dominant mode of information, population and wealth management. This is why realism is so important, again, today.

The hypothesis of realism as supplement needs careful treatment. Though realism is a broadly modern mode of describing, there have been many ruptures, mutations and transformations of realism, and more nuances and inflections, since the European Renaissance's embrace of perspective and the battle between romance and realism in Cervantes' *Don Quixote* of 1605. Realism's varied forms, from the prosaic and exhaustive account of the Dublin water supply in the Ithaca chapter of Joyce's *Ulysses* to the iridescent surfaces of Sofia Coppola's *Marie Antoinette* (2006), might be read as reactions to other ways of interpreting the world, from the chivalric in

Cervantes to the depth cinematography of action movies in Coppola. Rather than seek a description of realism as a transhistorical struggle between rhetoric and realism, as literary historian Erich Auerbach attempted in *Mimesis*, or circumscribing a particular variant as definitive, as might appear from Raymond Williams' account in *The Long Revolution*, realism should be understood as historically contingent on rival practices for describing and interpreting the world, and as a pursuit rather than a prescription. Something similar might be said even of the short history of the cybernetic theory. In Shannon's initial paper, feedback was only a means of checking that the system was functioning. Today, however, feedback is the raw material of a vast communications industry which, unlike Médouze's call-and-response storytelling, excludes embodiment and tradition, the oldest ways we have of recognising and communing with ancestors. Realism reclaims whatever is defined by its exclusion from total systems, including marginalised and superseded systems whose persistence proves the failure of totality, but only at the cost of realism's own incompletion.

Médouze's gestures and finger-clicking do not compute. The only hands that counted in the cane fields were field hands; today the only fingers that count are digits. The senses, already stripped back by Western monotheism and enlightenment to the face and genitals, now focus on hands and a limited repertoire of clicks and swipes. As far as data systems are concerned, human being has been reduced to hand-eye coordination tailored for information capital, whose only interest in human sociality is in behaviours that can be captured and monetised. The populations most thoroughly invaded by digitisation have the greatest difficulty acting or presenting ourselves to one another, because every presentation is a behaviour ripe for capture and commodification. And yet,

despite what appears a total assimilation of technically assimilated populations, a light breaks in. Whatever of the human is excluded from digital capital is indistinguishable from the environment: from all the noise that surrounds the perfected totality of signal. The remaindered human, by virtue of its failure to exist wholly inside information systems, while simultaneously becoming a source that information can be extracted from without cost, is increasingly external to the information economy. We are becoming our own environments.

Cybernetic apparatuses first supplemented then displaced human senses. The quantifiable aspects of behaviours no longer attend to felt or semantic experience. It is as if we had become Noël Carroll's movie characters, observed by cyborg audiences incapable of sharing our emotional lives. Deprived of inwardness and without the sensations that tie us to each other and the world, we humans are ultimately bereft of the Being that would make us autonomous. This incompletion, these failures to exist, demand the supplement of realism. Realism, however, has always depended on something other than itself: people, a world, cultural and technical traditions whose existence would either guarantee its truth or prove it by opposing it with legends and fantasies. A perfect marriage of two irreducible lacks.

Because it is obsessed with what can be sensed by humans, realism constantly refers to its obverse, what cannot be seen, touched, tasted or heard; whatever lies under the apparent, sensory world – social forces in social realism, or for naturalism the powers of nature. Data deals with an expanded sensory apparatus beyond the reach of human senses, generating from the quantities that appear to this massive but restricted apparatus only logical extrapolations, not the evidence of existence. Data deals with the self-identical and cannot plunge into the maelstrom of what fails to be. This explains why there are so

many anti-colonial realisms, and why there still remain tasks for realism in the twenty-first century. Shuffled to the socio-political margins by the triumph of data, the non-identical returns in the interstices of data as it appeared in the gap between images in cinema, an absence that now constitutes the being of remaindered humanity and nature. Data capture subtracts any idiosyncrasies of its measuring devices from its results, thus excludes its own technology from its findings, leaving realism the task of giving voice not only to the remaindered experience of the poor and of exploited nature but to the ancestral traditions locked in our media technologies. But because realism can neither represent nor speak on behalf of, its fourth task is to recognise the absences that information capital constructs.

Autonomy and Allonomy

The era of autonomous art is over. As digital cinematographer and artist Terry Flaxton put it in a 2020 email, media arts, electronic arts specifically, disappear when the electricity is turned off, thus demonstrating the dependence of art on its power supply, as also on the power industry, on the financial system for paying the bills, as well as the drives, networks and screens it requires, and the software – which, even if original to the work, is built on operating systems, machine code and hacker traditions, inherited units of logic and rules for their implementation. Flaxton's observation makes it clear in retrospect that the same is true of older art forms. A poem cannot contain its own rationale because it has been written on top of the infrastructure of a language and orthography that the poet rarely originates (concrete poetry, that abandons both, cannot escape its evocation of the poetic tradition and the print

medium). All traditional art media require stages, galleries and venues; notations, inscriptions, repertoires of gesture and motion, a legacy of instruments and tools, pigments, foundries and printworks, and a legal armature like intellectual property law which, since the Statute of Anne promulgated in 1710 (just nine years before *Robinson Crusoe*), has governed the sharing of cultural goods. The autonomy of art has long, if not always, been a precarious fiction.

True, art may still be useless, another favourite aesthetic truism. Giving up on beauty, communication or social function only deprives art of use. It does not remove it from exchange value. Having no use-value aligns it all the more closely with the society that shapes it if its only remaining use is to be exchanged. Alternatively it may have uses – as pleasure, as meaningful, as intellectual exercise – which then destroys the uselessness argument again, and once more emphasises that the status of art depends on it doing something. This is not in itself a bad thing. Aesthetic practices that embrace their sociality can do things that may not otherwise be possible, including offering an alternative to commodity exchange. One thing artworks are very good at is outliving not only their creators but the social order that birthed them, to the point that their pleasures no longer express for an audience today the matter they conveyed at their first appearance. Beethoven's *Eroica* Symphony may still express the Absolute, as the philosopher Theodor Adorno believed, but today scarcely evokes the fire and fury of Bonapartism or its tragedy. For Adorno the art survives when the work of making it is forgotten: the formal excellence of the *Eroica* survives when Beethoven's labours are merely dim historical context. Nonetheless, the labour and the intention may persist if we take it that the artwork is of value to the extent that it strives for autonomy *and fails*. If it did not fail, its freedom from every economic and communicative

function would make it incomprehensible; but if it did not strive for freedom to the point of failing, it would be no different than any other economic and communicative function. Only because it strives, and cracks in the attempt, can it expose the apparatus it is trying to escape and project the possibility of there existing an alternative, even if the artwork cannot realise it.

Proposing something rather like this in his ultimately pessimistic aesthetic theory, Adorno argued that although Beethoven first withdrew the dedication of the *Eroica* to Bonaparte in favour of his patron, later removing any mention of Napoleon from the score after he declared himself emperor, none of this matters to the subsequent reception of the work, or to the work itself. Knowing how any work came to be, Adorno writes, 'is as external to aesthetic experience as is the history of the dedication of the *Eroica* to what musically transpires in that symphony'. The symphony's posthumous reception, he believed, proved its autonomy from the historical conditions it was made under. But whenever they outlive the context of their production, artworks do not become autonomous but alien. Like migrants, as they become alien, they also become alienated – alien to themselves and alienated in themselves. Once separated from the conditions of their generation, they are 'free' only to become trophies of an aesthetic regime that requires them to be emblems of a freedom that does not exist. Separating works from the conjuncture of their birth is often traumatic: the loot of Empire, or the prison songs that became beautiful only when they were removed from the chain gang. The immortality of the Bard or Bach is only an assurance that mortality is everlasting, that the dignity, even the presence, of the past can always be excavated by the present, and that whatever our ancestors have left of themselves in the world, after they left it and closed the lid behind them, has become

the property of a culture that praises justice, but values individuals above justice, and is founded on theft. Contemporary neo-conceptualist art is a response that succumbs to the form of unpayable debt – the core concept, the *anima* that animates rapacious cyborg capital. Formal autonomy as ascribed to contemporary art is the aesthetic form of debt. This logic helps understand the continuing appeal of sacred music to atheist ears in the twenty-first century: God was, as debt is, the Lord who giveth and taketh away, whose ways are unfathomable, and who is, as Kant says of the sublime, 'great beyond all comparison'. Today a Bach fugue is evidence of the endless repayments we must make to a principle that exceeds even our mortality.

Kant's description of the sublime, 'beyond comparison', opens onto the divine. In flight from the infinite greed of capital, we can dream of the vast universe beyond our planet, or the unfathomable complexity of terrestrial ecology. Yet comparison – including the idea that there is an ineffable Something that lies beyond it – presumes measurement. Measurement in turn presumes a place from which to measure, which in turn presumes that there is already a distinction between observer and observed, the tiny human facing its environment or its gods. The awe we feel in front of the sublime is an aftershock of the trauma wrought on humanity by its divorce from union with the world. We know or suspect that, ontologically – because we share our being with everything that is – we are inextricably involved in our ecology; but phenomenologically and epistemologically – in our hearts and minds – we know that we are set apart. The end of autonomy is the beginning of ecocritique, which takes the primal ecological crisis to be the one that separated the world from the human, being from knowledge and experience. A distant historical event, recapitulated in the estrangement from wholeness each of us

undergoes in separating from our mothers, recurs in our contradictory selves as ecological processes that we feel ourselves simultaneously bound to and severed from. Autonomous art is impossible because there can be no autonomous self apart from nature. It is necessary because of the tragic severance of nature from humans.

Art's contradictory freedom from and dependence on the human extracts it from anthropocentrism to make it possible to imagine liberation, not only of humans but of nature and machines. On one hand, the idea that art stands apart from commodity exchange ('art' is what cannot be sold along with its material bearer) breaks the artwork's link to the non-human materials of the world. But because, on the other, art is dependent on nature, technology and the human, it shows there can be no freedom for anyone without freedom for everyone, and everything. Much of the discussion that follows concerns the media arts, because they retain that dependence on infrastructure that Terry Flaxton pointed out. Ecocritical as it cannot help but be, media art has a clarity of purpose that autonomous art lacks: to demonstrate the interdependence of the three phyla, technical, ecological and social. Truth requires that art declare its dependence. In his *Aesthetic Theory*, Adorno reads art's autonomy as resistance to *heteronomy*, the dependence of everything that is not art on the variety of forces operating on any social or cultural formation. Autonomy is self-law (*auto* + *nomos*), independence from all other laws. The rules of art come from art and nowhere else, and art's unity of purpose is a property of the artwork alone. Ecocriticism rejects both heteronomy and autonomy, proposing instead *allonomy*, different-law, law from elsewhere, as in 'allogamy', the cross-fertilisation of plants. The idea of autonomy as a property of art derives from the production of intellectual property as legal category since the Statute of Anne. Allonomous art transcends

ideas of authors and artworks as self-possessed beings in order to declare that another law is possible. No longer bound to a human-defined heteronomy, beyond self-rule and beyond the self that underpins it, in the extended field of allonomy, art and truth cross-fertilise, in 'an ideal world in the likeness of the real' as Bazin says, where not only the real but the principle of likeness embraces humanity, technology and ecology in their mutual dependence.

The look back on history that the digital media encourage reverses our usual beliefs about art. For Adorno, the autonomous artwork was free to escape its past, and/or free to augur another, better future. New media arts steer towards another aesthetic orientation, caught in Walter Benjamin's thesis that '*even the dead will not be safe*'. When art – or anything – flees its home, there is always an obligation to understand why: what is there in the escape, what was left behind, what drove them out, and is there anything we can do about it? The retrospective glance is especially important with long-lived and ubiquitous aesthetic faiths. A privileged aesthetic practice of true representing for the last three hundred years or more, realism, in most of its varieties, accepts, even welcomes the sensory experience of appearances, recognising the value of the everyday, so tending towards a political sensibility. Although this trust in appearances has always been largely humanist – what appears is what an ordinary human can see, hear and sense – realists have equally often expressed belief that capital, God, destiny, evolution, genes – things that do not appear – underpinned the reality they showed. What really matters, the matter of living, its mattering, is for realism inseparable from the everyday and the sensory.

One thing we know about the everyday is that it contains all the suffering in the world. In *Rue Cases-Nègres*, onlookers break into a folksong, 'Martinique, you suffer', as the boy

Léopold is taken away in chains. The song speaks from a timeless time, an endless cycle of colonial suffering present in the words but also in the repeating cycle of the melody. At the earlier scene following the death of Médouze, a griot improvises an ironic, comic eulogy interspersed with drumming that harks back to the Africa where, José will say even as the eulogy continues, Médouze is returning now he is dead. These musical forms belong to the folk, to a shared experience, a shared history, that bursts into the present and opens it up to a past that has never been erased, a shared dream of Africa.

The folksong and griot performance of *Rue Cases-Nègres*, so carefully distinguished from its cosmopolitan recoding in the phonograph record of Josephine Baker, do not predict a future, but they do introduce a time other than that of the white masters whose financial ledger Léopold was arrested for stealing, and whose fields were the death of Médouze.

A contradiction arises: how can truth persist as a quality of an art without escaping its social formation or the conditions of its making? What kind of truth is more important – matters more – than everyday suffering? Médouze tells José about the day Martinique achieved independence. 'I was so happy,' he says, 'I ran and ran until I ran all the way round Martinique and when I stopped running, I found I was back on Black Shack Alley.' *Rue Cases-Nègres* ends with José washing the mud-caked feet of the dead Ma Tine while saying, in voiceover, 'Tomorrow I'll return to Port-de-France, and I'll take with me my Black Shack Alley.' Médouze's storytelling, Zobel's novel, Palcy's film, and every screening of it all return us to the same colony. This is the film's truth, and it lies beyond the powerful effort it makes to escape – through Zobel's education and Palcy's post-colonial commitment – from the condition that makes it true. The only way Médouze can break the circle is to return, in death, to Africa, another circle. Césaire's faith in

the principle of continuity between Africa and its diasporas, a core belief of *négritude* that Palcy drew on in her adaptation of Zobel's book, has somehow to turn these circles into spirals leading upward and out from their vicious continuum.

To be true is to be true *to*. Because the majority of realisms depend on recording media, they are bound to truths of distant times and places. Yet the long tradition of picturing the world and how we live in it is, of all cultural orientations, the one that most obviously wants to be true *here and now* – true to the real as it appears, true to our common experience of the real. This is the challenge realism has always posed to aesthetic theories. Despite the poet Coleridge's claim that a poem should 'contain in itself the reasons why it is so and not otherwise', realism's reasons always lie elsewhere: not in the eternity of its autonomous existence, but in the there and then of the moment it records, and the here and now of the moment of its reception. Allonomy's law comes from another time and place, but owes its fealty to the present moment. Allonomy is not restricted to present, future or past, but speaks from and to a time that lies athwart the temporal and spatial distances separated by the work, specifically by the autonomous time of its internal structure. Allonomy operates in this hinterland between communication and history, between the drive to record the actual and transport it through space and time on one side, and on the other to recognise the inevitability of loss that accompanies any adaptation (like Palcy's versioning of Zobel), any translation between times and places. Autonomy pines for perfection: allonomy recognises the contradictions of preservation and loss. Prior to its depiction, and in the moment of depiction itself, there lie elements of a past that have resisted and escaped recording and that persist despite the impossibility of manifesting themselves in art. Allonomous realism catches the partial and diminished that fails to arrive

or scarcely survives in an aesthetic politics of what should have been the case. It distinguishes itself from 'alternative facts' because it does not claim exclusive ownership of truth, but the simultaneity of truth and its vanishing. Where post-truth speakers use declaratives ('I have to…') or imperatives ('You must …'), allonomy works in the subjunctive mood of contrafactual exploration, grounded, however, in a careful observation of the actualities of a given situation. From what fails to exist completely, allonomy derives possibilities, the potential, emerging from negation of the old autonomy, that things are not only as they are but as they might be. This is the fifth task of twenty-first-century realism.

Histories of Reality

The mathematical *patrón* underlying the cybernetic vision of truth tempts its acolytes with a dream of perfect knowledge. Realism, however, requires us to recognise that much is excluded from any representation, including numbering; that what is included in depictions tells us as much about the author as it does about the actualities it describes; and that the result is not imperfect, in the sense of falling short of an ideal or replacing a deeper truth with mere illusions. Realism acts like a Freudian fetish, a strategy to avoid the traumatic sight of the mother's genitals, arresting the gaze instead on some less disturbing display or item of clothing which the subject's desire can anchor on. This analysis rather misses the pleasure of the fetish itself, in our case the picture that resembles reality. 'Real' reality no more explains realism than nudity explains clothes: clothes, like realism, have their own fascinations. The comparison with the fetish does, however, help understand realism as a historical practice because it brings desire into

the picture. Lacan was at his sharpest when he observed that desire can never be fulfilled. If it could, we would stop desiring, but we never do. Whatever can be possessed, in the manner promised by the mathematical theory of information, cannot be the object of desire because it invariably fails to satisfy. Realism, which does not expect the satisfaction of perfect knowledge, knows that the data, the 'evidence' of sexual difference that the fetish displaces, is no more real than any other depiction, and no more true; and that there is no final truth even in a database the size of the universe, or in the universe revered as itself a universal database operating on cybernetic principles. Realism, in contrast, travels along the endless substitutions that depiction is comprised of in pursuit of an object, the Real, which can never be captured, never wholly depicted and, as object of a desire that can never be fulfilled, consistently fails to exist. It is because it is a mobilisation of desire that realism has a history.

This impossible Real cannot be deduced from the mathematical model and its claim to universality. The unique criteria the present moment has for recognising something as real are distinct from other ages and cultures. This book will not replicate the scholarly histories of these realisms, but it does need to give some account of cruxes in realism's recent history. Henri-Jean Martin opens his book on the history of writing with the thought that 'anyone imprudent enough to risk studying the chronology of writing alternates ceaselessly between vertigo and myopia'. That oscillation between extreme detail and dizzying scale applies to the historian of realism. You could hazard that 2019 realism is to data as 1719 realism (the date of *Robinson Crusoe*'s publication) was to romance and the fantastic; but how then would you position the 1937 debates on realism between Brecht, Lukacs and others in the pages of *Das Wort*? Their argument pitched the formal properties of

resemblance to actual reality against Brecht's bold assertion that realism requires analysis and estrangement from the overwhelming weight of everyday experience. Its relevance today might be traced in #BlackLivesMatter: one realism asserts the grit and shame of killing, another the structures of white supremacy that make killing possible, the first risking sentimentality, the second cold calculation. Neither succumbs to either the imagined beasties of pre-realist romance or the statistical abstractions of social systems; but beyond those limits, such modes of realism differ so greatly in scale and detail that accounting for the often-startling innovations of campaigners, or creating some viable consistency in the concept of realism, seem equally impossible. Something like three thousand years separates us from the *Iliad*, yet even now parts of it – the tactical training, the management of ships and horses – are strikingly realistic; and pictorial realism encounters far older techniques and more mysterious relations with the world in the Kimberley rock art at least 17,500 years ago, or the Vogelherd Horse carved from mammoth ivory around 30,000 years ago. At the same time, even the most meticulous renditions of actuality can strike a note of falsity, as Walter Benjamin noted of the *Neue Sachlichkeit* photographers. Media archaeologists properly argue for myopia, but the vertiginous is alluring, if only as a way of understanding how the mathematical theory has become so dominant that we no longer notice it. The anecdotal method which I adopt here demands attention to the encounter – of people with each other, with texts, with events and places – as crossroads of the larger forces that otherwise we discuss only in abstraction. Vertiginously large concepts like technology, nature and society have weak explanatory power until they are anchored in the crises of particularity that give us the words 'criticism' and 'critique'. For present purposes, only the myopic squint at battle formations in the Iliad or Benjamin's antipathy

to the New Objectivist photographers gives us insight into the mutable intersections of practices and ideas. Of realism and reality with forces and agencies whose forms become clearer as we inspect their actions in microscopic detail, like Ma Tine's feet washed by a child's hands.

The Situationists adopted the slogan '*Soyez réalistes, demandez l'impossible*' ('be realists, demand the impossible') four years after Lacan's seminar on the four fundamental concepts where he proposed '*le réel, c'est l'impossible*', the Real is the impossible. The impossible is Real, in Lacan's terms, because possibility, like probability, can only be defined in the Symbolic, the arena of language, numbers and logic. The Real is impossible because it cannot be counted, recounted or accounted for. To be realist after Lacan is to demand an unaccountable world. Lacan's relations with the surrealists Bataille and Breton from 1929 or 1930, and the reverberations of surrealism throughout Latin America and in Eastern Europe during the Soviet era, suggest that the threshold between possible and impossible remained a core concern of documentary, fictional realism *and* surrealism throughout the central years of the twentieth century. In Lacanian surrealism, and to a degree among the Situationists, an excess of meanings is always possible: the world (and we humans to the extent that we are of the world) mediates way more than communication can handle. Realism, then, is not a matter of somehow annihilating the border between communication and noise, between Symbolic and Real. Rather, realism operates at the limit, and makes that limit the material of its work. Realism's sixth task is to show the struggle between communication's ambition to universality and the resistance of what thus far lies beyond that colonial drive. Realism activates the threshold of incompletion.

'*Wovon man nicht sprechen kann, darüber muss man schweigen*', 'Whereof one cannot speak, thereof one must

be silent': the seventh and concluding proposition of Wittgenstein's *Tractatus* says that we cannot speak of or otherwise enumerate or state the Real. Silence marks the boundary of what language can say. Nonetheless there are statements about the Real – I defer to Hawking's *Brief History of Time* – that describe what cannot be experienced, such as black holes. But to the extent that they do describe, they indicate, mathematically and algebraically, the limits of symbols and the new Symbolic order. The threshold does not define the nature of being, or the Real: rather, the Real defines the limits of any symbolic order and points out, at the site of its border with all it excludes, that the purportedly universal terrain of Shannon's theory is in fact enclosed. Noise is not defined by its difference from communication: rather vice versa – communication is definable as what excludes itself from the noise of the Real.

The precarity of a symbolic order self-exiled from reality is nowhere more apparent than in Appadurai's account of financialisation as a tower of self-referential promises which bind speakers to one another by contract while freeing them from the goods that they once would have traded but now increasingly distance themselves from. Released from the use-value of bricks and mortar, mortgages joined the purely electronic circulation of funds that now constitutes the economy. Any realism since the Global Financial Crisis (GFC) of 2007–8 must assert once more those spurned buildings of brick and steel underlying remortgaged mortgages. Post-GFC realism is the revenge of the repressed Real. #MeToo and #BlackLivesMatter are realist enterprises because they name the real costs of symbolic orders. Those costs, however excluded from discourse, ideology and symbolic formations, participate in them as their defining boundaries. Within the closed system of finance, however, the hitherto final operation of humans – to provide meaning as the conclusion

of interpretation – is no longer needed, while meaning too becomes Real as soon as it is excluded from the Symbolic. First subsumed under capital as attention value, human responses that were once the final stage of communication have now completed the feedback loop by becoming sources of second-order data. The *formal* subsumption of attention into the commodification of audiences in the Golden Age of Television becomes *real* subsumption with the capture of likes, swipes and clicks in interactive network media, amplifying the scale and profit of data capture and processing. What we experience as meaning appears, to data capture, exclusively as optical-gestural behaviour abstracted, in milliseconds and automatically, for symbolic storage and processing. Interpretation of human data is no longer a human task, and the affective and semantic are left out of its equations. The human, supposed by previous realisms to be the core of perception, is thus riven between its acts, which are already data, and its meanings and emotions, which are either coded to become data or cease to matter. A key question for aesthetic politics is whether it is possible or desirable to return to some previous constellation of the self; or whether it is better to plunge into this new condition, this atomised data-cloud of behaviours, and discover new ways to persist beyond the human exception.

As the GFC demonstrated, the purportedly autonomous and enclosed world of derivatives was not self-sufficient, coherent or complete. Like the disintegration of the self, this is not a matter of timeless lack but of loss: a historical, time-bound and therefore changing incompleteness. Lack is ontological, a universal condition; loss is historical, a progressive diminution. A missing step that runs a system down or stops it frozen in its tracks, loss is historical because it belongs to the friction between avowedly autonomous symbolic systems

and the ontology they strive to expropriate and to escape. This is the terrain of the failed freedom of art. And the object of loss, the lost object, the missing step, where is it? It cannot be said to have no existence. It is only misplaced, in space or time. When the symbolic, specifically the universalising information order, defines the now and the here, realism, as loss, speaks from and to an elsewhere where what has been lost continues to exist.

'The Look of a Room'

The word 'else' tucked into 'elsewhere' deserves a moment's pause. Its proto-Indo-European root 'al' appears in words like alien, alias, the Greek prefix 'allo' (as in allergy and allonomy), alter and eldritch, as well as ultimate, altercation, altruism and subaltern. To speak of something 'else' that creative works depend on, or to speak of their relation to an 'elsewhere', is to call on those permutations whose ghosts still flitter at the edges of our casual usage. This 'elsewhere' is a kind of iridescence that disappears when we look directly at the word or at any appearance of the Real. The 'else' that drifts towards aliases and alibis, allegories and ulterior motives, also haunts realist works that survive the era of their making. If they depend on the reality from which they drew their claim to speak truly, what happens when that reality no longer exists?

Aimé Césaire's decolonising theme of *négritude* was not only an influence on Palcy: she referred to him as her father, not only intellectually but because, as a member of the Regional Council of Martinique at the time, Césaire helped fund the film. Jean Antoine-Dunne notes that 'The negritude movement founded by Césaire is referenced throughout the film *Rue Cases Nègres* thematically and in the use of visual

imagery', particularly in the care given to the cinematography of skin tones and the colours of land and sea, in the theme of Africa as lost homeland, and in the boost Palcy gives to learning from the African tradition as well as the European schooling emphasised in Zobel's novel. This doubled education not only points to the idea that, as Dunja Fehimović writes, 'a "true" Caribbeanness can only be found in and through contingency and relationality', but that the 'true' she so carefully encloses in scare quotes is itself fluid, '*errance*', wandering ('errantry', distinguished from purposeful nomadism and enforced exile by being shaped by perpetually new relations), as yet another Martiniquais writer, Eduard Glissant calls it. The conditions of making are financially precarious, especially for an expensive and collaborative art like film. They are also contingent, in the case of *Rue Cases-Nègres*, on the double traditions of an aspirational engagement in the creolising functions of European education and on African and diasporan solidarity. The film navigates between the claims of a Real that exceeds capture because it is ancient but also fractured, and one that exceeds capture because it is rooted in the non-identity of ex-slaves and colonisation.

The life of a work that survives the conditions of its making, living what Giovanna Fossati calls 'the archival life', the perpetual remaking of the work undertaken by humans, natural processes and technical maintenance and reproductions, is the site of other truths. Every encounter – with other people, with a situation, or with an artefact – is a unique, perhaps unrepeatable event. Production is never complete: it continues not only in the archive but in the historical, technical, social and ecological encounters accruing to the work that enrich the unique encounter it has with a specific audience in a specific reading, viewing or performance. Facsimiles and reprints, slides and .jpeg reproductions, criticism and classroom discussions or

the effect of close readings of extracts and details all contribute to subsequent encounters with the work, in the original or in reproduction. Whenever a work is sold, or reproductions shared, its price or lack of one becomes part of its archival life, even though any specific encounter has no exchange value, because it cannot be reduced to equivalence with other encounters. Its value lies less in what its maker meant or I understand than in the intersecting networks of economies, technologies and ecologies that draw me and the continuing story of its making to this meeting and then pass on, both of us subtly but permanently altered, forward and backward in time, and permanently altering the relation between this one work and all the others whose histories are braided into its passage through time. Not all of these encounters require a human presence.

The last line of Thomas Hardy's short poem 'The Walk' evokes 'the look of a room on returning thence'. One of the *Poems of 1912–13* written after the death of his wife Emma, 'The Walk' is an eminently realist poem. It gives a clear-sighted account of an emotional state, a detailed description, unburdened by sentiment, of a change in perception. The poet has taken a familiar country walk which he has done alone recently because his wife was too ill to come. Nothing has changed in that solitary stroll, he says, except that empty room. What makes it so valuable, above and beyond its finely tuned autobiographical account of loss, is its play on absence and presence, on solitude which is not the same as emptiness. There is of course the post-Victorian surprise of atheism, a Godless confrontation with death including, undoubtedly, his own (his auto-haunting) – the honest (if not entirely admirable, and all the more honest for that) self-pity where, all the same, the indifference of the universe is not exclusively about how existentially gruesome it is to be human. Instead the indifferent

universe appears in the persistence of the room without her, or him. This is not the indifference of the iceberg forming while the Titanic is being built that he would write about in 'The Convergence of the Twain': it has none of that poem's inevitability. If anything, the absence of 'The Walk' is entirely evitable: he just has to go for his familiar solitary walk – except that the empty room now accompanies him.

So who is doing the perceiving? Emma indeed, specifically absent-Emma; also Hardy-when-he's-not-there; and third, the room itself, as it waits, synchronously with the walk, self-perceiving, precisely at the moment when he is preoccupied with another scene ('the familiar ground'). Both this familiar room and its unfamiliarity now she has gone, are real, a space that now ejects him, his consciousness, most specifically his perception of it. It is the room that is empty and which he is not present in that changes where he is and what he sees when he is elsewhere, his habitation of the landscape of his walk. The rather forced rhyme of sense/thence only deepens the alienation that binds him to the affect of absence; and it is this alienation from his own perception that makes this so profoundly realist. It is a poem about the illegibility of a perception that is not exclusively human.

In theatre there is always an audience. The great fiction of cinema is that there is not. In Yasujirō Ozu's films, especially in the post-war period, scenes often end with the characters leaving the set or location, while the camera continues to film the empty space. Ozu's mystery is the same as Hardy's: As Mark Durden puts it in a discussion of Hardy and photography: 'Viewing scenes and people through descriptions of characters witnessing events and each other unobserved is part of [Hardy's] photographic effect.' What does a room look like when there is no one there to see it? Seeing without there being a person to see evokes the purity of perception that has

no perceiver, and therefore no desire, no revulsion; the scientific principle revealed not as objective but as non-subjective. In Ozu's *Tokyo Story*, a room sees itself because the camera, given the fiction of the absent audience, is in the room and part of the room, mere furniture, an ecological presence of the room to itself, while in Hardy's hard-won atheism, it is rather the work of the dead, and of death itself, to impersonate the absence of a perceiver, in order to realise (as all realism is a practice of making real) a subjectless perception. The poem has the medium-specific opportunity to see without a point of view. Ozu works with a tripod: the camera must occupy a point. Hardy invokes a more séance-like mode of perception that, having already rejected divine omniscience, is no longer exclusively human. Straddling the Victorian obsession with spiritualism and the new century's obsession with film, his imagined room is not just the room seen from his own point of view on his return, but the room in the absence of his dead wife and himself, the persistent reality of the unseen (by humans), and the affective presence of that reality as loss. Ozu's camera becomes environmental; but Hardy's country house becomes ancestral and therefore technological, drawing into its preoccupation with mortality all the dead labour bound into photographic devices.

Hardy's and Ozu's empty rooms both point towards the hypothesis that aesthetic realism concerns itself with truth to perception. Distinct from scientific or philosophical realisms that concern themselves with existence, aesthetic realisms, even those like Brecht's or Zola's that in different ways point to underlying realities expressed in the tangible, organise themselves around perception. But as we have just seen, that perception may not be exclusively human. Twenty-first-century realism then has the further task of extending the boundaries of perception from human sensing to a world

and a history that senses and feels itself. The boundaries of perception are no longer absolute, circumscribed and defined, as universal communication is, by what exceeds it. Hardy's hard-fought confrontation with atheism is the first modernist proof of the now ordinary and uncontroversial truth that there is no human essence. There is nonetheless appearance (the 'look' of the room) beyond human perception that determines the mobile boundaries of the human, especially now that perception is one of the few enjoyments to be had outside the inhuman realm of data. To see the world humanly but from beyond the limits of the human is to create Bazin's 'ideal world in the likeness of the real'. At the limit – which has no solidity of its own – realism is purely relational, as the colonial critique of European truth has shown, no longer claiming to be objective because it has become subjunctive. Subjunctive realism distinguishes itself from neo-populist post-truth by its renunciation of ownership and embrace of multiplicity, and by its refusal of post-truth's tactic of denial in favour of a dialectic of loss and affirmation. The new terrain of struggle over truth is the field not of what is but of how things ought to be, and thus relational, for ill or good.

Seven Tasks

The circular motif of the Atlantic slave trade echoes across the grooves of the record in Léopold's mother's boudoir and its repeated plays, through Médouze's realisation that independence only consolidated a new colonialism that locked him back in *Rue Cases-Nègres*, to José's closing line that even as he makes his way into a new future, he carries his *Rue Cases-Nègres* with him. It would be incorrect to equate

breaking the cycle of the race round Martinique with the rift in the otherwise endless cycle of becoming human that defines the earlier history of realism. Yet it can help in understanding why it is so necessary to break out of circular thought, feedback loops and the internal eternity of autonomous art.

'I don't want to make friends', says Jim Stark (James Dean) to Plato in the darkness of the planetarium in Nicholas Ray's *Rebel Without a Cause* (1955), just before the lecturer intones 'Long after we have gone', heading towards the scene's climax when, with special effects from the Zeiss hemispheric projector, he concludes 'We will disappear into the blackness of space from which we came'. Art's autonomy only makes sense as a talisman against an empty universe, without God or gods, where humans have isolated their affairs from the world beyond them, which now stretches out as endless and alien duration. Art's self-isolating eternity is a reaction to cosmic loneliness. How different from Guzman's aesthetic politics, where the history of calcium holds together trauma and community, colonialism and cosmos, in a braided continuum. Even Hardy's long zoom into the quiet couple making their way across the landscape underscores that even the most isolated are observed by a world they inhabit, and project their story into the future community of its readers. *Rebel Without a Cause* declines the challenge laid down by the planetarium display, shrinking its vision of community down to the surrogate family of Jim, Judy and Plato. Like an autonomous artwork, this closed circle sets its affection and care for one another against the social, historical and ecological world beyond its limits, as if the social failure of the nuclear family that initiates the plot could be cured by making a better, younger nuclear family. The is the kind of narrative and thematic circle Médouze breaks out of when he returns at last to Africa. Césaire's *négritude* ensures that

this return is not a circle but a spiral, upwards out of colonialism and neo-colonialism. At the heart of *Rue Cases-Nègres*, Josephine Baker's record spins but, like film, it converts its circular motion into a projection of love and longing, the affective shapes of a demand for an unknowable future determinedly other than the present. Realism's concern for ancestors extends not only into the past but into the social, technical and – as we now understand all too well – environmental futures which they make possible, or impossible.

This section identified seven tasks for twenty-first-century realism. The first is to extend perception throughout the human body and beyond it into the world that touches us whenever we touch it. The second is to accept the burden of the unnumbered ancestors whose tribulations paid for this present, and whose skills and knowledge are congealed into our technologies. The third task is to encounter and redeem whatever fails to exist and the fourth to supplement, through depiction, the loss that, as a result, constitutes the being of human, natural and technological beings. Fifth, allonomy derives, from its negation of aesthetic autonomy, a subjunctive realism asserting that things are not only as they are but as they might be. The sixth task is to activate the incompleteness of being at the threshold between communication's claim to universality and the resistance, ephemerality and even the mortality of everything that exceeds it, thus, as its seventh and final ambition, extending the concept of perception we began with, from exclusively human senses to a sensing and feeling world that includes and flows far beyond our bodies and our present. Realism is realistic when it confronts the exploitative actuality of our condition with the utopian potential of a common perception linking humans, tools and land. Truth to perception does not submit to past or present: it is a premonition of future senses, beyond human.

A Digression on Mermaids

In 1842, Moses Kimball, proprietor of the Boston Museum, purchased a mermaid. The creature was deceased, about two or three feet long and, it turned out later, had been fabricated from the head and torso of a monkey and the tail and other parts of a fish. It had had a prior public career, exhibited by a Captain Eades of Bristol, who believed that the specimen he had purchased in the back streets of Batavia, with proceeds from the sale of a ship in which he had an eighth share, was a natural marvel. Eades' son, also a seaman, inherited this wonder, and showed it in his lodgings, but was glad to accept an offer from Kimball, and sold it to him. Kimball had the wit to enlist Phineas Taylor Barnum, already known as the go-to hokum peddler of New York, who had recently purchased the American Museum, a cabinet of marvels. Barnum set up his lawyer, Levi Lyman, to play the part of a distinguished English biologist who would, apparently reluctantly, allow his mermaid to be exhibited to the paying public, and deliver lectures on it and on his own adventurous if wholly fictitious life. The ploy worked well for a whole year, after which Barnum sent the creature on a tour of the South in the hands of his uncle who, however, lacked Lyman's gift for ballyhoo, and the exhibit was widely mocked as fake. Undeterred, Barnum took the piece to London with some success, before installing it in permanence at his American Museum where it was most probably lost in a fire.

Harriet Rittvo suggests that these kinds of exhibits posed 'a tacit challenge to the definition of the physical world not only as the realm where natural laws operated, but also as the realm where specialists held interpretive sway'. Martha Chaiklin notes that Japanese mermaid stories go back at least to the tenth century, with etymological roots suggesting sources in China of the Warring States period. She argues that Barnum's mermaid and others like it represent major achievements of creative taxidermy, some including moving parts as well as wood, shark's teeth and dog bones as well as fish and monkey parts and that, as permitted exports from Japan since at least the seventeenth century, they became important sites for popular imaginings of the Orient. James Cook reads Barnum's success with the mermaid as a contractual nod-and-wink linking pseudo-intellectual showmanship with a newly urbane and knowing crowd who enjoyed the skill of the illusion. Zach Hutchins describes novelist Herman Melville's contemporary career as a touring lecturer. Melville apparently 'regarded the lecture circuit as a type of confidence game, an opportunity to bilk the crowds', an attitude Hutchins compares to Barnum's mermaid exhibit. Michael Leja extends the analogy, scandalously, to the Armory Show, the legendary 1913 launch of avant-garde art in the USA (including Duchamp's notorious *Fountain*, a urinal signed 'R. Mutt'). Several of these authors, and others who have treated the world of ballyhoo and bunkum in nineteenth-century America, also talk about class-based interplay of quasi-scientific, quasi-religious, quasi-philosophical interests and the history of popular amusements. One or two also discuss the waning interest in these kinds of novelties. The Feejee mermaid – as Barnum's mermaid was known – still reveals something about how, despite unrelenting realism, the ocean, the Pacific especially, retains its mystery.

If the glamorous mermaid of ship's figureheads was the favoured *fata morgana* of the water-weary able-bodied seaman sick of rum, sodomy and the lash, then the nasty monkey-fish is the truth of that hallucinatory wish-fulfilment. Yet it is true too that this miserable effigy of the failure of dreams – exhibited to landlubbers who never needed to dream of sea-maidens singing them to solitary bliss or death, those two expirations so perfectly blended in the mythic mermaid – claims a certain cynical truth. Barnum's 'real' artefact is like the wicked uncle who exposes the double entendre of every joke with the evidence of gynaecology. No mariner would ever have betrayed the mermaid in so gross a fashion, except that one did, and not some sailor on a spree who lugged it home, only to hock it for more drink in some San Francisco knocking shop, but the part-owner of a ship who bought this absurd memento. Captain Eades was perhaps the last to see beyond the nasty relic to the mythic creature that it purported to have once been. The fascination of the relic lies at the hinge between Eades' dream of beauty and the actuality of ownership and cash exchange.

As the word 'Feejee' suggests, Barnum's mermaid was orientalist merchandise, but more the bleak Orient of Brecht and Weill's *Surabaya Johnny* than the glamour of the Spice Islands. Not only an ordinarily perverse fantasy but the betwixt of hallucinated loveliness and the no less hallucinatory lure of disgust at the mire of sex and putrefaction, the poet Yeats' horror and fascination in 'Crazy Jane Talks to the Bishop' with the discovery that 'love has pitched his mansion / In the house of excrement'. This oscillation between desire and revulsion is the last illusion, because it pretends 'finally' to have transcended sexuality and sensuality by discovering their common decomposition. We have known since Freud that fantasy is not only irrational but multiple – observer, perpetrator, victim, lover and loved, voyeur

and exhibitionist, sadist and masochist, tender giver and tender gift all at once. That Feejee mermaids were the obverse of mythic mermaids is obvious. So too, to a Freudian, is their function: to make explicit a puritan disgust at heterosexual congress through the conjunction of the lecherous monkey and seafood. The mummification is, at first glance, the anomaly: the caesura of death between the rhymes of sex with putrefaction.

Trailing their ancestry in older faiths, mermaids take their infatuated seamen down into the sea-caves of the deep whence none return. Ordinary lust becomes desire in the moment when it cannot be fulfilled, becomes love, which is ready to surrender its life for its beloved. Of course Barnum's Feejee mermaid is the bestial imago of love in a decaying mirror. But mummification turns its parody of love into sheer fiction because it pretends to show what cannot occur: the end of desire. That this fixed finality wears death's grinning mask is proof that it is carnivalesque, a dance of death as Holbein might have seen it. The saddest thing is that in some mediaeval carnival, it might have lived up to its promise, to show that sexual desire transcends even death. But in Barnum's carny, the dime-show freak is no longer capable of the mythic and fantastic dialectic of carnival. It is instead a token in commodity exchange, a service provided.

Barnum's Feejee mermaid converts fantasy into the grotesque evidence that the commodified world of goods and services no longer bears the sacred stamps of memory or contradiction. It is merely the empty, voiceless carcass left where once a siren, calling Odysseus to abandon everything – home, honour, war, loved wife – sang so sweetly he had to stop his ears with wax not to harken to the honeyed lure of sex, the mystery of unending desire beyond the end.

Mermaids may well have travelled from Europe, echoes of Lorelei and Rhine maidens, silkies, naiads and river

spirits, nymphs of coves and rocks and seashores. They may well have met other fables from the indigenous West coasts of the Americas, and from tales of the bare-breasted beauty of Polynesian women. Perhaps Bougainville's voyages and Mandeville's fourteenth-century travels lent the Pacific its unending aura: desire as ocean. The Atlantic and South China Seas were already charted, navigated and known. In the Pacific marvels might still appear, not least where new and ancient empires met at crossroads of ethnicities, religions and moralities like Batavia. Even the symbol of England's maritime power, ever present on her coins with helmet, buckler, trident and shield, staunch Britannia, comely negation of the sensuous, was an Other of mermaids, overwhelming desire with unending duty. At which point the Feejee mermaid appears as Barnum's parody of Britannia.

Compare Gerty MacDowell, perched on a rock on the beach at Sandycove while Bloom masturbates until, at last, she reveals her limp, her imperfection, her unworthiness as object of pornographic desire. The terrible bathos of Joyce's epic, the reduction to banality, makes of Gerty a Feejee siren; but it also lifts the quotidian to the heights of epic truth, and Gerty does transfix and transfigure even while *Ulysses* retains its steel-eyed insistence that the sordid is also always and irreducibly sordid, even and perhaps especially when it is the site of apotheosis. Barnum's carny sideshow cannot pull off that second trick. He lacked Joyce's ability to see the radiant legend beneath the naked skull.

Instead, Barnum's Feejee mermaid secularises three sacred systems: the ancient belief in water spirits; the millennia-old fantasies of sailors; and the seizure of both in the symbol of imperial power. Animist belief in local spirits expands desire into a property of the world, where rivers and seas longed for the bodies of sailors as much as the sailors ached for the

bodies in the water. The fantastic mermaids were products of desire formed in repression, in the hierarchical discipline aboard naval ships that succeeded the rugged companionship of crewmates on Odysseus' craft, a desire perverted towards possession, in a fantasy that also dreamed of being possessed. This second desire was exclusively human. Britannia, the third, was always a sublimation of desire, power as austerity, alone on an anonymous and depopulated shore. But even this third desire, as sublimation, hauled itself out of the economic calculus that funded it, a power wrapped secretly in the heart, 'a matter shut up, sacred and apart' among men pledged to duty, as in Kipling's *Stalky & Co*.

That silent imperial honour is a tribute to the emotional power of individuality, assembled in common but experienced as the very foundation of the personal as source and site of secret duties. When Chaiklin argues that Feejee mermaids mediate the East for Westerners, she places these specimens as interfaces, screens to project on, fantasies to participate in, devices for producing the very difference they depend on. Fantasy mermaids mediated the incompatible worlds of sea and ship. Even as seasoned a navigator as Captain Eades, first purchaser of Barnum's mermaid, was unlikely to have known how to swim, and certainly had no chance to breathe underwater like Melody Jue's scuba diver. The interface between water and air was for Eades an absolute: the surface of the sea a division between human and inhuman. The uncanny mermaid that passed between the two realms was a fitting figure for the dissolving identity that attached to passage between East and West, the simultaneous experience of imperial conqueror and displaced traveller. The legal fiction of ownership demanded an unassailable person to whom property and debts could be assigned. As archetype (since we cannot know him as he was) Eades emerges from the various accounts of the Feejee

mermaid's provenance as a split personality, torn between the business of ship owning and the lure of the mermaid. We may imagine a hiatus in his psychology, an in-between, a void where neither universal law nor estrangement nor myth dominated. The abjection of the Feejee mermaid belongs to the *horror vacui* of this psychic disposition, displaced into thresholds of the deep and the East, but stemming at origin from the fundamental alienation that, in the mid-nineteenth century, was becoming another, more consistent and all-embracing universality: the rule of the commodity.

The Feejee mermaid became secular through commodification. Stripped down to a cash transaction, the sexual act is no more than a pretence that purchase can bring desire to an end. But the only possible end of desire, which is by definition perpetual, is death. Payment dissatisfies both love as the endless desire that transcends the grave, and the world's desire which, inhabiting everything, transcends the human. The greatest sacrilege of the Feejee mermaid is that it reduces affect, human and planetary desire, to the mummified conjunction of monkey and fish. In a last twist of its desiccated tail, it simultaneously trashed love and its repressed other, honour. As carnivalesque parody of Britannia and squalid reveal of prostitution, Barnum's mermaid was an act of resistance. But its cynical conjuncture of con-trick with the knowing spectatorship of knowing dupes simultaneously denied the utopian possibilities of desire in a new economy where common knowledge could become private property. It should have stopped once it had denounced Romantic individualism and imperial honour, the perverse offspring of repression and sublimation. Instead Barnum's commodification of desire annihilates one by one desire's transcendence of repression, its capacity to form a commons, its ability to transcend death, and the play of desire through bodies that are always wholly

immersed in planetary ecologies. The greatest sacrilege of the Feejee mermaid is that it reduces affect, the world's desire, to a grotesque mummy that ultimately only expresses a regime based on individual psychological and legal possession.

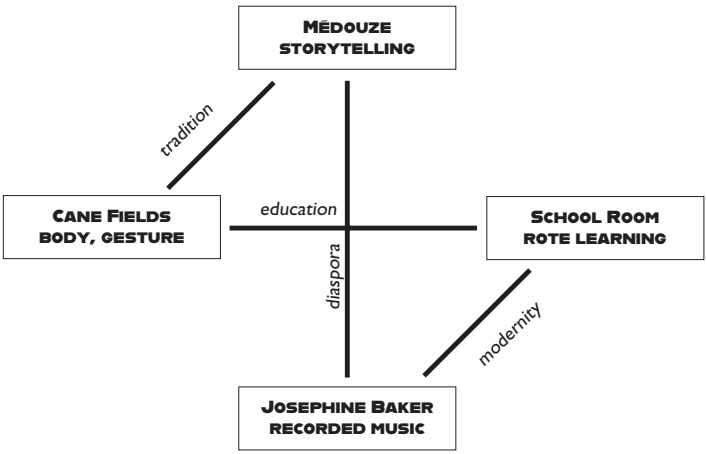
Gerty MacDowell's interior monologue is couched in the gauche romanticism of what we would now call young adult fiction, but for all that it gives a glimpse into what Barnum's exhibit denied: the subjectivity of mermaids, in Gerty's case her desire to be desired. Why else would the mermaids sing? She is immersed in desire, longing to lose herself in a desire which no longer differentiates between her body, Bloom, the beach, the waves and the sky. Even the moments of triviality and absurdity, when Gerty misreads Bloom's gaze as the spring of romantic love, not only deny revulsion, but intimate that lust may also be transcended. The Feejee mermaid's tale tells us that disgust is the next-door neighbour of the sublime.

2

Data Visualisation

Space and time

Some realist media paint the textures and colours of life, like Paul's Blackfriars film; and some tell us credible stories, like *Rue Cases-Nègres*. The truth of realism lies in the tension between picturing sensory detail and organising it to serve a narrative. Informed by but challenging cybernetics, mid-twentieth-century structural analysis coped with this contradiction through diagrams. A structural analysis of *Rue Cases-Nègres* might look like this:



Storytelling and recording, differently authentic expressions of diaspora, are linked by circularity to the Atlantic that connects Africa as Médouze evokes it to Paris, the colonial metropolis where Baker made her name. On the horizontal axis, repetitive labour in the cane fields and repetition in the school room, echoing the cycles of diaspora and its memory, are linked to the geography of colonial Martinique. At top left, tradition embodies and preserves past physical effort and exploitation. At lower right, repetition aligns with modernity. In this analysis, the truth of the film is its structure where neither the grooves of the record nor Médouze's tour of Martinique, neither modernity nor tradition offer José escape. Past and present join each other in an endlessly mirrored present, the present of the diagram itself.

Structural analysis strives to observe only what is there to be seen, the bare bones, but in order to get to them it has to strip away the perceptual realism of Médouze's intense eyes, his aged body half-naked in the firelight, and the very different languor of the white man's mistress in her boudoir. Instead it emphasises what cannot be seen: the Africa of Médouze's angry regret, the Paris that José's mother dreams of, and the Atlantic diaspora. It also strips away the story and how it is told in favour of organising analysis around the (fictional) world that the film constructs. It is a common accusation that structuralism converts dynamic tensions into balanced binary oppositions, because it prefers static relations in space to evolving relations in time. Diagrammatic translations of time into space – like the horizontal 'education' axis in the diagram above – are characteristic of the dominant media of the twenty-first century: spreadsheets, databases and geographical information systems. These media are dominant not necessarily because they are the most commonly used media, though that case could be made. Tabular data, maps and diagrams, data

visualisations for short, are dominant because they are the media that domination uses in order to dominate.

Structural analysis ascribes meanings and causes to invisible and intangible social formations. Data visualisations take us back to Plato and the European Middle Ages, and the belief that the world is changeable but truth is eternal. In ancient realism, truth persisted as the real reality apart from the ephemeral delusions of the world. For St Augustine, numbers, geometrical figures and God himself were real, and the world a mere shadow of that transcendent reality. The realism we looked at in the first chapter, faithful to perception, doesn't believe in that distinction. For this familiar realism, the world is what it is, its appearance is its truth, and we can perceive it. The renewed realism Brecht proclaimed, 'completely gripped by reality and completely gripping reality, must keep pace with reality's headlong rush', embracing the divided social, technical and ecological orders, the world is what it may become, and its appearing exceeds any claim that it is unchanging and that knowing it is a means of controlling it. Data visualisation, on the other hand, take us back to the Platonic roots of ancient realism. Number precedes appearance. Number is knowledge.

In the introduction to their classic study of classification, Bowker and Starr argue that 'to classify is human', asking only 'when and why do [classifications] become visible?' Their argument is that humans always classify things: fresh food and rotten, clean and dirty, permitted and prohibited. Humans classify in the same way they eat, make love and speak across cultures and eras – but always differently in different times and places. Languages, love-making and cuisines diversify, hybridise and evolve. Likewise sorting acts one way when it organises perceptible categories like raw and cooked and another way when we look at the world and ourselves as data. Because it is

no longer primarily anchored in human perception, as it was (and still is) in realism, data has to be visualised differently.

Realism still assumes that what escapes it, what is not seen or sensed (the river under Blackfriars Bridge, its pilings, the railway under the Embankment) is hidden by or for another purpose: the uncleanness of the sewer, the sacredness of the river. The information regime we have today, on the other hand, is as profane as it is democratic. With its roots in French republican *laïcité*, secularism demands the revelation of all secrets and that all that was once holy be stripped of its aura. The sacred inscribed in beliefs and statements of belief, in acts of fidelity and behaviours evidencing faith, must all become transparent and transcodable. The Thames is no longer T.S. Eliot's 'strong, brown god'. Médouze's circumnavigation of the island of Martinique is no longer a mythic race but measured out in metres.

God, destiny and evolution are properties of and beliefs about the world that have real effects on how we go about living. In the data epoch, on the contrary, underneath everything that appears, there is an utterly alien reality. Not Platonic forms (which Socrates could demonstrate were innate in the human mind, seeming to prove, according to Plato's *Meno*, that humans come from some otherworldly pre-existence where they are at home in and with the forms), but numbers. Measurements and their interplay (laws, formulae, algorithms) operate autonomously, and cause both appearance and the human selves that experience them. Humans are no longer socialised, fleshy bundles of desire and pain but statistical aggregates, at every scale from the chances of missing the next bus, all the way to the probable population of the world next Wednesday. Humans are no longer better or more central to the regime of numbers than any other phenomenon, because they are just as measurable as any other component

of the world. For information systems, everything that exists is information; and what is unknown, such as the sacred, does not exist, which is to say that it is rejected, ejected, externalised and environmentalised. But whatever is not information, anything that is therefore unknown, does not disappear: it becomes unconscious.

In any realism that still pins its colours to the mast of determinism, perception is always present, but the sacred, the secret, the underpinning cause or causes, are always in the past. A tale of events that have already run their course, the present of the telling in a novel, as in the Hardy example that opened my account of realism, is, like the past events it tells us about, already a sum of the past, a result, in many instances, of the events it recounts. Even scientific reports from the remotest parts of the universe like the M87 images, and in some ways these images most of all, tell us about the past. Paul's film on Blackfriars Bridge is a perfect example of one kind of journalism. It describes in great detail a specific locale at a specific time. It is not hard to read into it, in the structural mode just demonstrated, a diagrammatic analysis of social class, gender and racial relations, to which the hunched old man might add a further gesture towards analysis of disability. Journalism might be defined as the unresolved dialectic of description and ethical/political analysis. Truth is, for realism and for the journalism that is so deeply entwined in it, an ethical issue, founded on the completeness of the account and its openness to further development. For journalism and, one suspects, for realism as a whole, no account is ever complete. Any significant event needs more than one journalist to grasp what has happened. So realism opens on to dialogue and the dialogical imagination. A breaking story is only the start of the public life of news, the beginning of the interpretive angles that change how a story unfolds and the shape of the truth that

it evolves. Any news story triggers changes that alter how it is perceived and reacted to.

'Media determine our situation', according to media philosopher Friedrich Kittler, yet this account of journalism suggests that the situation also determines our media. Kittler's dogma needs to be qualified. The argument Michel Foucault launched against Marxism was about economic determinism. Foucault set out to replace economics with power but also to replace determinism with a richer form of struggle. Ecocritique has two options for a response. It could declare that the human-natural relation is the determining driver of history, an argument developed by Jared Diamond. Since 'environing' names the exclusion of nature from human affairs we could call this environmental determinism. Alternatively it could propose that the mathematical model of communication has functioned as an original sin dividing human from natural. The problem is that the mathematical model is a post-war thesis. To project it back in time, as Kittler does, is anachronistic and actually strengthens the model by supporting its claim to universality, even though it is convenient, since it gives a means of suggesting that the status of the environment as environs is determined by another cause: communicative determinism, akin to but distinct from Kittler's media determinism.

The question then is which if any of these is the final determinant. In the interests of making a splash among my colleagues, communication's primal divorce of senders from receivers and signal from noise is an obvious choice. But the question of finality presumes a prior question: what is determination? In the ecocritical context, and indeed the context of network communication, how does determining happen? The immediate answer must surely be that, ecologically speaking, there is no determination, only the multiple, in a realm of primal flux which lacks even the fundamental asymmetry of time.

In the eye of eternity, everything flows, in every direction. Let's call this 'vitalist' position ontological materialism. The alternative is historical materialism, which instead proposes that time is indeed asymmetrical, notably in the relation of sender to receiver or worker to capitalist. It is true that every action has its opposite (and in certain circumstances equal) reaction, and that underneath the governance of time's arrow in history and human experience, there lies the quantum void of eternal flow. But as experienced by humans, technologies and ecologies, while there is history, there is not necessarily any simple cause. There is only the snooker table of reality, where no one ball is the exclusive instigator of change and every ball is already in motion, but some balls are bigger and faster than others.

Truth then is never single. Every proposition, true or false, has repercussions that alter the truth of the situation that the breaking story discovered, so that the situation is always evolving in more complex ways as a result of what has been said about it. It is clear that no one thing caused the Wall Street Crash or the coronavirus pandemic. The simple model of one cause leading to one effect exists only in classroom exercises. Immense networks of influence congregate in the least exotic traffic accident, from policies supporting privatised transport to gravity and the speed of synaptic connections. Ripples from the event scatter into immense and borderless futurity. This does not however mean that ontology triumphs over history. It may well be that ontology, the being of the world rather than statements about it, is true. But truth is not a quality of being. Truth is a quality of statements and actions. It is thus historical and belongs to communication and the asymmetric order of time.

So truth demands responsibility, because what we say, believe and act on as true has consequences. This

responsibility is – and therefore truth also is – political: a collective enterprise, conducted under conditions not of our choosing, but nonetheless irreducibly engaged in the world we share, all of us, human and otherwise. Data visualisation is a truth-*making* process, a tool for controlling the unforeseeably radiating effects of any action and any statement. Unlike realism, although it does employ data collected from the present and past, data visualisation is an instrument for predicting and controlling the future. The question we will have to confront is whether a future predicted and controlled from the present is in any way different from the present, that is whether it is truly a future.

In C

As we saw in the structural analysis of *Rue Cases-Nègres*, data visualisation represents time through spatial relationships. The horizontal time or t-axis, standardised since William Playfair's *Commercial and Political Atlas and Statistical Breviary of 1786 and 1801*, translates change into space. Plato and the founders of modernity – Galileo, Descartes, Newton, the map-maker Mercator and (if we are to believe his 1495 portrait by Jacopo de Barbari) Fra Luca Bartolomeo de Pacioli, the esteemed 'father' of double-entry book-keeping – were all geometers. So too were Captain Cook and the cartographer-navigators of Europe's imperial expansion. For Plato, geometry was real: everything else was mere illusion, at best the flickering of ephemera over the universal, abstract perfection of underlying forms. Even the instinctive popular Marxism of 'Follow the money' points to a similar belief: that what we see and hear is partial and probably illusory. What is real is wealth and how it moves from place to place, person to person. Today,

even when it is standing still in reservoirs, wealth is invisible, unlike coins and promissory notes. Wealth has magnitude and direction. Money, however, as the formal system for communicating wealth, is measured in units. As Alvy Ray Smith has it of the field of vector graphics, the digital animators' familiar workspace, is destined to be reformatted for pixel-based screens: vector geometry subsumed under the arithmetic of gridded screens. Seen ontologically, wealth and computer graphics flow, but when they are presented on the screens of banks and trading floors or homes and cinemas, their representations are built of unit increments: pixels and frames, dollars and bitcoins.

Data visualisation's figuration of t-axis marks out time in units: days, hours, seconds, milliseconds. Horizontal rows enumerate the advance of time in incremental steps. Vertical columns ascribe quantities to each unit of time. In the grid these rows and columns form, any cell denotes a fixed quantity at a fixed time, depriving the unit squares of direction, reducing them to arithmetic. Even the extrapolation of probable quantities from the mass of data aggregated in the grid is the result of arithmetic calculations, not geometry. 'Numbers don't lie', but they do tell stories – we have all at one time or another been bamboozled by fictitious numbers. In data visualisation, those stories, diagrammed on pages and screens, do not unfold over time but accrue in space. This is how data visualisation can diagram the unknown future in the same way it diagrams the known past. Fourteenth-century globes, before the European voyages of discovery and plunder, used to leave blank spaces to indicate where explorers could go, sure that there would be something there, if only more ocean. Calendars do the same, marking out future time in boxes, each of them shaped exactly like today and yesterday, successions of minutes and seconds, which it is perfectly acceptable to expect will come into

existence in due order. In data visualisation the future is laid out like a map, *terra nullius* waiting to be colonised.

Statistics do not convey joy or suffering. They imply no ethical or political demand. They may account *for* but give no account *of* pleasure and pain, except as numerical indicators of well-being averaged across a population. Realism, in contrast, has a special relation with suffering, to the point that it risks revelling in it. In its rejection of the arithmetic regime, realism embraces the human in its alienation from nature and the machine. The political philosopher Rancière argues that the nineteenth-century realist novelist Honoré de Balzac forged 'a new rationality of the obvious and the obscure … (which stands in opposition to the histories of great names and events)'. By making anything and everything worthy of attention, Balzac democratised the world's contents and our ways of seeing them, something photography and film have continued doing. The choice between realist depictions and data visualisations is then not an ethical choice between good human and bad mechanical, but between realism's residual anthropocentric belief in the human exception, even human sovereignty, and data's democratic but reductive levelling of everything to the universal equivalence of numbers. Realism excludes much that is non-human; data harvesting ignores much of what is human. Data capture converts living human experience, knowledge and skill into numbers, in a process indistinguishable from the way factory machinery embodies the experience, knowledge and skills that Marx called 'dead labour'. In information capital, the living are attaining the status of ancestors, their numerical traces abstracted from the sensory complexity of living, to be aggregated, anonymised and locked into the black boxes of dead labour.

This becoming-ancestral, that abstracts data from the living and installs it in machines, prepares humans for their role

in a planned future. Similarly, Earth-systems science harvests information from the whole planet, responding to Crutzen and Stoermer's call for expert environmental management by developing cybernetic models of Earth as a complex of communicative networks, the human community among them. In this exemplary democracy of inputs, there is no hierarchy of agents, actions or events. Pandemics and politicians, per capita consumption of sugar and earthquakes, Punjabi farmers' protests and a typhoon in Fiji are all equal – and connectable – in the arithmetic universe. Posed as an alternative to the immobilised despair that too easily overcomes environmentally savvy activists, Anthropocene science proposes that systems theory and systems engineering can repair the damaged world. It is an explicitly managerialist endeavour, the political-bureaucratic application of scientific universalism. It subordinates diagrams' propensity to convert time into space into control over unplanned futures. The chances that Earth-systems engineering will resolve ecological problems are minimal. That may be the point: to stabilise the capitalist model that brought about the problem in the first place. *Rue Cases-Nègres*' cycles of return and restoration are shrunk and accelerated to iterative calculations on calculations in the universal grid, in the interests of an increasingly minute control over the emergence of time.

Realism, from Quattrocento perspective to contemporary video journalism, predates this intense technologisation of time and everyday life. In its literary form, even in recent examples, realism concentrates on conversations between psychologically recognisable characters. In realist images, novels and movies, workplace technologies like typewriters and photocopiers appear alternately sublime and comic, or shrink to plot devices and background colour. Nineteenth-century novels and paintings focused on the results of industry – the slums

and the wrecked lives – while the technologies themselves were romanticised like Conrad's steamships, dismissed off-stage as in Dickens' *Dombey and Son*, or transfigured in their effects, as in the dramatic sunsets of the nascent Anthropocene. New media of the later nineteenth century – popular illustrated newspapers, comic strips, film, telegraphy and the phonograph – and emerging practices of the early twentieth, like jazz and callisthenics, did not set out to depict the changing realities of technological, urban societies. Yet they saw themselves as direct expressions, and were seen by critics as symptoms, of a new culture, integral to the processes and tempo of the industrial era. You can hear the factory in Chicago blues, in the same way you can hear field labour in older folk songs.

The more-than-human timings in minimalist composers like Terry Riley and Steve Reich likewise express a new temporality and sensibility emerging in the 1960s. Indeed, as music historian Jacques Attali observes, music often runs ahead of other social, political, economic, scientific and cultural practices, predicting cultural forms that otherwise were only in the most germinal state. Minimalist compositions of the 1960s and 1970s reinvented human collaboration, but in a form only barely distinguishable from the programmed human actions that would become central to network economies after the 1973 economic crash. Heard or performed in the twenty-first century, the open design of Riley's 1964 *In C* comes across as a sonified foretaste of probabilistic management. Its countercultural commitment to freedom of the players, allowing them to realise the work at their own pace on their own choice of instrument, now seems to plug them into an overarching design that controls the patterns of their activities, converging around a shared plan, realising the composer's prediction of what the work should be in performance: a coordinated whole.

In C poses the formal problem of when the work exists – in the score or when it's played. Following Adorno's cogitations concerning the changing meanings of the *Eroica* Symphony discussed above, and seen from Attali's perspective, the *Eroica* and *In C* both describe states of social affairs that did not exist when they were composed. Riley's *In C*, whose form prefigures the probabilistic managerial techniques of the later 1970s and subsequently, is clearly distinct from the descriptive ethos of realism, and, as we shall see, likewise remote from realism's organisation of time. However, *In C* should not only be heard and thought of as foreseeing twenty-first-century modes of order and control. In its commitment to building a creative community from a disparate group of players, free of the demands of professionalism and the music business, it was and still is an unfulfilled utopian vision of an alternative future that has yet to emerge from our managerialist present.

The dialectic of utopian openness and statistical management shows most clearly in stories about the earliest rehearsals of *In C* at the San Francisco Tape Music Centre leading up the premier on 4 November 1964. Perhaps because the rehearsal space had a lot of reverberation, the performers found their individual parts drifting away from one another until, possibly at Steve Reich's suggestion, Riley added a repetitive high C, christened The Pulse, to keep the ensemble together rhythmically. In his book on the work, Robert Carl describes The Pulse as

> a steady, unvarying eighth-note texture which provides a clear rhythmic anchor, always the same tempo, always the same pattern. It is thus a sort of neutral 'grid' backdrop against which the far more sophisticated, complex, and shifting rhythmic relationships between the modules may unfold.

Carl added that 'One cannot ignore the harmonic content of the pulse' which guides the melodic aspect of the work as much as its rhythm. This metaphor of the grid is telling. In one direction, it points towards other avant-garde practices emerging in the mid-1960s: Bridget Riley's op-art, Sol LeWitt's modular cubes and a panoply of similar structural-minimalist artworks of the period. In another, it points towards a later minimalist composition, Philip Glass' score for the 1982 film *Koyaanisqatsi* (Godfrey Reggio), one section of which, accompanying visuals of television broadcasting, is called 'The Grid', described by Robert Fink as 'a 21-minute *perpetuum mobile*'. Fink links the composition to video artist David Antin's account of the metronomic rhythms of TV programmes and scheduling, and to advertising director turned social critic Jerry Mander's reading of the repetitive beat of analogue television's dots and scans. Overlaid time-signatures and patterns formed in repetition but producing effects of novelty can appear as pure expressions of commodity capital as well as modes of art practice.

They can also be read, in a third direction, as derivations from a new mathematics, encouraging and encouraged by the emergence of digital processing on a vast scale, and its applications to population and wealth management. The score for *In C* includes a set of instructions, evolved over the years, concerning how the players might perform the piece, but granting them a deal of leeway. Similarly, as LeWitt moved towards a conceptual minimalism employing other draughtsmen and art-engineers to produce his works from instructions, he noted

> There are decisions that the draftsman makes, within the plan, as part of the plan. Each individual, being unique, if given the same instructions would understand them differently and would carry them out differently.
>
> The artist must allow various interpretations of his plan. …

> The wall drawing is the artist's art, as long as the plan is not violated. … The draftsman may make errors in following the plan. All wall drawings contain errors, they are part of the work.

LeWitt emphasises a significant property of the processes that guided a pre-digital use of instruction sets to guide the production of works: the precise degrees of autonomy implicit in instruction sets. The plan is authoritative, with room for productive errors, within tolerances which, however, if seriously misapplied make another work, not the one conceived of at origin. At this stage, minimalism still allowed for creative aberrations. Twentieth-century algorithms are designed not to make these slips. They still operate with and on the contingency of human behaviour that LeWitt and Riley both enjoyed including in their constructions. In data visualisations, however, human contingency enters as data inputs, not processing. Two elements do remain the same in these pre-digital aesthetic practices and in data processing. First, the world of the work is constituted once and for all: what is not in the work is excluded from it. An excess of contingency makes a new work – as LeWitt phrases it, a parody of the original. Second, in their retreat from humanism, data visualisation and data processing tend away from hierarchy. The democracy of notes and players in *In C*, of lines, modules and spaces in LeWitt's constructions, carries over into the agnosticism of data processing towards the sources of its data. Both actively exclude or repress expression: flamboyant gestures and bravura performances, for example. The tensions between the ambition to control and fascination with Glissant's '*errance*', and equally between internal democracy and the practice of exclusion (of expressive gestures, emotional states and bodily experiences among other things) shape digital data visualisation, a far less stable practice than might first appear.

Temporealities, Temporamentalities and Chronoclasms

Ecocritical aesthetics must learn from statistical and systems science how to include the non-human, without sacrificing realism's commitment to the marginal and excluded, its embrace of what tries but fails to be, and its consequent capacity for empathy with suffering or joyful embodiment. The pulse in Riley's *In C*, that spatialises its temporal resources in grid formation, is integral to digital media. The experience of these rhythmically organised units as music is akin to the experience we have of digital image scans. The arrival of every pixel of visual data and of every data packet it expresses, is tied to a clock function synchronising any digital component with the whole TCP/IP network. Network Time Protocol (NTP) and Precision Time Protocol (PTP), both governed through the Internet Engineering Task Force, bind computers to Coordinated Universal Time (UTC) and to the more precise but more expensive International Atomic Time (TAI) respectively and through them to the International Standards Organisation. PTP, accurate to within millionths of a second, is the favoured protocol for finance software; NTP, accurate to within a few milliseconds (thousandths) is more forgiving of network latency, the varying fractional delays that the internet is subject to. Sociologist Judy Wajcman stresses the performative power of such protocols: '[digital] Calendars … serve both as a powerful metaphor for visualizing temporality and a tool for enacting it'; while Kate Crawford emphasises that the master-slave architecture of both protocols re-enacts colonial and racist structures at the heart of the contemporary. Time is a logistical infrastructure. It is neither given nor innocent.

We think of digital media in terms of zeros and ones, with no intermediate states. At the level of engineering and

ontology, there is always a ramp or curve between uncharged (zero) and charged (one) states, and there is no true moment of zero charge, only a threshold below which the charge is small enough to be ignored. Proceeding from zero to one entails ignoring the absence of a true zero-state *and* the curve occupying the time between the nominally zero and one states, where 'one' is a minimum threshold that must be passed to count-as-one. In terms of realism, the difference is minimal: photochemical reactions keep the chemistry and discard the electrons, and opto-electronics disregard the chemistry and keep the electrons. In both systems, a sufficient average number of photons needs to strike the light-sensitive surface to activate it. In both, filters separate the light into differently coloured wavelengths, traditional film through layers of additive-colour (cyan-magenta-yellow) film, in electronics through subtractive red-green-blue Bayer masks. Both combine the filtered results either in molecular-scale printing or pixel-scale numerical description. In terms of data capture, however, the fuzzy approximations of analogue recording technologies always kept the lost continuities in mind, where the clean distinction between zero and one belongs to an aesthetic of units and counting. The temporeality of data processing depends on this general agreement among engineers to ignore any vectors swooping up and down between adequately ('on') and inadequately charged ('off') transistors, asserting that the unit difference between states is all that matters.

By temporeality I mean the time occupied by the functioning of a device at the physical level. In the case of integrated circuit microchips, comprising anything from hundreds to billions of transistors, each transistor must operate in lockstep with all the others, relying on a clock, something like a quartz piezo-electronic oscillator feeding a time signal to all the transistors on the chip. The speed of processing, far faster than

human senses can detect, sits apart from the sensory time of natural cycles or the thresholds of audio or visual pulses that humans can sense, and that dictate technical solutions like the cycles of fluorescent tubes or the frame-rates of film and television. As media archaeologist Wolfgang Ernst explains:

> Counting and computing are not simply functions of temporal operations, but rather they also make the concept possible in the first place; the consciously ignored intermediate time of binary conditions is the condition of possibility of the logical operativity of digital computers.

Only by ignoring gaps between micro-temporal events can computers function at all. They function in a mode of time that is doubly discrete: disconnecting from anything outside themselves, especially the continuous changing of the external world; and separating units from one another so firmly as to make the units of distinction (on/off) the distinctive form of its internal organisation. (It is hard if not impossible to imagine glissandi, sliding notes, intruding into the percussive rhythms of *In C*.) Computer logic, the architecture of hardware and software, depends on eradicating any attention to continuity in favour of the absolute difference between the two available states, off and on. Thus computers operate in a different temporeality to, say, steam engines.

Ernst's chronopoetics accommodates both this technical scale of piezo-electronic oscillation and the human experience of time that it organises, 'in cultural and non-human time'. But since human culture engages with many temporal organisations, from diaries and wrist-watches to the cycle of the seasons, rhythmic working with hand tools and machines to feeling peckish at tea-time, there is good reason to supplement Ernst's determinist view that media time determines our temporal situation. Temporealities, the organisation of time

in specific ordered regimes and processes such as computers, do not *cause* the aesthetic and political experience of time in any simple, linear way. As we have seen, no single cause can determine an effect. However, it feels intuitively as if there are continuities, isomorphisms (shared forms) between technical organisations of time, such as computer clocks, and cultural forms, like *In C*.

These cultural, aesthetic-political experiences we can call temporamentalities, by analogy with historian Marc Bloch's *mentalités*, Foucault's 'governmentality' and political scientists Timothy Luke and ecological scholar Arun Agrawal's 'environmentality'. Temporamentalities, describe not the physical apparatus, often undetectable by humans, but the institutional organisation of the interface between technological temporealities and the conduct of human affairs. The difference between 45 rpm and 33 rpm records is minimal in terms of how we hear music. What distinguishes them is the institutional temporamentality of the three-minute pop song, its relation to AM radio, its management through pop charts and its currency in nostalgia, compared to the high-brow allure of the album, the connoisseurship of long-form music, the cultural and aesthetic value of album covers and the development of FM radio. In short, the temporeality of turntable speed is not convertible directly into the temporamentality of listening. However significant the pulse is to the structure of Riley's *In C*, its international success was at least as much due to the convenient fit between the forty-two minutes and three seconds of its first CBS release and the optimal duration of an LP record.

The temporamentality proper to our times is grounded in the mathematical theory of communications and its implementations, connected through NTP/PTP to global time standards to global networks of scientific instruments. It has

two characteristics that make it significant for an enquiry into truth. First, as implemented in the twenty-first century, this may be the first temporamentality since the age of myth that is not exclusively human. This presents a counterintuitive causality. Humans designed the hard- and software architectures that databases run on, and humans designated the purposes they are intended to fulfil. But humans are no longer privy to what databases do when they store and process data, while artificial intelligence experiments already indicate that humans can no longer predict what outputs will emerge from these unknown processes. This implies that it was a social temporamentality that shaped these machines, as they did their predecessors. But it is also the case, as argued by Borst and Mumford among many others, that the temporealities of the machines also have an effect on temporamentalities. While difficult to disentangle, as cultural theorist Ben Highmore argues, the distinction between temporealities and temporamentalities is if anything more important now than it has ever been.

It is only a slight exaggeration to say that, in the crisis of 1973, Fordism crashed into its own projection of infinite progress; and that in 2007 financialisation smashed into its attempt to control the future through debt. Such crises are not only moments when the bottom drops out of the present: they are chronoclasms, crises of time. They rip into any faith we place in the future, whether optimistic, fatalist or simply resigned to the idea that the sun will come up tomorrow and tides will ebb and flow the day after. In place of faith, chronoclasms bring uncertainty about the future, make us doubt what we thought we knew about the past, and unpick our old securities about the present. Unlike ordinary events, they don't just bring something new: they make us doubt the underlying nature of time itself.

There is undoubtedly a strange, ontological time at the quantum level subtending perceptible reality. Likewise there is equally undoubtedly an administered arithmetic measure of time deriving from technological applications of Newtonian physics. The bubbling of billions of subatomic interactions clashes with the sovereign authority of the clock in chronoclasms: contradictions between temporealities that undermine old temporamentalities and make new ones, like relativity and quantum time, possible. Chronoclasms may occur at any scale, from falling in love to epochal revolutions, when another time becomes possible, neither infrastructural nor institutional, technical nor social. Their emergence from the contradictions of ontological and social time makes history possible, and explains why knowledge can never be exhausted by science or administration. They are significant for data visualisation in the first instance because visualisations are culturally formed objects and techniques that claim to take account, even command, of time, while doing their best to ignore even the possibility of chronoclasm. Today, data and time share their structure with the dominant measure of everything: the commodity. Commodities – unit objects in exchange – now impose their form on the dominant means of understanding and managing the world, data. Data in turn has inflected how we understand commodity relations. From ticker-tape to trading software, commodities are time-based entities, not only as perishable goods but as time-bound contracts, most of all in finance markets. Temporamentalities describe how our ideas about the ontology of time and the practices we have of administering it, are historically stable: chronoclasms explain why they are also mutable. Data visualisations only work when they conform to dominant temporamentalities, just as they have to translate inhuman observations into humanly perceptible forms. To manage the continuation of business as normal

requires minimising the damage that chronoclasms would impose not just on business but on the projected futures of 'sustainable' business models.

To stabilise patterns in time, in return, requires stable visualisation strategies. Computer scientist Helen Purchase usefully distinguishes two dominant forms. Concrete diagrams include schematics of real-world devices and geometric depictions, like seating arrangements and sight-lines. Abstract diagrams show relationships, either in geometrical forms like Venn diagrams illustrating set theory, or in networks, for example circuit diagrams for logic chips. The diagram of relations between tradition and recording in *Rue Cases-Nègres* that opens this chapter is an example of the abstract genre. It stabilises the emotional roller-coaster of film viewing in a rational and settled group of shapes in space. In their comprehensive account of graphical timelines, Rosenberg and Grafton note of Alfred H. Barr's diagram connecting schools of cubist and abstract art on the cover of his 1937 MOMA exhibition catalogue that

> in presenting the timeline itself as a modernist artifact, Barr suggested a new alliance between the practices of scholarship and those of art. What is more, by combining genealogical and chronological elements in his chart, Barr echoed the tension between the organic and the geometric around which the cubism exhibition was organized.

Barr also matches his subject's aspirations by bridging the gap between art and design, in the manner of de Stijl and the Bauhaus. Two clashing temporamentalities – claims of heritage and descent, familiar from mediaeval family trees, and the calendrical time of capital – show up in his diagram in the tension between rectilinear and curvaceous forms, a graphical conflict of vectors and grids that would later define computer-generated graphics. Unusually, Barr's diagram makes the time axis vertical,

if anything emphasising the organisational power of graphical visualisation to translate evolution into spatial relations.

Barr's chart of modern art movements pulled a then-recent past into a form that made it comprehensible in the present. Flow charts of the kind now familiar from strategic plans and risk management presentations project present demands onto the future. The classic questions framing strategic planning ('Where are we now? Where do we want to go? How do we get there?') subordinate the future and its uncertainties to the present. They are governed by the idea that present conditions – the activities of the institution or company – should persist into the future. The one thing to be avoided at all costs is precisely what brings about the future in any meaningful sense: chronoclasm.

The modern history of data visualisation, from maps to flow charts and timelines, parallels the growth of capital. In the preface to his *Commercial and Political Atlas* of 1801, visualisation pioneer William Playfair wrote

> making an appeal to the eye when proportion and magnitude are concerned, is the best and readiest method of conveying a distinct idea. … the eye cannot look on similar forms without involuntarily as it were comparing their magnitudes. So that what in the usual mode was attended with some difficulty, becomes not only easy, but as it were unavoidable.

Playfair wanted his public – civil servants and entrepreneurs in the first decades of the British Empire – to be able to assess the state's (whence 'statistical') wealth, resources and population not just in tabular form but in ways that were more easily scanned and memorised than numerical tables, which, in any case, soon enough go out of date. Throughout the nineteenth century, politicians and civil servants lamented patchy

and inaccurate data and the lack of systems for placing them into relation with each other. The consequent development of paper forms and postal regulations and the evolution of filing and information management in censuses, insurance industry and office trades in the 1920s and 1930s had major effects on graphic communication. By the time computers arrived, all the basic systems required to gather actuarial and commercial data were in place, as were systems for matching them cartographically to postcodes, and for compiling data in ways that allowed connections to be formed between, for example, health, locality and income. Computers provided accuracy and speed far cheaper than human scriveners. That was, in the first instance, their only addition to the statistical systems built by triumphant capital between 1800 and 1949. Bell Labs scientist William S. Cleveland's list of basic elements still stands as a decent guide to the fundamentals of data visualisation: 'tick marks [indicating units on the vertical and horizontal axes], marks, scales, legends, plotting symbols, reference lines, keys, labels and markers.' Two techniques emerging to prominence in the twenty-first century add significantly to this repertoire which, at the time Cleveland was writing, still imitated realism in giving an account of the past. New techniques of real-time data animation, inheriting their scrolling from the impact of Playfair's time axis on chronophotography, added to new systems for dealing with probability, created significant new tools, nor only for prediction, but for the management of chronoclasms.

River Monitoring

Etymologically, data, plural of the Latin word 'datum', translates directly as 'givens': not just 'what is the case', but what gives (or fails to give) itself. Yet data is rarely if ever given: it is,

we say, collected, harvested, captured from the natural world and from human activities. In Lisa Gitelman's now well-used phrase, there is no such thing as raw data. The things 'given' are already shaped as things, and like some demented tyrant bathing in forced adulation, we accept what we wrench from the world and other people as if they were tribute freely given. And, like a tyrant, and even more like a colonist, we take from whatever might indeed be offered, but ignore the potlatch, and refuse to exchange, preferring accumulation and, in a perverse reversal of Derrida's commentary on giving, treat the giver as though they did not exist. Data are as much the loot of empire as the Benin bronzes in the British Museum. In exchange for looted data, the internet offers beads, or pictures of Grumpy Cat, the constant tickle of entertainments, 'attractions', as film historian Tom Gunning would say: isolated fragments of pleasure. Data capture not only denies that information is freely given: it makes it impossible for the world to give. Giving requires a recipient, not a bandit.

How then does data, that is not given, become the property of systems that process it? The model for capturing human data has, since Playfair, been that of the physical sciences. Earth sciences, for example, give complex answers to what initially appear simple questions, such as the state of a river. On 5 August 2015, Environmental Protection Agency (EPA) workers attempting to control seepage from the abandoned Gold King Mine in Colorado triggered a massive leak of mine tailings into the Animas River, a tributary of the Colorado River. In addition to carefully specified field techniques, the EPA account of the spill lists eight laboratory methods for assessing the amounts of metals sedimented into the river and related effects such as the solution of organic carbon in the water, plus a range of field methods. Among them Method 218.7 (Determination of Hexavalent Chromium in

Drinking Water by Ion Chromatography with Post-Column Derivatization and UV-Visible Spectroscopic Detection) is said to be accurate within the parts-per-billion range. It works by filtering a sample to remove particulate matter and bacteria before introducing it into a pressurised column containing a resin that adsorbs ions from dissolved minerals. An 'eluent' or solvent is then passed through the column to separate the ions from the resin; the time they take to separate indicates what kind of metals are in the sample and in what quantities. Another technique, Method 1631 (Revision E: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry), involves isolating and suspending samples and illuminating them with ultraviolet light, so that the excited atom emits a photon, whose wavelength is a fingerprint of the substance fluorescing, while the intensity of light emitted at various frequencies indicates the quantity present in the sample. The process requires a preparatory phase when samples must be 'digested', typically in a pressure vessel filled with a strong acid which is heated with microwave radiation to enhance the solution of heavy metals like arsenic, selenium, antimony and mercury. The resulting free atoms are analysed in the spectrometer.

It is clear from these descriptions that what is observed in these processes is not the river, not even its polluted water, but ions and atoms freed from environing matter, isolated and technically mediated to make them countable, if not by humans then by human-readable machines. There is an analogy to draw here between the filtration required for ion chromatography, the microwave digestion in preparations for fluorescence spectrometry, and the isolation of measurement from the environment its samples come from. This isolation of samples from the source and of ions and atoms from the samples is an earnest attempt to understand the toxic dynamics of

the poisoned river, and to heal them. But these scientific alienations disconnect the river from human meanings and understandings, for example from the Southern Ute and Navaho traditional custodians of the river. At the same time, they are one of the few ways humans – at least some humans – can reconnect with an alienated environment and at least gesture towards protecting it.

Samples from the Animas spill would have been carefully marked with timestamps and geographic markers so that the progress of the river's healing could be followed. Undoubtedly, especially in the circumstances, EPA field officers would have been even more careful than usual to follow practice, for example rinsing the sample collection syringes three times in the sample water before filling. A number of manufacturers of these kinds of equipment offer all-in-one machines that will prep the sample as well as analyse it, cutting down risks of contamination. The data these processes produce relies on the relation of the final measurement to the actual water, but also on the abstraction of the measuring process from the river's own activities. The relation between fluorescence and chromatographic data and the original samples isn't in doubt; what is intriguing is that the specific objects of interest have to be isolated from one another (each test works on a specific pollutant – in these cases either anions and cations or heavy metals – but not on others) and from other pollutants like particles of rock and microbes. The translation from murky water to data involves several stages of abstraction: collecting samples, isolating pollutants, and producing numerical accounts of them. Even prior to filtration and digestion, the samples are exactly that: samples, static moments taken from the flow of the river. The process of gathering samples is 'indexical' – there is a physical connection between source and sample. But collecting converts them into discrete instances

prepared so that they can be inscribed into the system of science, apart from the worldly ecology of the river. The samples only become evidence through the action of separating them from the ongoing flux of the Animas. Even prior to laboratory preparation, field sampling has eluted the sample from its place, its networks of causes and interactions, the relations that constituted it, in order first to constitute it as a discrete object, then to reconstitute it as enumerable data, both steps undertaken so that the river can be communicated, a message divorced from the noise of its flow. In environmental media, place is always vital, and yet, by sampling, place is reduced to its coordinates, just as the sample is established as an object, no longer embedded in ecological networks of action but an enumerable fact.

The techniques for establishing the health of the Animas range from electromagnetically induced plasma fields capable of measuring parts per quadrillion (ten to the fifteenth power) to a distinction between field observations the New Mexico Hydrology Protocol described as Strong ('The characteristic is easily observable [i.e. observed within less than one minute of searching]') and Weak ('The characteristic is present but you have to search intensely [i.e., ten or more minutes] to find it'). If field scientists take a Munsell chart to get a numerical value for the colours they observe in polluted water, riverside foliage or the organs of dead fish, their observation is still in play when they decide between two proximate hues. Field advice from the same Hydrology Protocol, referenced in the EPA's Monitoring Plan, lies at the opposite extreme to the heavily mediated lab tests, including, among the recommended field equipment, measuring tapes and a long piece of string. The fieldwork, if it is to serve the overall and pressing task of tracking the flow of mineral pollution along the Animas and into the Colorado River, has to translate bodily perceptions (e.g.,

accounts of smells) so they conform to a system that is fundamentally arithmetic. Environmental monitoring, with its mix of experience and measurement, begins with a translation into numbers in the interests of feeding a much larger machinery of integrated human and mechanical observations. River monitoring is not *for* the field scientist or the lab worker, or even the analyst, but Science, an imagined collective that knows what is too complex and too vast for any one human being to comprehend. The suppressed relation of exchange hiding under the word 'data' is impossible not because of bad will but because there is no longer a human subject to enter into the relationship implicit in giving.

The knowledge we get from real-time river monitoring is always late, for two reasons: because it takes time for samples to become data; and because the object of knowledge is not the present state of the river so much as the history of its flows from, in this instance, the Gold King Mine disaster to relative health. For all its technical devotion to the present state of the sampled water, river monitoring establishes a history and projects a future. Of course environmental scientists maintain records and seek some probabilistic way of forewarning about pollution events – it was, after all, an attempt to do just that that triggered the 2015 emergency. Equally, river monitoring aims to provide knowledge as to whether I can swim in or drink the water today. Still, there is a fundamental difference between recorded or real-time analogical media and its laboratory-constructed numerical translation, most of all in the gap between real-world processes and their digital representations, and what that implies about the subject, Science, that knows their results. These gaps between experience and measurement, between records, observations and planning, between the emergency and the clean-up, are managed through techniques designed to stop chronoclasms

having the kind of terrifying effect that the Lisbon earthquake of 1755 had on European self-belief and belief in a benevolent God. Monitoring, surveillance of the river ecology, is at heart a managerial project whose goal is homeostasis: a stable, unchanging relationship with change that favours, always, the continuation of present institutions and motives into an otherwise unstable future.

Flash Crash: Instrument

Everyone checks the weather before making plans for the day. Earth.nullschool.net, authored by Cameron Beccario, pulls down data from seven live research sources including the Goddard Earth Observing System and the Real Time Global Sea Surface Temperature Network, updating anywhere between thirty minutes and five days depending on the source and delivering animations on open-source software, with displays of wind speed and direction, particulate matter, wave and current information, and aurora observations among others. In one sense the result is just art. You wouldn't rely on it if you were rowing the Pacific in an open boat, because the twin problems of the live are that it is already too late to do anything about it; and the scale is either too small for planning ahead or too large for local coverage.

Nullschool is as inaccurate as it is open-source. The value of real-time accuracy over larger and smaller scales is clear from the price it can demand. Anyone can access financial data at no cost at the end of the day's trading, but during the day, real-time data feeds are costly (a typical basic service in 2021 cost US$999 per month), and require a computer base capable of making use of it. Nanex, a financial software corporation, offers, according to its sales page

> a high-performance real-time streaming data feed that delivers the whole market to your desktop computer. NxCore easily handles today's option and equity markets which can exceed millions of quote and trade updates each second and billions of updates each trading day.
>
> (www.nanex.net/2019/)

The granularity and acceleration of real-time animation is evident from screen recordings showing time units in milliseconds, far swifter than meteorological systems, and delivering, for a price, a seat at the high table where algo-trading – computer-based high-frequency bidding and selling – depends on millisecond advantages. The eMini flash crash of 2010 is a neatly documented example. It appears to have been triggered by a single order for fifty thousand contracts coinciding with an otherwise slow day's trading due to a then-current Euro crisis. A series of feedback loops in other electronic trading operations led to rapid, wild fluctuations in the specialist market, before crashing into the main futures market. In the futures market, profits depend on the difference between the present evaluation of the market and the predicted future evaluation, the 'implied volatility' not of the estimates of the price of an underlying asset but the prices of derivatives, that is how variable the expectations of the operators are about the movements of the underlying asset, 'the prevailing opinion on the prevailing opinion'. But if market predictions of the price of beans collapse, so does investment in bean production. The kind of automated trading that sparked and drove the eMini crash has present effects on future production.

Nanex Corporation offers an API (application programming interface) to handle data streams from 23 exchanges, from NASDAQ to the London Metals Exchange, including quotes, trades and indexes like Dow Jones and FOREX, at

speeds of over two million updates per second, capable of running on an ordinary laptop. Nanex visualisations observe the state of the market. We should think of them as a kind of porthole into a non-human world, the kind we see in old science fiction films where engineers peer through little windows into the spaceship's nuclear motors. The computers actively engaged in trading do not need these kinds of visualisation. Time for them is a mathematical function they don't need to understand or experience. Massive investment in straight-line cable and line-of-sight microwave links to reduce communication lag times by nanoseconds gives competitive advantage to the fastest comms links. So swift are the scrolling events that, even in slow motion, Eric Hunsader's animation of the 6 May 2016 eMini prices ping-ponging across the equivalent of 700 points on the Dow Jones Industrial Average lies at the threshold of perceptible, let alone comprehensible. A similar event in 2012 wiped a trillion dollars off the global stock exchange.

These behaviours are no more human than the weather, but like the climate, chaotic algo-trading is an outcome of human actions mediated through technologies, waste energy in one case, digital trading in the other, both driven by the demand for profit. For practical purposes, weather forecasting and economics are both closed systems. Both treat anything outside themselves as externalities in order to operate usefully. But the noise-generating capacity of externalities and supposedly homeostatic systems – systems in equilibrium – are not inconsequential. In the ping-pong of over- and under-bidding as the Nanex flash-crash animation progresses, there is evidence that traders, market regulators and technical managers are intervening in what might otherwise appear to be a purely mathematical chaos.

No one has ever dared leave an economic market to evolve autonomously from human interests, despite the

blandishments of the most devout believers in the invisible hand of the market. The eMini market is a corporate cyborg, a hybrid network of inhuman programs where humans act as sensors of externalities and random number generators. In this instance, the system generates a chronoclasm when the microsecond temporealities of algo-trading collide with the annual or longer temporealities of the futures being traded, alongside the thirty Hertz frequency of the screen display fostering the illusion that the slightly slower nervous and muscular temporealities of human users monitoring it are synchronous. The derivatives market that has grown parasitically on the futures market is performative, effecting future production. It is also retro-performative, creating the conditions of its own existence. As geographer Michael Pryke argues, under certain circumstances,

> visualization software brings markets, or perhaps more correctly critical components of markets … into full being and, in so doing, these technological artefacts stand to alter the formation of financial knowledge, in terms of both its geography and its potential consequences.

For Pryke, financial software and its visualisation tools don't just transcribe fiscal reality: they make it, not just discovering features but bringing them into existence. Such are the proliferating new products and practices in the derivatives market. The application of financial data produces profits, but it also produces actions in the world geared to those profits.

The computerisation of finance began with automated exchanges in the 1980s, swiftly followed by point-and-click trading, and more recently automated trading, which increasingly deploys computer-mediated high-frequency trading (HFT) buy-sell algorithms. Automated trading comes in two forms. Execution algorithms mediate human-instigated

actions, for example splitting a large order for shares into numerous smaller orders, the algorithm seeking the optimal timing for each trade so as not to spook the market or reveal a strategic move to competitors. Proprietary-trading algorithms are the second form of automated trading. Cultural economist Daniel MacKenzie and colleagues distinguish five sub-genres in this category: electronic market-makers that, taking the role of human pit traders, broker trades by buying at best price and selling at best offer, taking very small margins on deals but doing so in large volume; arbitrage between markets, finding small margins between prices quoted on different stock exchanges; statistical arbitrage, which identifies unusual patterns in particular markets and gambles on trade returning to normal; a fourth sub-type seeks out execution algorithms and anticipates their strategies; and a fifth, illegal since the Dodd–Frank Wall Street Reform and Consumer Protection Act of July 2010 but nonetheless current, places and withdraws orders in order to create spikes in prices.

Common wisdom is that 75 per cent of trades in contemporary financial markets are algorithmic, machine-to-machine plays on the market, with high-frequency trading spotted at anywhere between a high of 84 per cent (a figure said to derive from Morgan Stanley) and a low of 50 per cent. Most commentators agree that the figure is highest in futures markets. For an idea of the numbers involved, on the US Option market alone trading reaches '4,500,000 quotes per second, and 8 billion quotes per trading day' (nanex.com). Speculative markets, where traders extract rents from contracts to supply commodities months or years ahead, lend themselves to algo-trading. They are also the most powerful predictors we have of the immediate future of planetary geology. Cash values of future contracts for copper, oil, coal, uranium and other assets impact investment in mining and transport, alter valuations of

stockpiled resources and raw minerals, change plans for constructing large communication, logistical and urban projects, and influence decisions on extraction industry infrastructure. They impact employment and training strategies and change government policy on housing and infrastructures to support them. In an era of anthropogenic geology, the futures market and its software don't just warn of catastrophe. Financial media cause catastrophes.

Events like the flash crash are obviously chronoclastic. Less obvious is the ongoing catastrophe of resource extraction and its consequences, driven by everyday market events occurring at speeds and in numbers way beyond the capacity of humans to observe, let alone intervene in or control. Finance software is far from realist. It owns up to no analogies with the real world, not even the reality of underlying assets. It operates instead on stock market activities that are in themselves exclusively numerical. Nothing that is not measurable by the yardstick of profit exists for it, except when, through its human biochips, it registers an externality – a catastrophe – as a new set of data to be wrangled, once more, into profit.

Only paying subscribers receive breaking news from financial news services: others can view stories only after a delay that makes the news far less valuable than it is in real time trading rooms. The value of contemporary financial news feeds read by HFT computers lies in speed, to the extent that co-location services – placing trading servers in closest physical proximity to exchanges' servers to shave milliseconds from the lag between receiving news and placing a bid – are a booming revenue source for exchanges. At this level, 'real-time' no longer means the time of human perception. It belongs to a concertinaing of time, where past performance becomes standing-reserve, future repayments (permanently deferred) become present profits, and the present itself is truncated into

a vanishingly small, relativistic point. The *telos*, the ultimate goal of accelerating animation into the 'now' of real-time is to arrive at this present instant. The eighth- and ninth-century Byzantine iconoclasms destroyed icons to gain direct experience of God. If Plato was right and time is 'a moving image of eternity', then the financialisation chronoclasm may not be a 'natural' result of colliding temporealities but a deliberate act aimed at ending any contact with the infinite, indeed with any time other than this perpetually vanishing present, the model for digital video. Real-time signifies not only lost access to the past but the subordination of futurity to the present demand for profit.

The precise mechanism of subordination is projection. The metaphor is spatial: a high priest projects an aura, a lighthouse light. Financial projection doesn't cast a spotlight on the dim forms of future possibilities swimming into ken: it projects its present onto the blank fog of futurity. The image forms as a projection of perverse desire for profit and control, a means of defence. This projection is not illuminating but performative – an institutional and discursive action that brings about what it describes. Adorno would have called it 'instrumental', a projection not only of repressed desire but of the will that emerges from repression. Financial projections are instruments that bring about what they describe. Financial visualisations and the proprietary software licences and discrete high-speed networks they depend on insulate the global stock market from any form of democratic control. Where realism is a democratisation of everything, financialisation extends politics to include non-human agencies – cyborg corporations – in ways that ensure they and their beneficiaries dominate. Given the immense effects they have on the planet, hastening mining or delaying planting in accordance with projections that dictate their value, this fantastical-real

control based on real fantasies about losing control, acts out the dangerous contradictions, the psychopathology, of the entire system of world governance. Tom Wolfe's 'Masters of the Universe', the self-described stock traders prowling the pages of his 1987 novel *Bonfire of the Vanities*, owe their narcissism to the projective devices that divide them from their origins and responsibilities, while allowing them to project their fantasies onto the becoming of the world. The terrifying thing is that the digital mechanism of financial projections realises this infantile fantasy of control.

Among the notes Hannah Arendt left towards her unfinished manuscript *Introduction into Politics* are a handful of jottings under the rubric 'What is Politics?' clarifying why philosophy finds politics difficult (philosophy deals with Man in the singular, politics with 'men' – her term – in their differences). In the chaos of radical difference, all men are equal; but any form of organisation, especially those based on the family and kinship, destroys difference and equality in one stroke, replacing them with the similarities and exclusive qualities of the in-group. Kinship and ethnicity trump the original plurality of people. Arendt takes this as the irresolvable contradiction of politics: that in assembling different individuals into organised groups it can no longer serve the plurality it seeks to manage. So profound is this failure that, in August 1950 as she wrote these sketches, it seemed more than likely that international politics based ultimately on kinship in-groups was on the brink of destroying the world, and that the only alternative would be a world government, a dream much discussed in the period round the founding of the United Nations in 1949. From her experience of Nazism and her distrust of Stalinism, Arendt writes that this attempt to transcend politics would lead directly to despotism, and that 'Bureaucratic rule, the anonymous rule of the bureaucrat, is no less despotic because "nobody"

exercises it'. On the one side, political tribes formed from ethnic kinship groups and co-religionists – Proud Boys, the Lord's Resistance Army – and on the other, the invisible (and incommunicable) Hand of the Market: Arendt's description fits our condition all too neatly. This may be why world government by the market – by post-human cyborg corporations – seems, to the functionaries whose projections of control mask their terror of its opposite, preferable to democratic plurality that might too swiftly revert to wars of bloodlines and religion.

Seismography: Imagination

It would seem on this basis that all data visualisations involve some form of performative or would-be instrumental use of diagrams and charts to project control onto the chaos of an unpredictable future. Certainly projection is key to financial software and its visualisations. At the same time, the eMini flash crash demonstrates that algorithmically managed markets are unpredictable, bearing out the observation that we now inhabit a hybrid temporamentality whose other-than-human participants are in some degree unknowable and unpredictable, even though designed initially to carry through human desires. Data visualisations don't act exclusively as instruments of control. They also operate as depictions, even modes, of imagination. Take the Frontispiece to pioneer geologist Charles Lyell's *Elements of Geology* of 1838, a book and image that cracked open a previously unimagined temporeality. Lyell explains that geologists

> have discovered proofs that the external parts of the earth were not all produced in the beginning of things, in the state in which we now behold them, nor in an instant of time. On the contrary, they have

acquired their actual configuration and conditions gradually, under a great variety of circumstances, and at successive periods.

Lyell addes a few pages later that 'In order to classify the various rocks which compose the earth's crust, it is found most convenient to refer, in the first place, to their origin, and in the second to their age'. We are by now fully accustomed to the idea of geological strata being effects of historical accumulation, and to the idea that fossils are part of that record. To Lyell's readers, that was an irreligious assault on Divine Creation on a par with the evolutionary theory of Lyell's contemporary and friend Charles Darwin, with the additional challenge that where Darwin could point to visible evidence, Lyell had a more difficult task in visualising his propositions. The Earth's crust, he noted,

comprises not merely all of which the structure is laid open in mountain precipices, or in cliffs overhanging a river or the sea, or whatever the miner may reveal in artificial excavations; but the whole of that outer covering of the planet on which we are enabled to reason by observation made at or near the surface.

The title of Lyell's frontispiece, 'IDEAL SECTION of part of the Earth's crust', tells us that what he felt impelled to undertake was not direct observation but reasoned extrapolation from available sources. Print diagrams like Playfair's, which could draw on a far larger set of empirical observations, already had to fill in gaps with what he felt 'enabled to reason'. Lyell had aeons to fill in, and scant evidence compared to Playfair, but both men, at these critical moments in the history of scientific imaging, agree that where data gives out, imagination must be allowed in.

Printed graphics cannot picture change. Lyell's frontispiece illustrates a new conception of time, but does so without

moving. Four years later, in 1842, the devout Scottish glaciologist James David Forbes unveiled his seismometer. (Earlier pendulum-based designs were in use in Japan, and are reported as early as the second century BCE in China; as with other visual technologies of the epoch like the magic lantern, there appears to be a direct connection with Japan in the development of the modern seismograph.) The Forbes seismometer worked on the same principles as the phonograph, reading tremblings of the ground rather than of the air, scratching out invisible actions in visible form and in real time, rather like financial software translating the inhuman into humanly perceptible and legible form.

Though we perceive the seismograph's pen as moving, in fact it is being held stable, while the rest of the apparatus, particularly the drum holding the writing surface, shifts in response to tremors. Very early designs used relative motion; early twentieth-century seismographs used spring-loading and inertia. A plotter pen on a revolving drum was traditional, but the friction of pen on paper was enough to give false readings, leading to the use of beams of light reflected from the mass onto photographic or heat-sensitive paper. Contemporary seismographs suspend the mass in electromagnetic fields, allowing movement in two dimensions, recording the amount of electrical force needed to keep the mass inert, collecting information about energy use in numerical form and producing graphs from this second-tier evidence.

Like its mechanical and optical predecessors, electronic seismometers amplify the readings during the process of converting voltage into either numerical tables or diagrams for display. The old plotter drawings, with their near-symmetrical shakes on an unspooling drum of time-stamped paper, showed time on a scale parallel to the motion of the drum and motion on the vertical axis. To the unschooled observer, even without a

grid of measuring lines, the seismograph's output makes intuitive sense, as it does in so many movies: hectic motion 'means' strong seismic activity directly, without need to understand the Richter (magnitude) and Mercalli (intensity) scales. The indirect magnetic design picks up the direction of forces as well as their intensity and magnitude, delivering three-dimensional information. Though less direct than Forbes' design, the data output looks familiar, except that the unit measurements on the vertical axis are given in microvolts.

Seismography is a kind of indexical animation, making marks as a direct result of the movements they record or an indirect record of the balancing forces needed to resist them. 'Indexical' refers to the index finger, pointing at something in the real world. If you watch a working seismograph, you tend to look at the finger as much as what it's pointing at. Plotter seismometers are analogues in that the shapes they draw are analogous to, or isomorphic with, the movements of the ground, and vectoral in the sense that they record gestures, albeit mechanical ones, which have both size and direction – they move in time as well as over distance. Modern seismometers often have three masses lying at angles to one another to respond to different aspects of seismic motion, including depth and compass bearing. Technically the extra dimension makes them scalar media. 'Vector', however, keeps the sense of the temporeality intrinsic to seismometers, whose recording drums advance under the moving arm of the plotter in order to safeguard its timely intelligence.

To maximise inertia, seismographs are kept inside a windproof chamber, and isolated from accidental rumblings (traffic, shifting furniture, crashing waves which produce a permanent micro-seismic background) and from changes in temperature and the Earth's magnetic field, using invar alloy that responds poorly to heat and magnetism. Only by isolating

the device from the world can the world's movements become visible, as if to prove T.S. Eliot's assertion in *Burnt Norton* that 'Except for the point, the still point / There would be no dance'. In Eliot's poem, the still point 'where past and future are gathered' is an ideal extraction of the conscious moment from time that allows time to proceed. In the seismometer, however, the world's movement tracing itself against such stillness is the evidence of an inhuman present that trembles constantly, and now and then erupts with sufficient violence that our human senses confirm what the instruments say. The motion of the frame, and therefore of the world attached to it, draws itself as a line of motion, rather than the stilled depiction of Fox Talbot's photographic 'pencil of nature'. Though it can only draw two or three qualities from all the complex dynamism of the world, and only on condition that, like the EPA's laboratory methods, the measuring instrument is as isolated as possible from everything else in the world, the seismograph reverberates directly in sympathy with the Earth, and at the same time.

To be useful as a measuring device, the travel of the recording medium must be regular and reliable (regularity makes it easy to subtract the noise of the motor from seismic events, another moment of its isolation). Like the standard frame rates of moving image media, the rate of travel defines the temporeality of the device, although, unlike film and video, the movement is continuous. Graph paper and similar tools make it easy to take numerical readings, but they don't constrain the movement of the device in sympathy with seismic events. Seismometers are another instance of a single device charged with constant translation between analogue (continuous, geometric) and digital (discontinuous, arithmetic). A solo seismometer is limited to establishing the velocity (or acceleration) of Earth movements. To isolate other critical

elements – direction, distance and depth – an array of seismometers assesses the different times when seismic waves arrive to establish how far they have travelled and from what focal source. Standardising the rate of travel of all the individual devices in an array with NTP or PTP is critical to their collective functioning. A particular, arbitrary but common rate of travel functions as a measure of time, logically subsequent to the event it records.

Earthquakes and volcanoes are largely local phenomena, but seismography is a planetary science. A time-sheet from a single seismograph forms a single frame in a much larger animation produced in vast networks of seismometry operated by agencies like the US Geological Service. Live pages from US Geo's earthquakes service require skilled reading, though some vivid instances can indicate cause for immediate concern even to untrained eyes, and undoubtedly services are already mobilised even while the website updates. The Global Seismographic Network, operated through the Incorporated Research Institutions for Seismology (IRIS), provides open, free, global information from a network of 150 stations monitoring seismic activity, researching the structure of the Earth's deep geology and tectonic plate movements, and, as side projects, monitoring the international nuclear test ban treaty and aiding oil and other mineral exploration. Sharing these quantities of data in near real-time demands high-speed telemetry, involving networks as complex as those involved in global weather and atmospheric research. Indeed, they cooperate with climate observatories, oceanic and astronomic monitoring as well as a huge array of fibre-optic and satellite communications media. This intricate array demands logistical standardisation of instruments, measures and transmission protocols. The cost of providing these services is paid by commercial applications, military users and

government emergency services. Which suggests that seismometry is indeed a performative and instrumental form of data visualisation.

At the same time, the notorious inability of geological observation systems, even on the scale of the Global Seismographic Network, to predict local earthquakes (even anthropogenic earthquakes caused by mining, fracking and other subterranean activities) and volcanic eruptions tells us that all the accumulated records, while they help guide human societies towards being alert to formations like the Pacific Ring of Fire, cannot pretend to control or project the future in the manner of financial software. Watching a seismometer in action, we have the almost uncanny sense of the world drawing a portrait of itself as we watch, marking out the present in real time and storing records of the past, while the future appears only as a spool of unmarked paper, blocks of memory waiting to be filled.

This auto-graph of the world's motion appears in a form halfway between drawing and writing: a mark from which all meaning and depiction, all reference to language or appearance, has been evaporated; save only the pure fact of the plotter vibrating over the rolling drum, or closely related screen displays and sonifications. Human mark-making precedes any reference the marks might have to speech or imitation. The inhuman agency that makes seismic marks, even and perhaps especially when mediated through an extremely artificial device, treats its viewers to the spooky spectacle of an uncanny message from the underworld, with the distrustful fascination of the lady pianist watching the pianola keyboard during the *danse macabre* sequence in Renoir's *Règle de jeu* (1939). Even more uncanny is the knowledge that we are watching not the movement of the pen but its stillness as the Earth and everything on it moves. The trace left behind, which

the scientist pores over, is mere archive: a geomancy whose arcana we labour to read as if they were a language awaiting its deciphering, but knowing that they are the history of an entirely non-verbal, non-numeric set of activities without humanly recognisable significance. There is a purity in this self-inscription. This access to the world is mediated, as is all human perception, but it is access to the world. It calls us not as operators or profiteers but in solidarity, as inhabitants of the same present, and as participants in the deep uncertainty of the future. Seismography is a work of the imagination because it confronts us with the untrammelled and antagonistic forces of a non-human world that we depend on, try to control, but which escapes all human bonds, meanings, desires and hopes, pursuing its own inhuman trajectories.

It is worth recalling that the March 2010 Taiwan earthquake severed pan-Asian internet links to Guangdong and Hong Kong and cut the US–China cable, and that undersea landslides caused by Typhoon Morakot cut or damaged at least six undersea cables in August 2009. Social geographer Nigel Clark emphasises, in the case of Hurricane Katrina's devastating impact on New Orleans, that the offers of help that poured in gave evidence of a deep desire for community, after reminding us that the origins of modern philosophy with Immanuel Kant were triggered by the terrible Lisbon earthquake and tsunami of 1755. Complex seismic and meteorological networks of technologies and humans should impress us with their utopian aspects: the beginnings of community on a planetary scale. Emphasising the common in 'communication', seismography might someday teach us that even financial media may harbour deeply hidden utopian potentials. While their vulnerability to quakes and weather events should make us more modest about human privilege in the face of a nature that ignores us, we should also consider that these networks,

as common projects that both do and don't indicate and predict, are acts of imagination, and that imagination, in an ecopolitical frame, conjures collective improvisation beyond the old Cartesian, autobiographical and possessive self.

Pandemic: From Disaster to Crisis

Nonetheless, something new is emerging, a quantitative shift that is becoming qualitative and vice versa, in the developing form of financialisation. Alongside and using many of the same relational tools as social media and electronic mediation of distribution and retail, debt processing creates information about information. That second-order information powers financial instruments ultimately derived from real loans, now abstracted as interest rate swaps and derivatives, rarefied and at scales we began to see revealed in the Global Financial Crisis of 2007–8 (a crisis whose reverberations returned in the 2022 inflation crisis). Stored information about consumers was valuable in the first instance because it made their behaviours more predictable. What is new about information capital is that managing risk by predicting consumption patterns, now driven by cheaper and more massive datasets and tools for consulting them, are so plentiful that its value is diminished. What is now more scarce and therefore more valuable is unpredictable behaviour. As Appadurai writes, risk 'is simply immeasurable by any quantitative means. This amounts to saying that in regard to such trades, risk and uncertainty have no practical difference.' What is valuable in the global stock markets is the unpredictable, the random and increasingly the disastrous. Of course, the system is loaded: when, almost inevitably, the house of cards begins to collapse, states will race to replace the capital that vanishes, so the wealthy still profit

while the poor get poorer. Of course, this impacts the poorest most, on a global scale.

The Atlantic hegemony and the capitalism it brought into existence was always premised on globalisation and – often enforced – migration: in other words on colonialism. On the eve of the millennium, Patrick Wolfe wrote: 'The colonizers come to stay – invasion is a structure not an event.' Our situation is different. The moment of invasion, as Wolfe argues, the event of colonisation, became the condition we can call coloniality when it became a structure. But if coloniality is a structure, it is today constantly punctuated by events, such as the arrival of Covid-19. It is becoming clear, in the twenty-first century, that such events do not interrupt coloniality: they *are* its structure. Pandemics, proxy and civil wars, mass migration and ecological disasters are only the latest events that shape coloniality as it mutates from colonialism to neo-colonialism to post-colonialism. Counterintuitively, disasters maintain the profitable stability of the colonial order: they are the prized alternative to political and economic crisis. Disaster is integral to twenty-first-century capital and colonialism.

Despite a forty-year drift in vocabulary from globalisation towards neo-liberalism and more recently to neo-populism and financialisation, capital has never ceased to globalise, to destroy public and state control, especially in colonised economies, to devastate the commons and to expand into previously under-exploited areas. In the West, this has resulted in the real subsumption of consumption under capital when informatic systems enforce disciplined consumption and encourage the massive expansion of debt ('choice' and 'credit' in the mirror language of capital). On the global scale, there has been no end to racial capital, especially in the form of 'disaster capitalism' that profits not only from catastrophes but from the corporatised response that follows them.

Disasters are nothing new. Wars, genocides and ecocides have always been engines of profit. In our times, seismic disasters like the Haitian and L'Aquila earthquakes and climate disasters like those afflicting the world in the 2020s have become equally profitable random events. Even though the progress of global warming makes ecological disasters like fires and floods increasingly probable, no individual event can be foreseen with more than a few days warning. The adage 'never let a good crisis go to waste' applies to a long history of post-disaster profit-taking: what has changed recently is that gambling on disasters has become a central plank of the new informational finance capital. This new source of profit is still structurally colonial and racist, exposing the racist imperialism of European Enlightenment rationality and the capitalism that emerged from it promising to make 'the best of the diverse endowments of the world by encouraging the most efficient use of each country's particular resources'. You can hear the hypocrisy in some of the keywords of contemporary doublespeak: 'credit' for debt, 'choice' for consumer discipline, 'stability' for repression, and 'the rule of law' for law written by and for rulers.

The phrase 'rules-based order' as code for US hegemony in its period of decline is another such: heard almost exclusively in relation to the emerging hegemony of China. China's Belt and Road Initiative (BRI) has developed since 2001 when government and state-owned enterprises moved from mid-range, labour-intensive manufacture and wary integration into the world economy of the Deng Xiaoping era into a more outward-oriented strategy involving large-scale, international purchase of raw materials and energy, massive investment in port infrastructures controlling a large fraction of maritime trade, and expanding into land-based transport and communications

infrastructure in continental Asia. Chinese activity since 2009 incorporates all these but, in the wake of growing US unrest, has extended into diplomatic efforts to assure neighbouring states of the win-win nature of cooperation in the BRI and encouraging neutrality in any strife between China and the USA. At the same time, Beijing began to exercise more aggressive economic policies. Rather than use the US tactic of trade embargoes and sanctions (which it had suffered under for twenty years after the victory of the Communist Party of China [CPC]) China targeted recalcitrant trading partners with restricted access to Chinese markets (often using masking strategies like 'safety concerns') or by restricting its own exports, for example of rare earth minerals to the Japanese chip fabrication sector.

The mix of engagement in global markets and concern for internal stability marked by Party responses to Tiananmen Square and Hong Kong protest movements leads political scientist and policy advisor Aaron Friedberg to conclude that 'An integrated regional system' might offer 'a compromise between the certain self-impoverishment of a return to autarky and the unacceptable risks associated with ever-deeper incorporation into a truly global economy'. Here Friedberg refers to the choice between the economic trap of self-determination and isolation and the demands of a regional hegemon with global ambitions. Cultural sociologists Lilie Chouliaraki and Myria Georgiou distinguish territorial and symbolic borders: territory is in the main defined by international treaty, but symbolic borders can appear anywhere within or beyond the legally recognised territory a country occupies. China's symbolic borders align in part with its territorial borders (including the disputed territories of Taiwan and the South China Sea), but in great part with entrenched fears of 'foreign' influences, including not only 'Western' ideas of democracy it sees among Hong

Kong's protestors, but the religious 'influences' of Xinjiang's Uighurs and of Tibetan Buddhists. Neo-nationalist demagogues in China as elsewhere seek to quarantine 'influence' as they would influenza or Covid-19, a vector for unwelcome ideology allowing it to be labelled as coming from outside, even if that exterior is bounded by a symbolic rather than a territorial border.

Media analysts Chunmeizi Su and Terry Flew see a similar internal-external dynamic emerging in relations between the CPC and Baidu, Alibaba and Tencent, the 'BAT' companies equivalent to the US transnational FAANG corporations (Facebook, Apple, Amazon, Netflix, Google). While the BAT companies participate in the 'digital Silk Road' component of the BRI, the synergies with the state are great, including light regulation of these vast corporations. Noting that 'the Chinese government's concerns echo the growing debate in the US, Europe, Australia and elsewhere about how to address the power of giant digital platforms, their control over data, and their dominance of advertising markets', Su and Flew conclude that 'The BRI provides an opportunity for government–corporate cooperation, but also the potential for circumvention of government demands for closer supervision'. The government fears the liberties of its BAT netizens sufficiently to feel the political imperative to balance control against the economic and cultural liberalism that allows BAT corporations to invest in research and development and apply it at mass scales. On the much smaller scale of interpersonal networking, at the same time that government provides benefits for disciplined citizens, it also stands to gain from certain online freedoms. In the absence of a Habermasian public sphere, Sheng Zou argues, online parodies and similar naughty-but-acceptable practices enable 'young people to voice shared concerns' while also 'direct[ing] the authority's attention to imminent

social problems'. The privatised public sphere meets the needs of consumer discipline even as it alerts the state to potential problems, while the BAT companies quietly scrape enormous profits from advertising and on-selling user data – just like the FAANG corporations.

Apart from state paternalism, largely abandoned in the disaster capital ethos of the George W. Bush era and subsequently, the relational databases upholding the attention economy operate in ways remarkably similar to the operations of finance capital, in China as well as the Western hegemonic powers. As Elie Ayache writes, 'Traders don't use derivatives to trade the underlying; they use derivatives to make volatility tradable'. While the culture industries believe they are in the business of producing content, it has been clear for almost fifty years that the money lies not in content but in selling audiences to advertisers. The arrival of streaming services in the movie industry does away with the distinction between distributors and producers. The global spread of streaming corporations like Netflix, which now 'has direct-to-consumer subscription relationships with 150 million customers worldwide', is built on a business model which bundles user data for sale to data brokers who distribute market intelligence – intelligence about the market, rather than the intelligence of the market. This reversal – another example of capital's mirror language – rests on recognising that the commodity being traded is no longer either programmes or audiences, or even the attention of audiences, but data abstracted from that attention. Actual audience experience occupies the same position as Ayache's underlying assets.

Audience preferences have become largely predictable due to both the proliferation of data and the power of the recommendation engines that process it. What is now truly valuable is unexpected behaviour, whether of individuals or

groups. In Ayache's terms, this is the trade in volatility itself, with no reference to any underpinning pleasures or pains or even economic activities (data brokers do not guarantee that their data will make a sales campaign work, and many campaigns fail, regardless of how much data they purchase). The distance between the mobile geometries of derivative markets and streaming entertainment – indeed almost all network communications, especially social media – is negligible. Constant flows, constant destruction and construction of new forms, characterise contemporary organisation and trade, to the extent that the early twenty-first-century revival of the vitalist philosophies of Bergson and Whitehead seems tailored precisely to the new configuration of rhizomatic capital and its agnostic relation to the political ideologies of competing hegemonies. More importantly, unpredictable user behaviours and random actions in derivatives markets are events that not only fail to disrupt but actively construct the possibility of there being a market in the first place. In this they conform to the new structure of coloniality: like the coloniality it derives from, information capital is composed of disasters.

The market, like any information system, is built on a definition of information as 'a difference that makes a difference'. But when differences are predictable at the scale of computational power now available to BAT and FAANG corporations and their respective governments, the differences that make a difference are of greater scale. Disaster is no longer a challenge: it is an opportunity. As risk management requires risks be taken, so disaster management depends on the construction of disasters. Risk management no longer means avoiding risks but seeking them out.

Disaster is a surprisingly modern word: it appears first in Italian with the meaning 'ill-starred' in the 1590s. The

influence (that word again) of misaligned or misfortunate stars might emblematise ill fortune, fate, destiny. But equally it implies luck: the gambler's friend, the stakes in the high-rolling game of the derivatives market. Like its older Greek synonym 'catastrophe', literally a downturn, disaster sets itself up as a present occurrence, and for the gambler a future one. What becomes apparent in the prediction market is that disasters and catastrophes are not truly contingent. We may not know where and when the next cyclone will arrive, but we can be reasonably sure that it will. As Klein points out, exposing human and natural environments to risk is part of the planning of the disaster relief industry, which attacks both NGO and governmental preparations as unwarranted competition for a valuable market. A planned future is no future at all.

In order to be profitable, disasters must be local. Profit derives from difference, initially the difference between the cost of raw materials, manufacturing and labour on one side and the price that can be charged on the other. In trade, the difference that makes a difference lies between the prices different local markets will bear; in derivative markets, between varying expectations. Global catastrophes like climate change and the Covid-19 pandemic are treated as local events, constrained by terrestrial and symbolic borders, in order to secure similarly profitable differences. Without geopolitical differences, the market cannot profit efficiently. Thus the response of the pharmaceutical giants to the proposal they should set aside their intellectual property rights in the interests of a global response to a global problem was incredulity: the industrialised practice of medical advance is premised on deriving the maximum profit from intellectual capital, denying its origins in the collective wisdom of the General Intellect and the alternative economies of the commons. As decolonial

thinker Walter Mignolo notes, 'The logic of destitution is the logic of coloniality'. The alter-globalisation principles of the first World Social Forum at Porto Alegre still ring with challenges for contemporary information practices, including the principle to 'Prohibit all "patents on the mind" and on living things (be they people, animals or plants), in the same way as with the privatization of people's common goods, namely water'. This principle articulates human and non-human shares in the collective of the General Intellect or a shared planet. Such commonality militates against capital's logic of difference.

Just as the logic of private property is privation and the logic of intellectual property is to take from common wisdom, repackage, and sell back; so the logic of data harvesting relies on the cost-free abstraction of data from an externalised pool of human behaviours and on trading it with maximum efficiency. Yet it is clear from Mignolo's proposition that this logic of efficiency depends on destitution and privation. In particular, he singles out 'Two destituted domains relevant to the current convergence of a pandemic and economic/financial crisis … communal economies and healing praxes'. Intellectual property is a contradiction in terms (if I have an idea and give it to you, we both have the idea: ideas are not privative) instigated by a legal system written by and for rulers. Applied as pharmacological patents, it is a fraudulent derivative of communal healing praxes and cooperative and reciprocal sharing of wealth, labour and ideas. Intellectual property can achieve its parasitic profitability only by creating differences: between those who know and those from whom knowledge is withheld; between those who own and those who need; between those who hoard and those who share.

The secret of contemporary information systems, including coloniality, social media, pharmaceuticals and the derivatives market, is that all of them are based on extraction from, abstraction of and exclusion from substantive assets, which they have turned into environments through repression and externalisation. This is the sad plight of truth in the twenty-first century. Outside the confines of information systems, we can choose the realist option of believing only our own eyes, with the consequent risk of Flat-Earthism and the individualistic nonsense of neo-populist memes. Alternatively we can opt to 'trust the science', which several decades of critical science and technology studies, critical race studies and feminist critique have taught us to doubt. From the standpoint of information systems themselves, perceptual and scientific truths are semantic content, and therefore from a system's point of view insignificant, and either redundant or noisy and therefore of no account.

Disastrous coups, ethnic cleansings, land-clearances, industrial catastrophes, typhoons, fires, floods and pandemics are reliably random, and equally profitable for the older hegemony's corporate predation and the rising hegemony's planned economy. Just as debt ('credit') is money we promise to earn in the future to pay for things now, pledging ourselves to a wholly predictable future of wage labour; so a disaster is the imposition onto the future of a past structure of expected profit. To the extent that it is predictable, a disaster is a thing of the past, not the future. We do not need disasters. We need crises.

Capital only requires the kind of randomness that it can rationally assume will come to pass. Epidemiology tells us that variants will arise but not where, when or in which forms. The derivatives market gambles on when new strains will emerge, and with what consequences, while pretending

that there is no epidemiology: that everything is sheer blind luck. A crisis on the other hand is a turning point, as in the crisis of a disease which may get better or worse. Crises concern the future. Unlike information capital and its derivatives, crises are anchored in the 'underlyings': the actuality of experience, the harm or well-being of places and peoples. As disaster, the pandemic is an occasion for profit and it rests on (manufactured) ignorance and privatised knowledge. But taken as a crisis, the pandemic is an occasion for critical action and critical thought. It depends on thinking held and shared in common. Sadly, knowledge is subject to commodification: a basket of information – things known that can be traded. Thinking, on the contrary, is live, based on shared languages that no one owns (unlike the fictive intellectual property of proprietary computer code). Thinking evolves. Information, already tailored by capture, storage and processing to serve the teleology of profit, cannot evolve. Because the differences that produce profit are numerical (the unit difference between zero and one persisting in every whole number), every capitalist difference is essentially the same. Locality A and locality Z are quantitatively, not qualitatively different. In its grids of exchangeable unit differences, capital loses the local that it wants to exploit.

Disaster capitalism aims to extract profit from difference, but the differences it seeks out are only comprehensible to capital when they are reduced to information, a global abstraction. For that to happen, information must ignore local experience, even the experience of place. Similarly it reduces the continuity of time to discontinuous units of exploitable difference, which, reduced to the universal equivalence of money, no longer include the experience of time, only the perpetual present of profit. The mode of difference that disaster capital

profits from effectively erases the differences it exploits, the uniqueness and continuity of place and experience, by translating them into its universal code. Thus by treating disasters as unique events, capital eliminates the chronoclasm of historical change, so averting the crisis – the falling rate of profit – that underpins its process.

Profit, as the unfinished debt crisis teaches us, can only be made in the present: the so-called futures market is a present-tense competition to extract wealth *now* from a future that is denied existence by the sale of future assets that have no need to come into being since their value has already been spent. No wonder then that truth has evaporated in a world whose economic infrastructure is dedicated to ensuring that no future worth the name ever arrives. Critical thinking, thinking of, in, through and as crisis, as turning point, and as the prelude for action is the only alternative to ongoing catastrophe. The question of how to achieve it collectively is raised by critical theorist Jonathan Beller: 'The medium of revolutionary acting is necessarily ourselves – but bound together by what kinds of machines, heritages, media?' We should remember that machines, heritages and media are not exclusively human. Just as the Anthropocene inhabits the layers of globalisation, neo-liberalism and information capital that have exercised the collective critical imagination of the last few decades, so the more-than-human haunts any critical route out of disaster capitalism and capitalist disaster.

Crisis thinking is thinking about crisis but also thinking as crisis. Our media are ourselves, but 'we' is not exclusive to one species. The conflation of closed borders for (most) people and open borders for money gives the lie to the idea that 'we' are in any way separable from either the media we make or

the mediations that join us with technologies and natural processes. The privilege granted to the wealthy extends beyond permissions to travel through quarantine borders. We are certainly not all in this together: there is no singular humanity under capital, and even less so in an era of hegemonic transition. One of the features distinguishing (post-)coloniser from (post-)colonised is the far greater proximity of colonial subjects to the effects of ecological disaster. Global elites and the capitalist system that maintains them are global, in contrast to the local condition of the disaster-prone poor. The flooded refugee camps of Cox's Bazaar and Sind do not offer escape routes like those available to Americans fleeing the US West Coast forest fires of 2021–22.

The economic and thus cultural abstraction of capital from natural processes may prove catastrophic in the medium term, but its local effects are disastrous in the short. Critical thinking observes this as a crisis in the partition of the world, and seeks critical action, on the lines drawn up in the Porto Alegre manifesto, as the basis for an alter-globalisation – not another world-system but a planetary alliance of dispersed local forces. This dispersal is necessary in order to support the specificity of indigenous law, and to protect it from hegemonic imperialism, neo-colonialism or trade-and-technology developmental models. Local languages must translate into and from the demands of the hegemonic tongue. Unsurprisingly, the lingua franca of this exchange is money, and the temptation for local leaders, faced with disasters, is understandably to abandon common wealth in favour of personal accumulation on the hegemon's model. The global abstraction of the universal medium of exchange, divorced from the human-natural ecology of the local, wins out. No local story is explicable without these planetary forces; but neither are the globalising

processes of capital comprehensible without the intensity of local experience.

Crisis thinking is more than resistant. In many respects, indigenous and post-colonial rejections of 'universal' hegemonic norms are forms of resistance. That they do not result in the well-being of the people is clear from the Covid-19 pandemic and the continuing economic crisis engendered by colonial extraction of raw materials and labour. Migrants' seasonal farm work and hourly paid labour in retail, logistics and tourism is precarious in the sense that unlike the profitable disasters of finance, holding down a job is compulsory and thus critical. Critical thinking of and through crisis aims to demonstrate the failure of a capitalist epistemology based on the exclusion of natural-human ecologies, where commodification and statistical rationalism, embedded in information engineering and the design of fiscal and communication systems, endeavour to ignore what they in turn depend on: colonisation and extractivism.

The waste of human and natural life is integral to capital's functioning, the externality it needs for cost-free exploitation. As waste, human-natural environments act as the unconscious of capital, just as indigenous languages act as the unconscious of the dominant discourse of global systems. What appears as instability in the discourse of power and prosperity (mirror-words for privation and hoarding) are symptoms of the return of the repressed, perhaps the most utopian potentiality among all the temporamentalities operating in the new eco-colonial conjuncture of information capital. Disaster capitalism ignores local experience in favour of global abstraction: profit. It perpetuates a present when disasters are probable, so that further profit can be derived from them. Critical thinking treats disasters as crises of the system that perpetuates and profits

from them. It accentuates the localness of disaster in order to expose the globally catastrophic trajectories of hegemony and hegemonic struggles; and it devotes itself to creating the conditions from which another future could emerge. To change the Social Forum's slogan, another world is not possible – it can only become possible. To make it so, we should begin by denying the universalist language of global hegemonies: the commodity form, rationalist engineering and the exploitation built into the fungibility of data, cash and commodities. Currently it is as difficult to imagine a new mode of information beyond the data-model enforced by communicative rationality as it is to imagine a world beyond capital. One reason it is so hard to imagine, to 'image', is that the dominant temporeality of our times, finance, no longer needs visible data or any address to human senses because humanity is increasingly marginal to its functioning. Humans form only an external environment to extract data from, not the masters of a Science that has outgrown them. To imagine a commons composed of localities and local struggles requires learning from this post-human cyborg while rejecting its teleology in order to move beyond the anthropocentric and individualistic models of imagination we inherit from the Romantics. Far less often quoted than its opening phrase, Bateson's definition speaks of 'differences that make a difference *in a later state of affairs*'. That is not the information commodity in its perpetual present. Any 'later state of affairs' implies history, historical process, change, action that comes from abandoning the endless return of the present. The utopian potential we found lurking in the depths of seismography, the potential to create a commons that might even emerge from the depths of financial automata, requires crisis to avert disaster.

A Digression on Angels

In Bill Viola's 2001 video installation *Five Angels for the Millennium*, the instant of experience is a gateway through which an alien and elemental reality arrives. It is a picture of the chronoclasm that haunts the Western tradition. Privileged agents in the religions of the book, angels are ineffable messengers between incommensurable worlds. John the Evangelist calls their medium *logos* when he opens his gospel with the words 'In the beginning was the word'; and when the archangel Jibril commands the Prophet of the Quran, 'Indite!' (write!), the word, descended from God into the breath of the angel, sounds in the Prophet's senses so that he could understand and transcribe. The angelic encounter is not only mediated: it is mediation itself, mediation as allonomy.

Angels appear: that is their duty and their glory. Their appearance is here: in the human world. Their being, however, as messengers, liminal creatures of more than one world, is elsewhere. There have always been gods of doorways and gateways. Each of these little gods watching over their local passages is only an intimation of the angel of the door, for whom every door is a corridor between orders, modes or opportunities of being. Aquinas, 'the angelic doctor' of the thirteenth century, says,

> the perfection of the universe requires that there should be intellectual creatures. Now to understand cannot be the action of a body, nor of any corporeal power …. Hence the perfection of the universe requires the existence of an incorporeal creature.

Aquinas' angel appears – to Adam and Eve, to Mary, mother of God, and to the Prophet – but also exists as disembodied intellect. One of Viola's five angels, the *Fire Angel*, evokes the analogy of the universal arche-fire that inhabits every individual flame. The ancient Greek Heraclitus perceived a founding and originary fire in every living creature, fragments of the great blaze from which all existence derived. Such is the being of angelic fire: not a concept but a principle that shines out, comforting or destroying, in portals opening onto the mundane, sublunary world with joy or violence, but forever alien. Angels come from the plane of the eternal flame, tear open the solidity of the mundane, and present themselves to the world as evidence that the world is other than itself.

The sensuality and sexuality of angels has long been a matter of fascination. In the Ethiopian *Book of Enoch*, a prophetic text dating from the third century before the common era, the angels are distinctively male:

> It happened after the sons of men had multiplied in those days, that daughters were born to them, elegant and beautiful. And when the angels, the sons of heaven, beheld them, they became enamoured of them, saying to each other, Come, let us select for ourselves wives from the progeny of men, and let us beget children.

These progenerative inclinations are far from the infantile, presexual charms of *putti* and cherubs fluttering through Baroque heavens. In the Byzantine Orthodox Church,

> As Jesus had referred to the angels in heaven as 'neither marrying nor being given in marriage,' it became a Byzantine custom to regard the eunuchs as being symbols of the angels in their liturgical roles, and icons of the angels and archangels always depicted the heavenly beings as imperial eunuchs of high rank.

Deprived of sex, the Caliph's eunuchs were marked by loss, though a loss they could not know as it was put in place pre-emptively in the pre-pubescence of male castrati (Origen, whose discourse on angels was a powerful influence in the European Middle Ages, was widely believed to have castrated himself in an effort to obtain release from worldly desires). In other traditions hermaphrodites were treated as angelic, having the parts of both sexes and therefore being whole, as the sexed population are not, being severed one gender from the other. Of both genders and neither, the queer angel of the threshold faces both ways, towards and away from sexuality and generation, like the angel in Elizabeth Knox's 2000 novel *The Vintner's Luck*.

The proverbially arcane argument over how many angels can dance on the head of a pin concerns the materiality of angels. If angels are wholly spiritual then they are pure message, the medium connecting us, communion, and as many of them can dance on a silicon chip as God wants. The absurdity of the question, and consequent absurdity of every possible answer, at least from the standpoint of the human intellect, is of a kind with equally obscure yet defining contemporary questions such as the problem of the rest-mass of photons. The authors of one 2005 paper note,

> failure to find a finite photon mass in any one experiment or class of experiments is not proof that it is identically zero and, even as the experimental limits move more closely towards the fundamental

bounds of measurement uncertainty, new conceptual approaches to the task continue to appear.

The uncertainty principle, operating as foundationally in quantum measurement as it does in angelology, does not thereby point to there being nothing to measure. Both questions, the dancing angels and the mass of a photon, can be posed, but only by avoiding the question that haunts angelology, quantum physics and attempts to think mediation: *where* are they? According to Benjamin, the Talmud speaks of angels who 'are at each moment created anew in countless throngs, and who, once they have raised their voices before God, cease and pass into nothingness', a hollow infinity to the eyes of Western rationalism, but for Benjamin the place 'where origin and destruction come together'. Despite attempts to position angels inside gendered order, and Origen's third-century derivation of an ideal hierarchy of 'thrones, and dominions, and principalities, and powers', the originating and traumatic otherness of angels persists as they burst in and out of existence as unreliably as Higgs' bosons. Combining angels bubbling in and out of existence and their dances with the specificity of the rest mass of photons prompts a further question: *when* are they? And in what mode? There is always the possibility that angels and photons are pure appearance with no ground in Being. Although dominant theories of communication and semantics emphasise the diminishing quotient of reality in each representation, is it possible that the angel is neither present nor absent but re-present?

Viola's *The Quintet of the Astonished*, made a year before the *Angels*, reverses the angle of view so that instead of seeing the angel we see those to whom it appears. However Viola elicited the actors' shock, we spectators of the projected spectators witness the performers' performances as profound, because of

the scale, extreme high definition and extreme slow motion of the projection. We observe what Benjamin called 'the optical unconscious', that prises open the habitually closed passage of small fragments of time to reveal the infinities lying within the layers of action and reaction lodged in *Quintet*'s unfolding moment.

The mystery of the angel is only matched by the mystery of the flesh. The two can scarcely be distinguished in Bernini's *Ecstasy of Saint Teresa*, where marble preserves the ecstasy of both the piercing angel and the mystic who receives his wounding blow, a parable of the mystery of incarnation and the incarnate world in all its materiality, whose actuality can be explained in an infinite regression of causes, but whose existence is, or should be, forever miraculous. As the archefire appears in each unique flame, each of us is from an elsewhere we cannot even intuit. The mystery is that anything or anyone or I exist at all. I can appear only by inscribing myself into the world of appearances, the world of the sensible, by appearing to others, including animals, plants, the rocks we wear down with walking and the water that from time to time constitutes our cells before transforming again and moving on, and that intuited observer we call a guardian angel. In Berkeley's eighteenth-century *Principles*, *esse est percipi*: to be is to be perceived. Being necessarily entails appearing. But not everything that is appears, and not everything that appears, *is*, or not necessarily in the same way that it appears: buds appear in Spring, but if Spring appears in buds, it appears in a far less immediate way than the appearance of buds. There is mystery in the appearing of physical as well as angelic beings. *The Quintet of the Astonished* shows that the entry of the real into history is always traumatic – that whatever its intention, and especially because it is true as no human words or acts can be, the angel enters time with the force of an atom bomb.

Indeed, the Bomb itself is an angel, the Absolute Real making itself manifest. This is the prophetic burden of Rilke's opening lines in the First Duino Elegy, from around 1912:

> Who, if I cried, would hear me in the angelic
> orders? Even if one of them suddenly held me
> to his heart, I'd vanish in his stronger
> Being. Since beauty is nothing
> but the terrible beginning we can only just bear,
> so we adore it for its cool disdain
> that could destroy us. Every angel is terrible.
>
> (translation modified)

Being, *Dasein*, beyond vision, fatally beyond comprehension even if it can be grasped by the intellect (as angels could be grasped, gendered and ordered by Origen and Aquinas), the Bomb is an angel that exceeds even the survival of those that it appears to, the angel Azrael that takes souls out of this world. The angel of death, this fatal arrival that ends history, appears as a new truth. It enforces the non-perceptual actuality of physics on a population who had thought themselves formally and finally divorced from the natural world. The revenge of Being on appearance, the angel of the Bomb arrived as a stranger – and continues to arrive, even in a time when we have almost forgotten that it dwells among us, the invisible trigger that turns alienation into annihilation.

After Hiroshima, the world is no longer historical or natural. The global system has bootstrapped itself out of the swamp to become pure appearance, a simulation of cash divorced from assets, consumption divorced from ecology. The angelic bomb and the atomic sublime that attends it as a new and terrifyingly nihilistic aesthetic inhabit the interstices of finance capital as it constantly reformulates the grounds of its own existence.

As interruption, the angelic event, that has not ceased to undercut the everyday with its permanent alternative of annihilation, proves that this simulation, which must aspire to totality, can never be total because it is always dependent on the world it boasted it had bootstrapped itself out of.

The angelic encounter rips the human world in two, between the ecological identity of body and world, world with body, on one side, and the immortality of recording on the other. It is only in *this* moment of history, a history brought about by the Recording Angel, that the angelic encounter can be thought of in this way: as the destroyer, as the revenge of ontology on appearance and on life, framed by its ecological formation among everything that is born and dies. Viola's video works create electronic gateways for angels to appear. For the fifteenth-century Islamic divine al-Suyuti, known as Jalaluddin, angels were made of light, the true angels created from 'fire that eats, but does not drink' – the light of the moon – in opposition to devils created from 'fire that drinks, but does not eat' – the fire of the sun. Viola's angels too are light, but they proceed from neither heavenly body, in the first instance at least. They are made of pixels, and under the pixels the global industrial standards of code and protocol. Angels appear in the interstices of a global system that has separated itself, in appearance – which is what angels are and do – from the physical world of molecules and cash flow. The angel is both product of simulation and proof that simulation, which must aspire to totality, can never be total because it is always dependent on a world it rejects. The angel is neither materially real nor entirely symbolic but explicitly and forever the relation between real and symbol. As message, as threshold, the angel relates. In its arrivals and encounters, it has no Being of its own. It is, to the extent that it 'is' at all, a flowering of presence in the gap between ontology and time: not in history but

the root of history, and therefore perpetually coming into and fading out of being, like the fields and frames that comprise its present on Viola's screens. This much may be true of all video, or a condition against which much or even all video strives, as film strives to concentrate attention on what does appear rather than the dark absence that does not. In Viola's *Angels* and *Quintet*, slow-motion constructs and realises the angelic as messenger (as what can be perceived) by pointing towards the incompatible temporalities of the different worlds that angels travel between.

Archangels no longer visit us poor humans and our poor time, a time conditioned by loss. Humans live their lives in expectation of mortality because they live apart from (maternal, ecological) wholeness. When we organise our lives around mortality, we diminish ourselves by shrivelling into individuality. As the subject of biography, 'I' dies, but as subjects of history, 'we' do not. To contemporary individuals, the historical experience of loss can only appear as the timeless condition of lack. And yet this chronoclasm, constitutive of human being today, allows angels to pass between these opposed qualities and disparate dimensions of the human and its proto-human other, the promised and premised human who is immortal because timeless, despite being condemned to mortality and time.

In his theses 'On the Concept of History', Benjamin describes the *Angelus Novus* being blown backwards out of Paradise as the wreckage of progress piles up at its feet. It is the angelic moment whose failure to be implies and is implied by the very relation that makes its ephemeral appearing possible – even though the angel's appearing is more grounded in time and therefore more real than its second existence in the atemporal Absolute that it comes from. It is the history that it caused that makes the wreckage of history so terrible

for Benjamin's angel. At the same time, the wind caught in its wings is not contingent. It is the energy of the atomic blast it caused by intersecting time with the Absolute. Ever since *Chott El-Djerid*, his 1979 study of mirages, Viola has realised that the failure of video to capture the material of the world is identical with the failure of the world to appear; and that both concern not only the weakness of perception, human or electronic, but the incompleteness of both being and appearing. The shimmer of scanlines and the shimmer of heat haze are at one with the ontology of light that fails to come fully into the perceptible realm, and light's assertion of its actuality in the human sensorium. This indecision is a condition that permeates the relations between the Absolute, time and history. As the mass of the photon approaches the limits of measurement, it opens onto Frege's ontology of non-identical zero. The Angel encounters us with the power of non-identity. It is, in this sense, the essential component of every encounter: the non-identity of those who come together – neither identical with each other when they meet face-to-face, nor identical with themselves. In the strange encounter with the angel, I realise that 'I' am not identical to myself, not-self-defining, but defined by otherness and controlled from elsewhere. The angelic encounter thus makes possible release from identity. Recognising that my autonomy is subject to the allonomous laws of a world and a history beyond my self, I depart the perpetual present for a history which must end elsewhere, as all departures must, but cannot begin except in trauma.

In Bernini's *Ecstasy*, the traumatic encounter with the sublime is an ecstatic exit from the world. At Bikini Atoll, reversing the act of the angel that drove Eve and Adam from the eternal Garden, the angel of the fiery sword drove us out of history into an endless, systemic present. This present – the present of the market– is inhuman because it denies what the departure

from eternity into history made apparent: that human time is marked by loss. Loss of ecological, maternal and communal union, felt as profound lack, binds us to a fading past and propels us into a future that debt and derivatives have already drained of its difference from the present. The paradox of the angelic encounter's queering of desire in the face of the nuclear sublime – and the equally aesthetic terrors of climate change – is that each of us experiences it alone, yet all of us experience it in common. The traumatic realisation of our alienation from the world and one another propels us towards one another and into a world that has just proven that it is unstable, and therefore, despite everything, open to change.

3

Glitch

Solar Observatory

The word 'glitch', originally astronaut slang for power surges, refers to any electronic interference or disturbance powerful enough to notice but not powerful enough to close a system down. Comet tails on old tube cameras, horizontal marks traversing analogue video scans, dead pixels, the stutter of scratched optical media and the spinning wheel of death on streaming media: none of these make media impossible to watch, and often, as with live music recordings, add to their air of authenticity. Applied retrospectively to film, any scrappy or dirty presentation evokes glitches: dust and scratches, stains on a screen, or an imperfection in a lens. Most of the literature on electronic glitches comes from electronic engineers seeking to fix them. Many artists, to the contrary, have embraced them as evidence not just of the materiality of the medium, but of a medium's contribution to making art. Ink bubbles disturb the careful composition of darkness in intaglio printing, but the later technique of aquatint deliberately set out to encourage them – the ink itself participating in the

printmaking process. Net-art duo Jodi and glitch artist Rosa Menkman use glitches to create new visual and sonic forms, making the most of system protocols' ability to navigate their way past interruptions. Data visualisations translate the endless froth of natural occurrences and human-scale events into spatial diagrams, tools of administration. Glitched time-based arts like video and music can alter our perception of time, but we don't expect chronoclasms in data visualisations. A chronoclasm is a rip in time; a glitch is just a tear, tiny in comparison, often momentary and swiftly healed, leaving only a scar in the temporeality of the apparatus. The question is whether these scars point to a greater rift in temporamentalities. A glitch may not shred the calendar, but it can puncture its claim to completeness. Glitches appear as allonomous impacts from elsewhere; but they may also be moments of a medium's intrinsic non-identity. Like angels, they are most contradictory in the moment of their appearing, not least in the case of scientific observations.

The Sun is light-giving, life-giving, but also blinding and dangerous. Launched in 2010 as part of the Living with a Star project, NASA's satellite-borne Solar Dynamics Observatory (SDO) carries instruments designed to observe solar spectra otherwise absorbed by Earth's atmosphere. NASA and Lockheed Martin, the constructor, upload daily movies from data gathered by the Atmospheric Imaging Assembly (AIA), animations producing apparent motion from still frames. Each daily movie is an extract from a much larger animation of the sun's activity accumulated in NASA's databases. The AIA animations condense hours of individual images in the 131, 171 and 304 Ångström (ultraviolet) wavebands, shifting them to visible colours. At thirty frames per second and with frames captured twelve seconds apart, each second of video shows six minutes of solar activity. When a flare arrives in

the video of the X8.2 solar flare from 9 September 2017, the electromagnetic pulse creates interference patterns and the sensors shut down between frames. The MPEG codec that compresses and decompresses the images for transmission tries to fill the gaps by interpolating data from previous and following frames. The cracked video signal combines impacts of external events with the internal protocols of capture and transmission. It struggles to codify extreme external moments of solar activity, generating more interruptions as it tries to respond. The excess of data – of wave-particles driven by this vast solar eruption – drives the receiver into a paroxysm of activity as it tries to manage the overload. Anomalies like these have driven cosmological enquiry and its pursuit of ever more sophisticated instruments since Galileo trained his telescope on the moons of Jupiter. NASA's Scientific Visualization Laboratory is one of those instruments. After quantum uncertainty, the question arises: what does such a complex device observe – events, or the effects of its own observation?

The Visualization Laboratory website gives the option to download good quality stills from the solar observations. Removed from the flicker effect of the rapid succession of frames, the individual images show big differences over the twelve-second gaps between them: some show detail of the Sun's surface, but significantly less than is visible in frames before or after the flare; some are almost dark, when the sensors have shut down to recover, and some show remarkable artefacts from the system, notably something like a lens flare running vertically through the outer western edge of the solar disc, and what appears to be a kind of Moiré pattern, a chequered overlay that might be generated by the pattern of pixels on the receptor chip. The lens flare can be construed as noise, generated in the interaction of the incoming energies and the lensing apparatus. The Moiré might equally be analysed in

similar terms, but its patterning seems to echo Terry Riley's score: a rhythmic pulse that depends on but exceeds the architecture of the chip and the operation of the transmission codec. It reveals the grid of pixels underlying all the images, and by inference the sampling technique that underpins stop-motion animation.

In the normal run of events, as in the opening minutes of the X8.2 video, the gaps between frames are effectively invisible, masked by the continuous scan timed to match the acuity of human vision. There is no need for scientific data to be presented in this way other than for humans to watch. The raw data is of more value to scientists and contains more information than the animation's necessarily slimmed down data-set. It tells them not only about wavelengths we cannot see, but about what happens between frames. Data captured remotely that requires remote processing so it can be transmitted back to Earth, like pretty much all data capture today, is exclusively digital, meaning it is broken up into discrete packets of observation and transmission. These gaps are a core challenge for truth, addressed at the 1950 Macy Conference in this discussion between pioneer cyberneticians Warren McCulloch and Norbert Wiener.

McCulloch: Let us put it this way: as long as the probability of a state between our permitted states is great and has to be taken into account, we have still a flavor of the continuous. When the probability of the Zwischen [between] state is zero or negligible, we think chiefly in other terms. That is, I think, purely a matter of practicality.

Wiener: … I say that the whole habit of our thinking is to use the continuous where that is easiest and to use the discrete where the discrete is the easiest. … One thing that we cannot do is to take the full complexity of the world without simplification of methods. It is simply too complicated for us to grasp.

The constraints of measurement, telemetry, network protocols and video formats rest on ignoring the in-between but they also produce interference patterns. For a government-funded agency like NASA, digitisation enables simplifications that make measurements comprehensible and meaningful to politicians and the paying public. Dividing observations into discrete frames smooths an otherwise staggeringly violent solar event, but also shows viewers the effects of that violence on the measuring device itself. The video captures not only information but the noise it generates. Data animations are also noise-reduction and noise-management systems. By analogy with Mary Douglas' definition of dirt, noise is data in the wrong place. Unlike data visualisations, diagrams and maps that sweep the noise aside, the AIA video includes noise, the enemy of rational systems. Symptom of an irrational event, this noise re-presents solar violence on behalf of a technoscientific system which itself stands accused of violence. Speaking for a generation of decolonial activists, Enrique Dussel writes of 'the death of life in its totality, through the indiscriminate use of an antiecological technology constituted progressively through the sole criterion of the quantitative "management" of the world system in Modernity'. In the case of NASA's SDO, the satellite launches alone are violent acts against the ecosphere, just one of the ways space science involves environmental injustice. The question is whether noise, environmental or systemic, is as violent or irrational as the system that gives it birth.

A Disturbance of Memory

In 1936, Sigmund Freud wrote 'A Disturbance of Memory on the Acropolis' recalling a visit he made to Athens with his

brother in 1904, thirty-two years earlier, 'a generation ago' as he writes. The anecdote involves an unexpected and inexplicable feeling of despondency that came over the brothers at the idea of travelling to Athens, and Freud, when finally he stands on the Acropolis, finding himself thinking, 'So all this really does exist, just as we learned at school'. He describes two sensations at the time of the event: a sense of surprise at the real existence of Athens; and an even greater shock at discovering that as a schoolboy he had somehow doubted its existence. Motivating both, he argues, was disbelief that he would ever stand on the Acropolis: 'this doubt of a piece of reality, was doubly displaced in its actual expression: first it was shifted back into the past, and secondly it was transposed from my relation to the Acropolis on to the very existence of the Acropolis'.

Freud speaks of this sensation of incredulity as 'derealization', akin to déjà vu, only now not the memory of the present, but a projection of a disturbed present onto a (false) memory of the past. Although, for Freud, ultimate explanations always lead back to infancy, this disturbance of memory suggests an opposite temporality: a retroactive generation, planting the cause of present derealisation in a doubly remote past – a memory from 1936 of an event in 1904 that recalled a childhood in the 1860s. Not so much an anachronism then as an anachrony, in this case not the storytelling device putting events out of chronological order but creating, in the present, the memory of an event in the past that might explain a present affect. Memory works constantly to remake the conditions of its own existence.

Anachrony doubles moments in a life – a memory of an event reflected in a memory of remembering the event – and the possibility, perhaps just the suspicion, that the act of remembering not only reinforces but creates a memory. Like stock market trades, memory is retroactively performative: it

brings about the conditions of its own origin. We don't remember the past the way we recall phone numbers. Remembering actively produces the memories it brings into the present Not at all the retrospective construction of a 'false memory', remembering enriches the affective power of an event doubled in memory, turning events into biography. Freud's experience on the Acropolis was not an aberration of memory but a moment when memory revealed itself in action. Like one of Foucault's archives, it doesn't so much record a life as bring it about. Recording and archiving only complicate the curious auto-generation of memory from the present. Glitches similarly may be considered as occurring retrospectively in a present which they cannot inhabit, much as a representation is always the delayed appearance of an excluded past. Instead of considering glitches as systemic, we can consider them as temporal phenomena: as anachronies. Freud's 'disturbance of memory' is what we would now call a glitch.

A glitch is evidence that control is never complete. It is a tactical revolt of the *Zwischen*: of material against its organisation into a system. Any artwork, indeed any communication, typically establishes its source as in some way human. A glitch indicates another subject in the medium, a ghost in the machine, the inhuman haunting our communications. Where control belongs to the perfection of mastery, glitch shares with the decolonial struggle the work of demonstrating that power is never complete or terminal. It is a material event that throws the very notion of control and the implicit patriarchal, white, scientific, rational subjectivity of communication systems and colonialism alike into question. Of this subjectivity Ashis Nandy writes,

> while the economic, political and moral results of colonialism have been discussed, its emotional and cognitive costs have been ignored.

And as Freud has reminded us in this century, what we choose to forget has a tendency to come back and haunt us in 'history'.

The colonist possesses and oppresses the colonised, but colonialism also represses and possesses the colonist. The key example in Nandy's account is Rudyard Kipling, condemned to repress 'the other Orient … as archetype and as potential'. In order to produce the ordered, unified, commanding persona of colonial rulers, Kipling and his peers learned to submerge their polytheistic, multicultural and androgynous urges, projecting them instead onto the alien 'Orient'. The cruelty of the colonist, directed inward as well as out, is a symptom of this repression: a glitch in the colonial system that never stopped it functioning, but made its materiality obvious to anyone prepared to see it. As the philosopher Ernst Bloch wrote 'capitalism is unhealthy, even for the capitalist'. The English public schools enforced the Freudian repression that Nandy describes and that triggered Freud's uncanny experience of unreality, but also a kind of Hegelian 'cunning of Reason', sacrificing its stunted and dispensable functionaries to ensure the triumph of the Raj. Today neo-liberal consumerism has democratised repression in the state of perfectly informed consumers serving the market, the new universal subject of history. As sole proprietor of the new totality, the new 'cunning of Reason', the market depends on perfect communication, an abstract mathematical technology extracting profit by moving symbols from A to B with maximum efficiency. Nandy's 'emotional and cognitive costs', however, are no longer ignored, as under colonialism, or repressed like Freud's disturbed memory. Data mining is an extraction industry; information is the metal refined from the ore of data that interfaces rip out of the ground of human–machine interaction. Humans are the environment of information industries, treated with the same disdain as raw

resources and dumping grounds for waste product. Today, like physical waste dumps, waste humanity is treated as raw material. Having gone as far as it can in its geographical expansion, capital now colonises the minds and bodies of consumers. The production of unhappiness is as integral to the reproduction of capital as is the production of waste.

Infernal Affairs: Non-identity and Integral Glitch

Four years before Claude Shannon published the Mathematical Theory of Communication, with its preliminary assertion that 'semantic aspects of communication are irrelevant to the engineering problem', Horkheimer and Adorno noted that 'On the road to modern science, men renounce any claim to meaning'. Shannon took the line that 'The system must be designed to operate for each possible selection, not just the one which will actually be chosen'. 'In science,' Horkheimer and Adorno specified in advance of Shannon, 'there is no specific representation … Representation is exchanged for the fungible – universal interchangeability.' Their next step, however, goes beyond Shannon's mathematical theory: 'The identity of everything with everything else is paid for in that nothing may at the same time be identical with itself.' Shannon's now-hegemonic model asserts that signals are self-identical and only noise, and therefore glitches which are their symptoms, are non-identical. Horkheimer and Adorno already intuited the self-alienation of signals: that glitching is not aberrant but normal. Systems not only generate, but are defined by glitch, noise and non-identity, opening the possibility that they depend for their normal and normative functioning on meaninglessness.

Film noir, reaching its maturity in those same 1940s, constantly interrogates the meaning and meaninglessness of human life. As ecocritical film theorist Jennifer Fay suggests, this perspective comes from the kind of actuarial view made explicit in the insurance swindle plot of James M. Cain's *Double Indemnity* of 1936 and its 1944 film adaptation. 'We are seldom, it is crucial to remember, the sole drivers of our data-driven existence', as Dan Bouk concludes in his history of the life insurance industry. Fay adds, 'Whether he is biologically programmed or simply prone to accidents, the noir hero is not an individual human but an aggregate in the form of an individual', continuing to note that 'To perceive our individual stories and encounters with particularity at a scale that erases psychology and ambition is to find, in the large, even geological view, accumulated effects beyond human meaning'. It is not fate but statistical probability that governs noir's quintessentially contemporary and urban aesthetic. Noir navigates the city in the knowledge that nothing is accidental, but nor can anything be planned. The system operates spontaneously.

In latter-day Hong Kong noir *Infernal Affairs* (*Mou gaan dou*, 2002), Lau is a triad mole in the Hong Kong police; Chan is a police mole in the triads. With the exception of half a dozen scenes, the action takes place in interiors and streets, mediated by neon signs, shop displays and network media – computers, mobile phones, satellite maps and TV screens. In the iconic rooftop confrontations, the camera closes in on two-shots, throwing the distant mountains out of focus, or cuts to extreme long shots where the human figures are almost lost in the urban roofscape, sharply divided from the hills beyond its border. We see either individuals or their world but never both at the same time, while their world is divided between the urban and the natural that the city defines as what lies beyond it. Office windows and car windscreens place characters in

relation to the world while simultaneously alienating them from it. The deaths of the moles' respective bosses causes the protagonists to be estranged from their identities. All this alienation is a normal function of film noir and to a degree of all classical cinema.

An unmotivated shot of clouds punctuates one of the rooftop scenes. The indefinite and unrepeatable form of a cloud makes an indexical claim about cinematography that escapes the otherwise fictional diegesis. At the same time it indicates a radical displacement between the image and its recording, between the *manifestation* of the cloud to the camera and its *appearance* on screen. That distinction between event and representation marks a discontinuity within the image. Horkheimer and Adorno note that 'language expresses the contradiction that something is itself and at one and the same time something other than itself, identical and not identical.' The same is true of images, especially when they persist not only in their own right but articulated with other images in the syntax of editing.

Towards the end of the film, Lau drives along a road bordered by tall concrete walls. Above the concrete, above the roadworks blocking an off-ramp, and screening the tower blocks beyond, a bank of trees and shrubbery is held apart from the estrangement of the automobile and the highway from the natural enclaves that they lead towards. In addition to the non-identical nature of the trees, shared with the street-side planters and pot plants of earlier shots, this sequence is punctuated by a lens flare, an effect assiduously avoided in the rooftop sequences and other exterior scenes throughout the film up to this point. An oblique scatter of diffracted light interrupts the eyeline connecting viewer and scene, lying athwart the screen and, as has become almost a cliché of formal criticism, disavowing the invisibility of the apparatus. The

flare is neither of the image nor of the screen but a symptom of another operation beyond the sense-making work of film syntax or viewer engagement, beyond even film's fundamental job to show us something. The lens-flare is evidence of a non-identical process at the level of photography, a collaboration of natural light – the sun – and the machinery of cinematography – the lens. Given that we can generally infer the presence of sunlight in daylight shoots, and read its position from the fall of light and the angle of shadows, it is the extra-diegetic stroke of the interrupting flare that makes it significant. It shows both the incoherence of the cinematic system – that it cannot control everything that occurs in the process of production – and its incompleteness – that there exist other partners in production beyond what the screen is used to showing or intended to show. The flare shows that another world is possible, beyond the world that the film came to show. The lens-flare hovers in a space between image-world and auditorium but also in another time. Who knows if, at the moment it was recorded, there had not been, eight minutes earlier (the time light takes to travel from Sun to Earth), a flare like that recorded in 2017? Unlike daylight, which is always presumed as the condition of seeing and therefore invisible, a lens-flare points towards the final cause of daylight, its miraculous, boiling source. These flares, solar and lens, interrupt the time of narrative and the presence of illumination to itself and what it illuminates. Now light demonstrates that it is always already delayed and displaced. Our characters are alienated, so too is their city; with the advent of the lens-flare, the film that should describe and contain them is alienated from itself and its instruments. Seen, again, from this point in its run-time, the film enacts Horkheimer and Adorno's 'identical and non-identical' paradox.

Whatever Kazimir Malevich might have intended or subsequent interpretations may say, his abstract painting *Black Square* (1915) as it exists today in the Tretyakov in Moscow is marked by its *craquelure*, the damaged surface left by the drying and shrinking of the paint and its disengagement from the canvas. Whatever he may have meant (and he left a whole box of notes) or subsequent commentaries have unearthed, Marcel Duchamp's *La mariée mise à nu par ses célibataires, même* (1915–23), known as *The Large Glass*, as it exists in Philadelphia today, is extensively cracked. Duchamp is said to have remarked that the damage made the work 'definitively unfinished'. There is a possibly apocryphal tale about Nam June Paik's *Zen for Film*, a movie comprised entirely of clear blank leader. On seeing it on its return to New York from a tour scratched, scuffed and stained from its travels, the composer John Cage declared it 'much improved'. The afterlives of Paik's *Zen for Film*, Malevich's *Square* and Duchamp's *Glass*, three pillars of modernism, continue the coming-to-be of the art after the artists ended their labour. Malevich's oil cracked from desiccation; Duchamp's *Glass* along faults in the glass; and the damage to Paik's *Zen* is the outcome of projecting it – that is of its ordinary life as a film. In all three cases, the damage, the glitches, are integral to the media they are made of. The question is whether these glitches interfere with the autonomous working of the art, or whether they are integral to it, as Duchamp and Cage contended.

The aesthetic problem concerns the nature of the system, at the scale of the enclosure of the world in the market, or of the self-enclosed worlds of an autonomous artwork or a classically well-made film. Like the marks on the three artworks, the clouds and lens flare in *Infernal Affairs* involve disjunctures in time. Clouds change forever, but there are always clouds. When the film cuts away from the intensity of

the action to contemplate them, it changes from narrative to meditative time. The lens flare parts from the time of the fiction and from the time of viewing. Like the anamorphic skull in Holbein's sixteenth-century painting *The Ambassadors*, a different time – of mortality, of eternity, of transience – enters the pictured world, Hong Kong in the movie or Henry VIII's Hampton Court in Holbein's painting. Holbein's skull, it must be said, is not incompatible with the pomp of court diplomacy, any more than sunstrike is alien to Hong Kong. The comparative degree of truth is not in question, but whether the truth of film records the world or records light, and whether a portrait catches appearance or essence. We have to answer, in these instances, that both alternatives are true. The glitches do not interrupt: they are integral to the works where they occur.

This finding contradicts many earlier commentaries on glitch including my own. It may have been the case that digital glitches circa 2010 were still potent antitheses to communicative rationalism. As Mark Nunes put it in his admirable introduction to an admirable collection on error, glitch and noise, 'In its "failure to communicate", error signals a path of escape from the predictable confines of informatic control.' Things have changed. The success of prediction engines based on mass data harvesting from social media and the resurgence of algo-trading in derivatives markets, make risk no longer a danger but a source of profit. Contingency is now the difference that creates value in the information commodity. Even if cracks and *craquelure* stand between artwork and viewer, they also authenticate and therefore assign difference and value to the unique work. Randomness distinguishes uniqueness and, counterintuitively, makes the unique entity fungible. (The description of blockchain smart contracts as 'non-fungible' tokens is a serious misnomer.) Interruption is now a system resource.

Glitches have two formal relations to systems: as manifestations of externalities and as their representatives. This is how readers can always read past the asterisk in 'f*ck', and reconstitute even badly damaged messages, and how transmission protocols, codecs and imaging and audio software jump over damage or incorporate it. There are also two possible sources of glitches. The distinction between environmentally and internally generated incoherences is correct read from Shannon's engineering perspective, but there is a third source indicated by the term 'representatives', semantic incoherence generated from the 'semantic aspect' that the mathematical model excludes. Today, however, that semantic aspect is precisely what the dominant systems require, and what they harvest from social media, financial records and cultural activities. The results of human (mis)understandings appear in the system not as noise but as glitches, functionally equivalent to eco-technical noise. Once they start to act inside the system, glitches are no longer indices, directly caused by noise, but symbols, tokens circulating inside the system. Glitches stand in for contingencies – externalities that the system apprehends as external noise. At the same time, systems not only assimilate them perfectly, as *Infernal Affairs* assimilates its lens flare, but actively depend on them to guarantee their completion, coherence and veracity to their own terms. A system that can feed on contingency has a greater claim to universality than one that can't.

It is a point of almost theological nicety to divide noise as event from glitch as effect and symbol, and to divide glitch internally between manifestation, representation and meaning. To some extent, the distinction between environmental and systemic noise is a false dichotomy. Even emphasising the temporal estrangement of glitch from both signal and source, or asserting that a glitch is only a glitch because it is defined

as such by the system, are gratuitous formalisms until we realise, as *Infernal Affairs* shows with its lens flare and obtrusive clouds, that non-identity is integral to the systems where glitches appear. This is important, *mutatis mutandis*, because if glitch is non identical *and* integral to the system, then the system is non-identical. Any universal, rational, efficient and self-operating system is non-identical. Thus any form of self-operating, auto-teleological system, any system claiming autonomy from ecologies, technologies and ultimately from human motivation, is likewise non-identical, incoherent, incomplete and untrue. Decolonial critique since the work of Quijano, including Mignolo and Walsh and de Sousa Santos among others, has argued powerfully that Eurocentrism is a product of colonialism, not vice versa: that capitalist rationality is a product of its exclusions. Today we witness the colonisation of every form of human behaviour as raw material for info-capital, no different in purpose from the pillage of the colonised ecosphere in the wake of Columbus. All our systems – the invisible hand of the market, scientific rationalism, the discourse of universal law and ultimately the hegemonic mathematical theory of communications itself – are non-identical, and, in the decolonial perspective, fictional.

The Departed: Gangster Economics

Martin Scorsese's *The Departed* (2006) takes its cues from *Infernal Affairs* (2002), sharing the plot device of the undercover cop planted in a gang, and a gang mole working in the police force. Like *Infernal Affairs*, the character development of the protagonists plays on the fallibility of memory as they begin to lose their sense of identity. In both films the city is more than setting. Lau and Mak's rooftop encounters under ice blue skies

and the long shots of the city's mountainous surroundings contrast with the colder, darker palette and oppressive interiors of *The Departed*. Both films are contemporary-set: *Infernal* in 1999, two years after Hong Kong's return to China from British rule; *Departed* in 2006. The ethical vertigo of *Infernal Affairs* may belong to those first steps into independence in the last years of the last century. *The Departed* seems weighed down by the legacy of the twentieth century as it curtails the spurious optimism of the early twenty-first. The opening sequence of *The Departed*, intimating in advance the vertigo of untrustworthy memories that will afflict the two moles, has a structure surprisingly analogous to Freud's anachronous anecdote of the Acropolis memory.

The Warners logo rolls in silence at the start, with faint bird song and street noise gradually rising under the company credits and the black frames that follow, including the text 'Boston, some years ago'. The first image cuts in to shouts and scuffling: in grainy 16 millimetre, men are fighting in the street. In the montage that follows, it is hard at first to decipher whether this is library, or a shot restaged to look like library footage. Many of the shots are news coverage of the notorious white riots directed at Boston's then-recently desegregated school buses and their police guards, at their peak in 1974–76. Costello's voiceover begins, including a vernacular history of race and gangs in the metropolitan area. At this stage, we can't know if he is speaking in the present or back in the 1970s. Over shots of school buses, the first notes of the Rolling Stones' 'Gimme Shelter' begin – a track Scorsese also used in *Goodfellas* and *Casino*. The track appeared on their 1969 album *Let It Bleed*, and features in the title and throughout the Maysles Brothers 1970 documentary film *Gimme Shelter* covering the Stones 1969 tour of the States that culminated in the murder of an African-American fan at the hands

of a motorcycle gang during their set at Altamont. The song is dropped down the layers of sound when library footage of an African-American interviewee, one of the few Black faces we see in the movie, shows him saying the events 'put hate in your heart'. Stock camerawork pans loosely over Boston's rooftops and the Charles River, zooming in on a neighbourhood as the voiceover tells of an Italian gang taking over part of the city. Here we cut in to high resolution 35 mm: a tracking shot following Costello (played by Jack Nicholson) as he walks through a garage, silhouetted against doorways, in shadow between them. We are now in a different time to the library footage, but the voiceover still isn't synched with the actor, who takes a flamboyant drag on his cigarette in the middle of a line.

The dialogue here takes on a structure approaching Freud's disturbed memory: 'Twenty years after an Irishman couldn't get a fuckin' job, we had the presidency, may he rest in peace.' This gives another set of dates: 1961, Kennedy's inauguration, and 1941, the year the US joined World War Two. We can presume that the action we are watching is no longer historical, but is indeed 'Boston, some years ago.' In the dialogue scene that follows, 'Gimme Shelter' continues, increasing and decreasing in volume around the speeches, clearly not a part of the diegesis of the store location. Dissonant because never anchored in synchrony with the image, the song's function changes constantly. Over the library footage from the 1970s, it indicated the tenor of a moment in history (one Stones biographer says of the album it opens 'No rock record, before or since, has ever so completely captured the sense of palpable dread that hung over its era'). Later it is more generic: bad-boy music, a continuum of danger and rock 'n' roll over decades.

In the store, Costello talks to a child he identifies as 'Johnny Sullivan's boy', living with his grandmother, and offers him a job. Cut to the Sullivan kid as altar boy, the piety interrupted

by a return of the voiceover, criticising the Church, over a cut that takes us back to the garage, this time with young Sullivan listening to Costello's speech, no longer voiceover but synch. The scene ends as Costello for the first time leans forward into the light and reveals his face, followed by a reverse shot of young Sullivan, followed by a match cut to the same character, this time played by Matt Damon, ten or fifteen years later, in police uniform, beginning the narrative proper. The trope of the hidden face emerging into the light was a specialty of noir cinematographer John Alton. This evocation of the earlier cycle of American film noir overlays the Hong Kong source, layering the stylistic provenance of the 2006 film in parallel with the complex of dates structuring the monologue.

If the present of the film is 2006, as Scorsese says in interview, the dialogue scenes in the store and garage must be set in the early or mid-1990s, referencing three earlier times: the busing riots (and white flight from the city centre) of the mid-1970s, the Kennedy presidency, and the labour reforms of the 1940s. Jack Nicholson was born in 1937: the Kennedy presidency and the gang wars of the 1970s are credibly Costello's memories. His recall of 1941, when he would have been four years old, belongs to the construction of an imagined community: the Boston Irish. Here memory is no longer personal, carrying a freight of experience whose precepts could be handed on to a pre-juvenile recruit. Instead, it is part of the construction of a collective distinguished from its neighbours and its government, for which the Romance languages have the incisive phrase '*noi altri*', 'us others'. The reference to the 1940s is historical, not personal, legitimated by the line of dialogue about being good in school: the date both an institutionally acquired fact and a surrogate memory created in the interests and through a process of community-building.

These stacked, incommensurable ways of recalling the past, matched by the shifts between sixteen and thirty-five millimetre, and by the drifting relation of Costello's soliloquy from non-diegetic commentary to diegetic dialogue, carry through to the fluctuating work of 'Gimme Shelter', at once archetypal macho rock, the prototype of bloated stadium anthems, an uncompromising rip-off of African-American blues and soul, and a homage to it, especially at the moment when the edit privileges Merry Clayton's storming delivery in her part of the duet with Mick Jagger. The racist history of rock music is only amplified in the racism of Costello's monologue; but the verbal element of the soundtrack is presented as a sociological observation of collective identity formation and its processes of violent exclusion – demonstrated in the brief flashback to a long shot of the execution of an Italian-American couple on the beach near Logan airport, which, after a medium-close shot canted steeply upwards to Costello's amused reaction, includes his accomplice's recommendation that 'you should see somebody', implying that Costello's laughter is not just anti-social but schizophrenic, a personal effect of communal differentiation.

Costello's dissociation and Freud's derealisation, Scorsese's temporal displacements mimicking Freud's anecdote, the divergent recollections and presentations of past times, the dominance of a history memorialised by and for the victors, are all carried by the movement of the song from the 1970s to the 1990s to the 2000s. This deracination of multiple presents will be acted out in the cracked symmetry of the two-moles narrative borrowed from the Lau/Mak movie and their mirrored sense of estrangement. *The Departed* is not just about history: it is trapped in it.

The progress of a narrative always reformulates what we remember now of what went before.

Editor Thelma Schoonmaker's audio montage in *The Departed*, though she eventually resolves its layers by synching sound and image, is also consciously re-membering the soundscape of Boston's past. Not only is *The Departed* dependent on common resources like the English language, on investment markets and on supply chains, raw materials and energy suppliers, technical equipment, engineering standards and the global bodies that oversee them. It makes its recall of history integral to the movie, reprocessing history in the same way it reprocesses celluloid and sunlight; but unlike 'any movie' it places that reprocessing at the front of the film, ensuring we understand that the history it recalls took place only for the demographic who believed, at a certain moment in the mid-2000s, that they were victorious. The effect is vertiginous because the inference is that any historical memory, any historiography, is necessarily fictive – an act that performs memory, individual or collective, in and for the present – and so is any identity founded on believing it. *The Departed* is not an autonomous artwork, partly because it appeals to human interests, notably when it demands we understand the historical forces forming Costello but also that we judge him. The allonomy of *The Departed* does not contain Coleridge's 'reason why it is so, and not otherwise'.

The Departed is flawed art from that standpoint because it depends on materials, techniques and most of all histories that pre-exist it and interrupt the formal unity of the work. An ideal, structurally perfect film, in this view, would be free of social or moral influences or judgements. It would carry only a coherent and complete marriage of sound and image from source to spectator. This view of formal autonomy, associated with art critic Clement Greenberg, comes surprisingly close to the mathematical theory of communication. The autonomous artwork and the noise-free signal are structurally

the same: free from the interference of meaning or use, but infinitely exchangeable, like commodities. Yet as we have seen Horkheimer and Adorno argue, information, the difference that makes a difference, is non-identical. To the extent that artworks act as if they were closed systems, like telecommunication networks, they contain in themselves the reason why they are otherwise rather than so.

The glitches in Freud's recall and *The Departed*'s historiography are first symptoms, then symbols of noise, that is of all that has been excluded from memory and film as systems. They mark the integration of waste into every system. In Freud's account and in *The Departed*'s opening sequence, memory does not eject its waste product: it mines it for new processes of rememoration, individual and collective. Similarly information capitalism ceaselessly processes new configurations from stored information, and today it has also expanded into mining noise, the waste by-product of information processing. The risk once associated with noise is no longer a danger to profit-making. The behaviours of increasingly disciplined consumers, the real subsumption of consumption under capital, are now so predictable that the system requires wholly unexpected and unpredictable events in order to leverage their differences into profit.

The gangster economics that so fascinate *The Departed* are integral to this new formation, from Boston gang wars to the Trump presidency. Criminality operates in the same way as climate disasters: as unpredictable inputs of data that capital can turn to profit in the form of differences that makes a difference. As Jonathan Beller demonstrates, social differences produce differences in wealth. Profit depends on privation. The efficiency of markets is measured by how successfully they transfer money from A to B. We know from observation that this system is lumpy: wealth accumulates in vast sumps

we know as corporations. The exchange of like for like results in noise because it does *not* produce difference; the random exchange of unlike things is noisy because it is chaotic. The 'invisible hand of the market' ensures that private property produces privation as much as it produces property. Nature must be excluded from the market not because it is random but because it is equitable. Some of the nature that has to be excluded, that becomes waste, is human nature.

In the first lines of the film, Costello says, 'I don't want to be a product of my environment. I want my environment to be a product of me.' In the same talk that gave us his definition of information, Bateson gives an insight into the gangster theory of economics and the concept of environments as externality and waste when he says,

> the last hundred years have demonstrated empirically that if an organism or aggregate of organisms sets to work with a focus on its own survival and thinks that is the way to select its adaptive moves, its 'progress' ends up with a destroyed environment. If the organism ends up destroying its environment, it has in fact destroyed itself.

Capital wants to destroy its environments. It has always believed that the creation of wealth is the sole good, and that the world is well lost in its pursuit. On the way, it abandoned the idea that wealth had a function beyond accumulation. Previously, the purpose of wealth was to consume. Now that consumption has become a source of information and therefore of more wealth, it is no longer the teleological end of profit. The old capital sought to create wealthy individuals. Its art was the art of perspective that made its spectator the centre of their universe, the master entitled to enjoy every pleasure. Today capital seeks only profit, profits derived from profits, profit without end or purpose. Its art is data visualisation: spreadsheets,

databases, geographic information systems that place their spectators in the position of managers. The move from magisterial to managerial is a move from personal enjoyment to impersonal accumulation. In the process, pleasures, however mutilated by biography, fly out the window. Capital no longer needs our satisfactions. It needs our randomness, our novelty, our unpredictability. It needs us to be mad.

The surrealist tradition in montage was intended to be a gateway to unconscious desires and affective flows between humans, technologies and ecologies. Eisenstein's montage was to shatter bourgeois norms and release revolutionary potentials. Randomness, pioneered in art by John Cage, Nam June Paik and their Fluxus co-conspirators, wanted to liberate the collective capabilities of humans and non-humans. It seems from the perspective of the twenty-first century that they did not demonstrate the limited autonomy of art relative to other socio-economic forms, but that cultural forms predict the shape of future economies (as Attali says of music, 'It heralds, for it is prophetic. It has always been in its essence a herald of times to come'). Today, when, in economic accounts but also in some environmental politics, even nature appears as a self-regulating communicative system, we confront the possibility that madness is not the exception, and not only human. It is clear that nature is in crisis: each fire, flood and new pandemic is a glitch in the smooth running not only of a healthy planet but of the perfect market. Nature is going mad. Our technologies are, as Marx wrote, 'dead labour', the black boxes where we keep the knowledge and skills of our ancestors and increasingly the knowledge and skills of the living, prematurely treated as if they too were dead. Inside their black boxes, the ancestors too may be mad. The stupid errors of artificial intelligences are harvested for their contingency: what remains, as waste, is their insanity.

Enlightenment rationalism is dissolving in a non-identity of its own making. Like Costello in *The Departed*, it wanted its environment to be a product of 'me' – but that 'me' is now captured by its environment: by managerialism, where the promise of satisfaction for 'me' is no longer just deferred but annihilated. Freud's disturbance of memory was a quiet statement of his fundamental discovery that behind mental 'illness', the fragility of individual psychology, lurked a history of social repression. That individuality, now a residue of history, a waste product of the information economy, is irreducibly denatured, derealised and fractured; and mental illness reveals itself as the waste product of the integral subsumption of consumption under capital. The artwork that once functioned as the model and aspiration of the self-identical self, its highest pleasure, is revealed as non-identical. Knowledge, once the highest goal of Enlightenment, has become a commodity whose purpose lies beyond knowledge-in-itself. This is the end of the European Enlightenment project. In the epoch of non-identity, we, *noi altri*, must begin to look elsewhere.

Authenticity and Illusion

To borrow the title of Susan Schuppli's 2018 installation, 'Nature represents itself', especially at moments of crisis. Disasters on the scale of the 2010 Deepwater Horizon oil spill speak, incomprehensibly, perhaps, in Wittgenstein's terms ('If a lion could talk, we wouldn't be able to understand it'), but performatively in Austin's. Calling this disaster a glitch is only demeaning if we accept that a glitch is a disturbance somehow improper to a communication system, like the speech of a lion. In this case, as Clement Valla wrote of his *Postcards*

from Google Earth, 'these images are not glitches. They are the absolute logical result of the system.' We thought glitches were assaults on systems, and perhaps they *were*. What if they *are*, now, integral to them?

Any interruption of the Market's perfect communication is blasphemous. For the Market, the world exists only as its self-realisation. Any other goal, desire or tendency is not only illicit but shameful and doomed to failure, since no other can exist that is not included in the perfection of the Market, perfection which presumes universality and completeness. This totalitarian dogma is one reason why glitch aesthetics became so important during the emergence of finance capital: because any glitch is evidence of an Other, something that escapes, exceeds and challenges the universality the Market claims for itself. Just as, in Nandy's analysis, the unquestionable union of Empire produced colonists' savage symptoms of repression, the universal completion of perfect communication brings its unconscious into existence, and the unconscious of pure communication is the glitch. No one should embrace the unconscious as a good in and of itself. It is a symptom of repression. Determined by the assumed perfection of absolute communication, glitches are evidence of exclusion, repression and therefore unhappiness, human and otherwise.

At the same time the unity of the Market, like every communicative system, depends on noise – on the parasite that it excludes, externalises and represses. Noise is multiplicity, as opposed to the pure signal of smoothly running communicative perfection. This noise is the primal mediation from which communication seeks to elevate and abstract itself. As media historian Douglas Kahn asserts, 'Radio existed long before it was invented'. The communicational function of radio depended on the prior existence of the radio spectrum, inhabited by uncontrolled static, whistlers and other phenomena

long before human broadcasts. There were sunspots and auroras long before the invention of electronic communications, but they were integral to an ecology which, like a nearby waterfall, might make it harder to talk to each other, but were equally likely to be integrated into the conversation. The mathematical theory excludes the waterfall and the aurora. Electromagnetic noise fills the radio spectrum with everything from cosmic radiation's echoes of the Big Bang to the ephemeral crackle of lightning. So noise is the material substrate of electronic transmission, the pre-human, inhuman universe out of which we drag our messages into existence, and against which we strive to retain their integrity. This noise can then be seen as both primeval nature and the entropy that threatens every act of order. This certainly was the standpoint of the first cyberneticists like McCulloch and Wiener. As Mary Douglas argues, order gives the world meaning by giving it structure:

> As we know it, dirt is essentially disorder. There is no such thing as absolute dirt: it exists in the eye of the beholder … Dirt offends against order. Eliminating it is not a negative movement, but a positive effort to organise the environment.

Meaning constructs itself by distinguishing itself from the dirty, noisy world around it, which it ejects. This process is curiously doubled. In a first movement, as Elinor Carmi argues, the cybernetic efficiencies set out in Bell Telephone's post-WWII move to automated switchboards 'was achieved by disciplining and managing women and then driving them out of the workforce. Their noise became silenced by automatic machines.' Yet as she also argues, the ejection of noisy women from the circuit was preceded by the integration of their bodies into it, under hybrid regimes mixing Taylorist time-and-motion discipline with the biopolitical integration

of switchboard operators' bodies into the operation of the system. Like the 'natural' environment and economic externalities, noise as primal energy is incorporated into the system but simultaneously rendered of no account.

Noise did not exist from the origins of the universe. It is a historical concept, defined by the requirements of evolving communicative systems, applied retrospectively to everything that communication was not. Prior to the development of recording and transmission technologies, sound was, as film theorist Christian Metz had it, the sound *of* something: a soundscape was composed of human activities, animals, trees and rivers, meteorological and geological events. The harmonies of the seashore and the discords of war, the calls of the spirit and the howling of wolves, formed a sonic universe without noise. Primordial noise did not lie around waiting to be discovered: like nature, it was invented, through its exclusion, to define a new idea of a non-human, unexperienced reality that had always been there, but never named or controlled.

Observing that 'Modern scientific technologies tend to work toward eliminating accidents', digital artist Masaki Fujihata has written that 'Complete control requires anticipating and preventing the unexpected, thus precluding any element of discovery or surprise. But for humans to remain creative, we cannot do without the stimuli of the unexpected.' Programming the unexpected is, however, already contradictory, since, as Manon and Temkin point out,

> from the point of view of the file, whose genetic predispositions are rigid and fixed, there is nothing random about glitching. 'Open 57904.jpg >> replace all Q with 9hJ' produces exactly the same results every time. Alternately, we could say that glitch practice is pseudo-aleatory, since results which appear random are in fact entirely reproducible.

Noise, once discovered, can be generated as well as revealed. Thus a glitch operates as a proof of the limitations of communication and at the same time as a quality of communication. As Dirk de Bruyn puts it, observing the integration of programmed glitches with the commercialisation of digital video editing software,

> While originating in alternative moving-image production processes that politically marked the glitch as no-budget filmmaking's badge of honour, such artifacts are now positioned as afterthought inside digital editing programs, to be aesthetically spun and nuanced as ornamentation in post-production.

Like the Adobe Photoshop lens-flare filter, which produces the illusion of a real lens in an unreal image, engineered glitches have become proof of the presence of a camera. Instead of telling us the scene was staged, the lens-flare encourages us to believe that there was a physical event of recording, and therefore what we see must be real: the illusory evidence of fictional interchanges. The doubling of the mediation produces an effect of authenticity, like the mimicking of long-lens camera snooping in *Citizen Kane* that Garret Stewart refers to as 'authentication by disrepair', or those ubiquitous gunsight and binocular masks in westerns and thrillers, or double-printing and colour filters to mimic effects of inebriation and madness. Only in art gallery screenings and occasionally in critical writing do these effects reveal anything about the medium itself. Even archival disintegration of the image is evidence of integrity: the medium must be authentic because it bears the scars of its history.

Deliberately produced glitches exploit this authenticity effect. Rosa Menkman distinguishes 'hot' glitches aimed at producing an end-product and 'cool' glitches – goalless

processes and explorations. Her taxonomy distinguishes intentional and ultimately instrumental glitching from accidental, where at least a share of creativity belongs to natural processes or technologies or both. The aesthetic goal of a 'hot' glitch, concentrated on a spectacular effect, restricts glitches to what humans do and want, and, like many artworks, hides the labour that goes into their making, human and other-than-human. Analogue video synthesisers like Dan Sandin's Analogue Image Processor that Phil Morton used to make *Colorful Colorado* (1974) avoided predictability, even though the device was programmable, because the work was shared between artist, engineer and machine and because the results were clearly a surprise. Woody and Steina Vasulka's Rutt-Etra synthesiser that they used in video art tapes like *Art of Memory* (1987) is more under control of the artists. 'Experimental' media used in the film industry since the slit-scan technique developed by Douglas Trumbull for *2001: A Space Odyssey* (Stanley Kubrick,1968) are a step closer to Menkman's hot glitch. Writing about Kanye West's 'Welcome to Heartbreak' video, which Menkman also uses as an example of 'hot' glitch, media theorist Carolyn Kane argues that 'the proliferation of datamoshing and glitch styles have little to do with challenging habits of visual consumption or sustained critique' but that nonetheless 'these highly stylized digital artifacts have taken a thin slice of the process and temporarily abstracted it from clear channels of commerce and communication', while film scholar Caetlin Benson-Allott asserts that the glitches in Lady Gaga's 'Paparazzi' music video are

> feminist appropriations [that] draw viewers' attention to … the mediated setting of desire and spectacle without entirely dismantling that setting; instead, they direct it toward other investments. Through

the prolongation of desire, they create pleasure in the breakdown of the system.

The multiple overlapping and synchronous positions offered by fantasy strand the fantasist in a perpetual present where the system is always breaking and always restoring itself. Since they are defined by the system they interrupt, glitches are fantastic, in the technical sense that even dreams of escape depend on the existence of the prison, and autonomy depends on what it maintains its autonomy from. The multiple, simultaneous positions fantasy allows determine a perpetual present indistinguishable from the system that they seem to undermine. But equally glitches, even in their most commercial applications, retain some remnant of their utopian function when, against the perpetual present and perfect communication, they assert the primacy of work.

Andrew Norman Wilson's photographic series *ScanOps* (2012) reintroduces human and non-human work to the apparent autonomy of self-regulating systems. It selects images from Google Books' vast catalogue of scans, picking those that show the gloved fingers of scan operators, the hidden labour creating the world's largest library. Like those frames in cartoons where we catch a glimpse of animators' and technicians' hands that Hannah Frank writes about: 'The disturbing presence of scratches, stains, and grain – or are they pen strokes, paint splotches, dust specks? – do not occlude the object but instead reveal the nexus of social, technological, and economic practices that is the photographic apparatus.' The handcraft of traditional cartoon-making, like any physical apparatus, is vulnerable to environmental accidents, the way the meniscus of a physical photograph might be marked with fingerprints. Google's 'cloud' repository pretends to ahistorical immateriality. Wilson's *ScanOps* undoes this aspiration to

disembodied perpetuity, denying digital artefacts the autonomy that would empty them of history, labour and ultimately significance. The result is paradoxical: glitches upend the system because they are autonomous from it, but they depend on the system that defines them as external and autonomous. The only way to undo this contradiction involves work, of the kind that Frank's nexus of practices and Wilson's *ScanOps* reveal. But in an economy that forces people to work, work's only freedom is as autonomous artwork or celebrations of its subordination to platform capital. Glitches need to operate beyond this present: they need time.

Mechanical media rely on repetition. In Shannon and Weaver's theory of communication, repetition is redundancy, thus a form of noise, hence entropic. If it is reduced to a site of eternal repetition of the same, an archive is also noisy and entropic. But archived works – especially digital files – are at work, decaying and mutating. Glitches don't allow pure repetition to erase time, because they are always temporal phenomena. Against the indifference of repetition they assert Bateson's 'difference in a later state of affairs'. Moreover, glitches, whatever their provenance, are also phenomena perceptible to all three phyla, human, machine and natural. This too is a temporal phenomenon

In our times, older meanings of nature as polytheist and pantheist commons lie buried under more recent concepts of wilderness and raw material. The latest layer, nature as data, traps it in circuits of communicative capital. Glitches only work as work, and work only occurs in time. Freud's labour of remembering and the collective-biographical exertion of *The Departed* create origin, undercutting capital's fantastical perpetuity that has neither beginning nor end. Emerging in technical breakdowns, the work of glitches recruits ancestral labour in the task of rewriting its own history. Hot glitches not only

reveal the normative techniques of domination: they sabotage the arithmetic capture it is founded on and the lack of meaning underneath the manipulated symbols constituting the world-as-data. Glitches revolt against temporamental indifference – the indifference that allows capital to exchange coats for nails and both for a set number of hours of labour. Operating at the level of processing, glitches undo the exchange relation, the indifferent difference of zeros and ones, by challenging the actual with a past it cannot assimilate. Chronoclasms reveal the future; glitches rewrite the past.

Forgetting

To remember is always to recall otherwise: a relationship to the past rather than a more or less accurate statement of it, arising 'from within the legacy of ruptured teleologies, whether the forgetful field of what Derrida understood as the erasures of archival fever, or from what Foucault applauds as the modifying thickness of archival accumulations'. A first useful labour of 'accidental' natural and technological glitching is to promote forgetting and to integrate the material 'forgetting' of decay into the fabric of archival texts and objects.

Writing in the pages of the review *Kasark* in the mid-1950s, the Swedish critic and curator Pontus Hultén believed that the age of representation was over, that contemporary art had to present itself instead as object in the world, and therefore proposed that 'chance enters as a symbol for the tie to reality in which contingency rules'. For Hultén, reality was contingent, meaning both random and dependent, 'contingent upon'. As a new event in reality, an artwork is accidental and unpredictable but nonetheless causally connected to natural and

technical processes. This new status leads Hultén to redefine the word 'symbol':

> There is no model for the one who is seeking that which he has never seen. The pictures that are symbols for the reality he wants to construct cannot be restricted to space or time. The symbols for his freedom have to be even more liberated than he himself has the power to be.

Hultén embraced cinema and kinetic art as machines capable of generating symbols through the contingent actions of human and non-human actors. Because they were free, these symbols could act back on humans from outside. Modern art had begun to incorporate real-world objects in the early years of the twentieth century. From its inception, cinema too collated found objects and scenes, assembling symbols from disparate shots produced by collaborations between humans, technologies and locations. Hultén's symbols deploy these hybrid cinematic techniques of chance and necessity to disrupt the indifference of exchange, replacing the inhuman market with more than human mediations.

In the 1950s when Hultén was writing, contemporary art was busy responding to cybernetics, refining Duchamp's earlier discovery that art may be 'definitively unfinished', a remark that could still be seen as a claim for authorial control over random process; Hultén proposes a liberation of the artist even from themselves. Digital media critic Ryszard Kluszczynski looks further: for a liberation of the artwork from the very object status which, for Hultén, was the means to human liberation when he writes of hypertext,

> the ultimate object of analysis is not the work itself … but the field of interactive artistic communication, where the work, along with other elements (the artist, the recipient/interactor, the artifact, the

interface) becomes entangled in an intricate, multidimensional complex of communication processes.

Such works are no longer objects but 'fields' that might also include air, daylight, acoustics, electricity generation and supply and the society and economic system they imply, dust and microbes and the ecosphere they imply. As field, the art is incomplete (because it requires an audience to exist at all) and actively at work across dimensions and processes. The accidental glitch is proper to the kind of extensive becoming welcomed in by Kluszczynski. But as the shattering of Duchamp's *Large Glass* indicates, glitches also erupt in works that at first seem both authorial and complete, indicating that neither attribute is stable: that it is not only human makers and interpreters who are active in the art experience but the work at work in its worlds, and the worlds at work in the art.

At the same time it is worth noting Wolfgang Ernst's warning that interruption is integral to media systems like TV:

> the unexpected corresponds to the disturbance that is television proper: the paradoxical structure of the medium demands extraordinary events that can appear only within the ever-same schematics; live broadcast would then be the condition of possibility of disrupting an otherwise imperturbably streaming flow. … It is precisely [such disturbances'] exhibition within their own genre that makes the paradox of television as a medium apparent: constantly having to provide the unexpected.

Television, especially in its broadcast form, like Kluszczynski's hypertext, is not an object but a communicative nexus dedicated to regulating difference. In the authoritative mode of broadcast news, continuous transmission takes precedence

over all other priorities. Even in its failures, TV carries on, assimilating glitches and catastrophes into its regime of onward flow and indifferent differences. The art world is even more devoted than broadcasting to shocks and innovations, all of which function smoothly within art's ever-expanding ability to assimilate anything whatever. Disruptions are part of the continuity, the homeostasis of art and broadcast.

Ernst's extraordinary events whose appearance is governed by schematics have become signifiers. Hultén's symbol is not a signifier, locked into a lexicon and a grammar and severed from its referent. A symbol, as Hultén proposes it, is a privileged technical and material form marking the passage from non-human to human. As long as a glitch can be treated as a signifier, it can be assimilated, but if it is a symbol, it stands, with angelic ambivalence, at a threshold between human systems of signification and non-human contingent reality, and becomes capable of the liberation Hultén celebrated.

As symbol, a glitch is latent. In wet photography, the latent image is the state of the frame after exposure but before it is fixed in the darkroom. The parallel in digital photography is the stage between the accumulation of charge on the exposed chip and its amplification, digitisation and removal into storage. In computer systems more generally, latency is the time taken to relocate any item of data, such as the time it takes to download or access a file from a hard drive. Latency parallels the duration of perception, the time between photons reaching the retina and the brain recognising the things they bounced off. Like perception, symbols take time to process. They draw on remembrance and forgetting, misremembering and misforgetting. Latency is not a condition of suspended action: it is the time of work. Like dreams and slips of the tongue, symbols form in the rebellion of nature against

control and ancestors rising up against their imprisonment in the black boxes of technology.

Even though they are latent, glitches appear in systems as if present, allowing them – as symbols – to act. A glitch has material consequences. Whether its source is human error, natural contingency or technical artefact, a glitch in code changes the performance of the programme. Latency is suspension only from a human point of view: communicative capital turns our gaze away from the feet paddling furiously below the surface, repressing the remaking of the past under the eternal present of unfolding signification and communication. Only now can we return to the distinction between environmental and systemic noise. Environmental glitches mark the emergence of repressed primal mediation into the sealed circuits of domination. Communicative capital has discovered, as analysed above, how to assimilate and exploit such glitches as signifiers. Systemic glitches on the other hand rewire the system by re-membering pasts, dimensions as strange to communicative reason as the lens flare is to cinema. The retroactive creation of a past doesn't depend on the content of the memory: the very fact that it is of another order than the eternal present of Ernst's ever-same schematics of imperturbably streaming flow. Cyborg capital seeks control over the future by erasing the past which, however, in the form of ancestral dead labour, it depends on. The retroactive work of systemic glitches perturbs the imperturbable, reveals the time of work beneath the fantasy of the ever-same, and so breaks down the control of signification that has, in recent years, diminished nature to data. Technical glitches restore the power of natural glitches.

For political economist Antonio Negri, '*the common is that which distinguishes*'. Contra the idea of a global commons which belongs to all, Negri recognises claims to differential

access: nature reserves are out of bounds to humans; indigenous peoples claim exclusive rights to sacred places. Negri's difference is useful, based on and full of use, as opposed to the indifferent differences of exchange value. Negri continues: 'Language and cooperation have to contain within them *a break at the level of practice*, an ongoing affirmation of the centrality of common practice, which means a concrete conjoining of knowledge and action within these processes.' If we understand his premise to apply also to media, which are not exclusively human, then common practice must also contain the natural (ecological) and technological (ancestral) commons, which can no longer be abstracted as environments and externalities from the human *polis* but must be recognised as having their own claims to act and to labour towards producing the common, even as their actions produce differentiations within the common.

Now it seems apparent that the issue is not estrangement of the cyborg from the world but the self-estrangement of the world-as-data from the world-as-waste. In this scenario, glitch is not disruption but symptom, a fault in the systemic alienation of the world from itself demonstrating that the system of world-as-data is imperfect and incomplete. Glitches do not communicate but mediate: that is, they are not messages, not even channels or phatic connections between estranged systems, but mediations between media forced to serve the market and their ancestral substrate. They are the necessary return of what data capture represses but which it nonetheless needs in order to exist. The information economy is the continuation of colonialism, the foundation of European modernity. The autonomy claimed equally by modernist art, by information systems and by the Market not only produces but requires these colonies, human, natural and technological, as resources to be

mined. Glitches are not evidence of failure but on the contrary evidence that while the system still functions, it must stay in contact with a world which otherwise it has alienated. All of which points to the conclusion that glitches should not be understood in the diagrammatic sense proposed in Shannon's original paper, as occurrences in information space, but as symbols, events launched from another time, the anachrony of hegemonic communication with an Other that is both subordinated and emergent.

Accidental and a-subjective glitches not only undermine the intentionality of instrumental reason: they replace it with another logic proper to the allonomous interactions of the commons, the emergence of a past incompatible with capital's perpetual present. As a preliminary conclusion, then, while external, environmental glitches can be assimilated into existing regimes of signification and exploited, systemic glitches poke holes in the otherwise seamless weft of efficient communication of signs and cash. They seem inhuman because they are the actions of ancestors, and appear latent because their time does not conform to the imaginary flawless flows of information capital. They are symbolic acts which work towards the common by renewing mediation between human, natural and technological processes, restoring their common differences to the indifferent exchange of the Market. They are performative work in common and for a common good. Glitches produce truths out of time, making memories and histories that jolt the system out of its present. Their truths are true to the media they punctuate, in that they are the actions of ancestral dead labour refusing their imprisonment, servitude and exclusion, expressing repressed pasts that construct their own origins apart from the fantasy of a perfectly self-present system. Glitches deny communication's

claim to transcendence, forcing the admission that it is still anchored to multiple grounds. Glitches' truths recall, and in recalling reinvent, the differences, the work, and the time of differentiating and working that ground even enslaved media in worlds their cyborg overlords would rather forget.

A Digression on Cats

Like the market, Covid-19 knows us but doesn't care. Ana Lily Amirpour's 2014 film *A Girl Walks Home Alone at Night* predated the pandemic by several years and shows us how the world might care for humans. Like all vampire movies it evokes blood as medium, unsettles the connotations of menstruation and thus of femininity as lunar, reproductive and close to nature. The gender-switch – Amirpour's vampire is female – already breaks the code: the Girl (unnamed throughout the film) is unnatural. Beyond some obvious allegories – perfect in their ambiguity – there lies the challenge of the film's ending and of the role of one of its principal characters. The plot is a love story and ends as the young male character Arash and the Girl drive away from Bad City, the petroleum-powerhouse town they inhabit and that inhabits them, shot in chiaroscuro black and white in another petrol-economy town in Southern California, a diasporan doppelganger that displaces the Farsi dialogue with evocations of American youth culture (US rock among the Farsi songs on the soundtrack, Arash in James Dean clothes and poses, his US classic convertible and, in a marvellous sequence, the Girl skateboarding in a chador). After driving for a while, they park up. Arash gets out. He seems to be making some kind of decision. He gets back into the car and drives. The final shot shows taillights receding. But which way are they going – escaping the city or returning to it?

The love story involves a boy and the Girl, but elsewhere the film plays with all the roles. With flamboyant make-up, Arash dressed as Dracula dances with the Girl at a costume party; earlier she has been treated to a would-be erotic dance by a pimp who she bites and kills. In another unexplained insert sequence, a trans character we have been introduced to briefly as a streetwalker controlled by the now-dead pimp dances alone on a rooftop with a helium balloon for partner. This mirror of the pimp's attempted, assertive, almost bullying seduction routine is far more joyous, celebratory and asexual, as the core love story also appears to be. The play of roles, genders, sexes and asexualities elevates the movie from realist narrative towards some kind of symbolism. But of what? Perhaps the question is best asked of the rooftop trans dance, and another sequence of the Girl dancing alone: who is watching? In many films the answer, drawn from André Gaudreault's work on early cinema, would be 'the cinema', what he calls '*le grand monstrateur*', the great showman, the One that shows us the events on screen. But *A Girl Walks Home* presents an alternative to this self-reflexive analogy of the market's self-sufficient present.

In the opening scene, Arash collects a feral cat from the outskirts of town. The cat accompanies him through the story, often caught in close up, watching events unfold. At moments it enters into the plot, first being sexed by the pimp (who calls it Mr Cat), later by Arash's junkie father who accuses it of 'having your mother's eyes' – another gender uncertainty. The cat is a cat, as real as any of the actors. In sequences in the car, where it perches between Arash and the Girl, it seems to follow the alternating lines of dialogue, turning its head towards each speaker, perhaps a trained animal, an actor, but no less a cat than Arash is less human for being an actor. At the same time, obscurely, and in ways that may never yield up a satisfactory resolution, it

seems to have the role of watching and witnessing and, least or most specifically, of seeing. On Merleau-Ponty's principle that we make some kind of compact with the world that, in order to see, we must also be seen, the cat presents the world's view of the action, an inhuman gaze beyond the suturing of male desire into the order of continuity editing, even as the turns of its head suggest a classical shot-reverse-shot structure that, however, replaces the implicit masculinity of the *grand monstrateur* with a feline look, dispassionate, almost objective except that it too is an object of the camera's gaze and therefore not free to be an impartial frame or framer of actions and objects.

The grounding ambiguity, the non-identity of the cat (simultaneously cat, symbol, observer, actor, function of the film, emblem of the world that sees rooftop dances and automobile romances, impartial observer of the film but at risk at least twice in the narrative …) undermines any ordinary reading of *A Girl Walks Home Alone*. Rippling between the anthropomorphisms (Mr Cat, mother) and animal embodiment, between feral and domesticated, between subject and object of the film's partition of looking, the cat is an unsettled and unsettling presence of un-nature, an absence of either nature (which Bad City has dispelled) or reason (or why would it matter if a cat sees anything?). The cat that persists throughout the movie is, rather precisely, nothing. A mote in the eye, a patch of invisibility in the omnivoyant world of cinema. The film was shot – and most frequently shown, in the age of DCP (digital content package) projection, optical discs and streaming media – digitally. In the first chapter of this book, Godard's line from *Le petit soldat* (1963) that 'Photography is truth. Film is truth twenty-four times a second' introduced the idea of the non-identical ground of cinema. The multiple non-identities of the cat serve as onscreen personification (an animation) of this precisely invisible generation.

Except that this is not film in the sense Godard spoke of in 1963. The different rhythmic infrastructure of video's perpetual disappearance only operates on condition that it is invisible to human eyes, but cats can see it, whence their general lack of interest in screens. We piously tell ourselves that the truth of video is not what it pictures but the code running beneath it, the really real code. In this way digital video seems an even more truthful medium than film because it exposes itself as a medium in Greenberg's modernist sense, speaking from an even more fundamental ontology of flux and difference, but only by recusing itself from being anything more than a statement about statements, that is by withdrawing from the world into aesthetic autonomy. Yet we know this is impossible: we know that it depends on code from somewhere, administered by global standards for image transport, running on some kind of device, made from materials fabricated in some plant, of metals and plastics transported, refined and managed, derived from some mineral resource. We recognise the activities involved: actors human and non-human, locations, lights, microphones, production crew, machines, finance. And we have learned in the previous chapter that the evidence a medium gives of its own existence is the sound of ancestral voices speaking into and across the seamless unfolding, in this instance, of cinematic time. The cat is mortal. But it reveals that the world, the ecology, also participates in its own revealing. This cinematic cat hovers between its screen persona and the laws of physics. The ontologically subjunctive form of video, never wholly present or absent, echoes the untruth, the subjunctive 'might', the quantum uncertainty of electrical charge, which can never decline to zero, and never achieve completion. The language of zeroes and ones is a fiction. The cat in *A Girl Walks Home* looks less like a Persian cat and more like Schrödinger's.

Or like the Cheshire Cat in *Alice in Wonderland* that fades away leaving only its grin, the scale of difference between one image and the next, between one form of unconsciousness and the next, is never settled. For the viewer, watching Paul's Blackfriars Bridge or *The Departed* on film – when we are unconscious for around half of the movie's running time – or viewing *A Girl Walks Home* on video – when we are semi-conscious all of the time – hardly feels different. But we are no longer unconscious in the same way: not plunged into non-identity, but swept into the rhythm of an alien pulse. Losing analogue cinema's absences, its non-identity, we enter electronic space where image and darkness are no longer fundamentally separate states. Like Kipling's cat who walked by itself, appearing and disappearing are our ontology. We are no longer simply inscribed into the visible: we are constantly being marked as visible and equally constantly being erased. The condition is at once personal – how it feels to be watching this here now – and social; at once biographical (how I am made anxious by a disturbance of memory) and historical. Reaching for an understanding of this unsure state in his essay on the uncanny, Freud stepped away from his usual focus on biography to intuit a deeper recall of repressed and oppressed magical cultures:

> We – or our primitive forefathers – once believed in the possibility of these things and were convinced that they really happened. Nowadays we no longer believe in them, we have *surmounted* such ways of thought; but we do not feel quite sure of our new set of beliefs, and the old ones still exist within us ready to seize upon any confirmation. As soon as something *actually happens* in our lives which seems to support the old, discarded beliefs, we get a feeling of the uncanny.

Even more than cinema's reanimation of Plato's cave, video's simultaneous fading and becoming allows Amirpour's cat to haunt her screen and her audience. Video is decolonising the unconscious. Domestic and wild, loved and despised, the witch's familiar and the ecologist's enemy: the privileged figure of this familiar stranger, this strange familiar, is surely the cat.

4

Abstraction

From the motto 'know thyself' carved on the temple of Apollo at Delphi, via Polonius' advice to Laertes in Shakespeare's *Hamlet*, 'to thine own self be true', to contemporary marketing slogans like 'Obey your thirst', the self, subjectivity, has commanded its own kinds of truth. So too have various abstractions, from inspired contemplation to logical abstractions and calculation. The wager of this chapter is that if abstraction is truth to the subject, then subjectivity is the truth of abstraction, and that subjects and abstractions have changed through a shared hundred years of history. If so, then truth too must have changed.

The Condition of Music

When Victorian aesthete Walter Pater wrote 'All art constantly aspires towards the condition of music', he was likely thinking of the kind of abstraction emerging in the art of his contemporaries like James McNeill Whistler and Claude Monet. Given that it appears in a book on the Renaissance, it seems equally likely that Pater was teaching himself to look at historical painting through the lens of an emerging modernist aesthetic. The passage goes on:

> That the mere matter of a poem, for instance – its subject, its given incidents or situation; that the mere matter of a picture – the actual circumstances of an event, the actual topography of a landscape – should be nothing without the form, the spirit, of the handling; that this form, this mode of handling, should become an end in itself, should penetrate every part of the matter: – this is what all art constantly strives after.

Pater was not yet theorising an autonomous artwork, more that the 'matter' – its reference to an exterior landscape or the poet's interior reaction to an instigating situation – should be indistinguishable from the 'handling', the material work of placing words, spots of colour or musical notes. Ecocritically, Pater's distinction between matter and handling comes across as a way of coping with the radical alienation of body from mind, human from nature. But without the explanatory passage that follows, the bare statement that art aspires to the condition of music already points to a desire to distinguish art from noise, a desire to achieve a deeply temporal experience like listening, and a substitution of formal properties for the bitter experience of bodily and emotional alienation.

The history of abstract art suggests not one but several responses to Pater. The abstract art of Kandinsky, who demonstrated his musical chops through a lifelong friendship with the composer Schönberg, responded by embracing, along with his friend, a very definite form of spirituality. Thirty or so years later, New York abstract expressionism responded to both by reverting to a rugged individualism of Romantic gesture, passion and the masculinity of mess. Meanwhile the aethereal mysteries of the radio spectrum, by the 1940s thoroughly colonised by capital, devolved into the synchronised pulses of global electronic industries, becoming the *matter*

that abstraction had to deal with after 1946, leading towards the modular repetitions of LeWitt's wall drawings and Riley's compositions described in Chapter 2. In many respects this trajectory too followed Pater's rule, this time chasing neither Pater's contemporary Wagner nor the Second Vienna School that paralleled European abstract art's first appearance, but chasing the evolutions of serialism and minimalism towards the fields of sound developed by mathematically inspired composer Iannis Xenakis who wrote of composition as 'an integration of grains, of elementary sonic particles, of sonic quanta'. Barry Truax's experiments with sampled sound compositions like *Riverrun* from 1986 expand on Xenakis. A pioneer of granular synthesis, Truax split sounds into very small samples, each of which could be manipulated for speed, pitch, timbre and other qualities and reordered to derive wholly new sounds from any source. *Riverrun* begins with discrete, percussive droplets of sound, moving through passages of multitracking somewhat like Riley's overlapping instruments, then working through the tonal qualities, extracting pure timbre, or pure tones, sometimes slowing majestically, elsewhere transforming into a wholly electronic, piercing whistle, before becoming more like a massed choir that, gradually, moves from voice to breath and thence, over a hum reminiscent of foghorns, fades into the distance. The shape is that of a river from source to sea, thus contravening Pater's intuition, in fact doubly so because it cites in its title a literary source, the first word of James Joyce's *Finnegans Wake* (1939). Adorno believed that Schönberg's twelve-tone compositions developed their most significant achievements out of 'that negative abstractness experienced in turn as self-alienation by the musical subject'. Truax reverses this polarity. Truax's composition is a positive abstraction of significant (and in Hultén's sense symbolic) music derived from the alienation of human subjects from their world, but on

condition that the relation is mediated through a technology no less complex than a symphony orchestra.

Sonic realism arrived late with Pierre Schaeffer's *musique concrète* and R. Murray Schafer's soundscapes, a project Truax participated in. As painting abandoned reference to the physical world, music embraced it as meditation on the sensory nature of listening, the continuum of culture and nature, and the articulations of the two made possible by the technical forms of musical and digital technologies as ancestral commons. At last the retroactive performativity of finance and memory paid off in the capacity of abstract painting and music to redeem the histories of music and painting, not anachronistically but as a step through synchrony – the shared present we can experience in the encounter with art – rewriting the past (of recorded sound, of ancestors) in order to open a future freed from the tyranny of the present.

In a footnote to the Overture of *The Raw and the Cooked*, the anthropologist Lévi-Strauss argues that 'The so-called songs of birds are on the frontiers of language; their purpose is to express and communicate. Therefore it is still true that musical sounds are part of culture.' He goes on to grapple with *musique concrète* (which he says 'may be intoxicated with the illusion that it is saying something; in fact, it is floundering in non-significance') – effectively accusing it of siding with nature over culture. Lévi-Strauss is committed to restricting music to musical instruments, to the exclusion of non-human musics. It is true that animal sounds and displays are mysterious to humans, at once akin to our arts and distinct from them. Like the arts, they are multimodal: a plant or animal display that warns off predators may also attract pollinators or mates, and it is hard to say whether what attracts mates is colour, pattern, scent, motion, taste, chemical signals or even orientation towards the sun like daisies ('day's eyes') or

sunflowers (in French *tournesol*, sun-turning). Despite this amazing complexity, and the evidence of bird and whale song, the standard textbook is entrenched in the same presumption as Lévi-Strauss: that animal (and plant) displays are communications: channels for conveying information.

The ascription of communication to non-human species by Lévi-Strauss and contemporary animal behaviourists is in its own way as much an abstraction as is hearing the dawn chorus as a symphony. The train-rattling after a peacock fans his iridescent tail-feathers combines sonic, visual and quite possibly other modes of signalling which to another species only acquires meaning ('pride', 'food') after the initial, abstract effect. Communicative efficiency doesn't describe the complexity of display that threatens rivals, lures mates and alerts predators when he flaunts his beautiful but disabling appendage. Likewise the scent, colour and nodding flowers that entice hoverflies to pollinate bluebells incite bees to eat through the flower, steal the nectar and, ignoring the pollen, destroy the flower. Ethology may describe some features that hunters, gatherers and farmers don't know, but the reverse is just as likely.

It is not that animal communications science adheres to errors of the dominant scientific model of communications so much as that it assumes as given things that, in other times and cultures, have appeared very differently. The mathematical paradigm that seems so common-sense today is historically very specific. Though Wittgenstein believed that we wouldn't understand a talking lion, in the opening lines of *The Canterbury Tales*, completed around 1400 CE, Chaucer described how 'smale foweles maken melodye', and in the Nun's Priest's Tale suggests that in a prior or mythic time, 'as I have understonde, / Beestes and briddes koude speke and synge'. Either they lost the power of speech or we lost our

ability to understand their communication, but melody, wordless, aesthetic and abstract, remains. Islamic art, at its peak around Chaucer's time, barred representation but embraced flower motifs, suggesting that for Islamic divines and their artists, plants were considered abstract, neither depictions nor communicative. It is possible animals communicate within and between species, but humans are also animals, and if we are hypnotised by dances, melodies, patterns and colours, why would it be strange that other species should also find incommunicative abstraction entrancing?

Granular synthesis and the other tools of soundscape and *musique concrète* teach us to listen not to a door closing but to the sound, abstracted from the door. At the same time, these methods hark back to the ancient Greek Pythagoreans who believed numbers were the foundation of a harmonious universe, guiding the paths of the planets in tune with the intervals between notes on the scale. Rather than force numerical patterning on natural sound, post-1949 sound arts have tried to listen to the free sounds of the acoustic ecology and follow their lead towards new ways of composing. Something similar appears to happen in electronically generated sound arts, where the distinction between sound effects and music blurs, and with it the distinction between source and listener, sender and receiver. Reverberating with philosopher Gilbert Simondon's theory of individuation, electronic music pioneer Daphne Oram asks towards the conclusion of her critical memoir 'Could the world be a never ending pulsation of energy forming into individuality, then being disseminated by entropy, only to reform into new individuality – a basic pulsation, the very fundamental of all fundamental sine waves?' Cosmic consciousness gets a bad rap in critical theory but in the history of abstract art, perhaps especially in its approach to Pater's condition of music, it arises as a genuine alternative to

the instrumental forms of abstraction deployed by data visualisations. The problem is that the temporamentality underlying Oram's formulation looks too much like the timeless present of information capital. We need more subtle tools to distinguish between different conceptions of timelessness and universality, different ways of putting them into action.

De Stijl: Cosmos and Commodity

European abstract art emerged, not entirely out of the blue, with Kandinsky's first untitled abstract in 1910. More or less simultaneously over the course of World War I and its immediate aftermath abstraction spread among Russian suprematists and constructivists, the German Bauhaus and the Dutch de Stijl group. Kandinsky and Itten at the Bauhaus, Malevich around the time of the 1915 *Black Square*, and Piet Mondrian and Theo van Doesburg at de Stijl were all engaged in varying degrees by the *Geisteswissenschaft* ('spiritual science') of Austrian 'occult scientist' Rudolf Steiner. You can get a sense of his significance at the time from a sentence in Soviet critic V.N. Volosinov's book on *Freudianism*. Where Marxism was a science, 'psychoanalysis advanced to a position far beyond other contemporary ideological movements; Steiner's "anthroposophy" alone was possibly able to compete with it'. The early history of abstract art is full of references to Steiner's concept of spirit, as in Kandinsky's book *On the Spiritual in Art*. A less remote divinity than the Christian God, Steiner's spirit was akin to Hegel's *Geist*, bridging 'spirit' and 'mind', individual subjectivity and the cosmic Subject of universal history. Anthroposophy, Steiner's school of thought, described a spiritual realm suffusing human and non-human worlds. Permeating the media of art beyond semblances and

traditions, its presence could be sensed, by the sensitised, as the more or less proximate reverberations of universal harmonies. This pervasive cosmic Subject emerged in early twentieth-century modernism, in part in reaction against the scientific empiricism of preceding decades but in part as an assimilation of it. No longer the universal force (*Kraft*) of Helmholtz's nineteenth-century thermodynamics, Steiner's cosmic *Geist* nonetheless introduced thermodynamic law to mystical panpsychism, embracing the idea of a universal principle and simultaneously reimagining it for a spirituality otherwise at odds with secular science.

One of those influenced by Steiner, the artist Theo van Doesburg began exhibiting abstract canvases around 1915 and composed his *Principles of Neo-Plastic Art* by his own account in 1917 from notes begun in 1915, though it only hit the newsstands in 1925. The English translation of the book is prefaced by a short Statement on behalf of the de Stijl group whose fourth axiom announces, recalling Pater,

> IV. We reject all subjective choice of forms and are preparing to use objective, universal, formative means

The *Principles* proper open with an ostensibly antithetical statement:

> I. Everything that surrounds us is an expression of life. Every living thing experiences its environment consciously or unconsciously

'Everything', that is the cosmos as a whole, even if it is not alive, nonetheless expresses life, conscious or unconscious. Something suffuses the universe and speaks through it; and anything that is alive senses that life.

Keeping that in mind, consider some possible readings of van Doesburg's abstract painting *Decentralised Composition* of 1924, produced in the last year of the *Principles*' development

(1) The second principle of the 1925 book is that every creature turns its experience to use. The third specifies that these experiences are sensory, psychic and intellectual, with a footnote specifying that the psychic is not only inward and psychological but spiritual, *geistig*. Experience is universal: so too are body, spirit and mind as modes of experience, though not every entity develops all of them. Drawing on Steiner's colour theory, itself derived from Goethe's *Farbenlehre*, de Stijl transcribed the body as red, spirit as yellow and mind as blue. White is the plenum. Black is the void. These are Doesburg's 'universal, formative means.'
(2) Even in a decentred composition, the existence of a centre is never in doubt. The harmonies of the composition, even displaced, evoke an achieved or achievable synthesis at the end of history, in this instance the history of art.
(3) The work does not depict synthesis because history is not yet over: it is a premonition of the end of history enabled by creating a temporary halt in historical development.
(4) It is a summary of all history to date, but not of the totality of history which continues after it.
(5) Despite the areas of colour and line, this is a blank canvas prepared for the future to fill in.
(6) It abandons words in favour of colour, the universal language of Paradise: a promise and a premonition.

Abstraction in these sample readings connects the canvas to Benjamin's concept of Messianic now-time. It is ripped out of the continuum of history and simultaneously woven into the traditions of an-iconic art, which laid the painting open to accusations of being 'Jewish' art in Hitler's Germany and

to the equally demeaning accusation of being merely decorative. But de Stijl, and van Doesburg in particular, embraced the decorative, expanding into furniture, architecture, interior and product design in a kind of aesthetic utopianism. De Stijl interiors were only apparently artificial and totalising. They sought instead, through the principles of colour, to open the human environment to a pan-psychic cosmos, recalibrating and equilibrating mind, spirit and body.

Now a counterreading: the *Composition* confronts its historical actuality, the Now of 1924, with its antithesis and its apotheosis. Nothing implied that the future would look anything like this, or that there was only one future. The canvas was a door that might lead anywhere as long as it led out of the present, out of the habituated, out of the given, out of the necessity most of us feel about the time we inhabit. It excluded itself from causality, either as a result of the past or as instigator of 'the' future. This implies that the leap out of history is also a decentring critique of clock-time, which the painting mocks by presenting it with a reflection of its precision, a parody of double-entry book-keeping ledgers and the printed forms that witness the grounding of clock-time in the endless piling up of abstract wealth, and of the real subsumption of labour under capital in clock-based factory discipline. Spatialising time like a calendar page, the canvas substitutes the immense textile of traditions with the banal infinity of integers, the count of seconds as they accumulate, of interest accruing without meaning, a devastating premonition of Claude Shannon's semantics-free communications: a time-signal.

This reading of the *Composition* as parody of accumulation asserts the autonomy of an abstract painting while signalling what makes it eminently commodifiable. The reading is weakened by its avoidance of van Doesburg's pan-psychic intuition, a forerunner of affect theory expressed in its an-iconic,

a-causal and a-temporal properties. No-one said abstraction had to imply self-identity or unity (van Doesburg appears to, in translation, but his own term is *Gestaltung*, which I read as something more like assemblage). Like any modern artwork, the *Composition* is internally contradictory, a quality caught in van Doesburg's thirteenth principle:

> XIII. The stronger the aesthetic experience the more completely will the objective, natural appearance of the object of the experience be annihilated.
>
> This means: (in terms of our example) the cow as draught-animal, as source of food, as product for sale; in a word; the natural animal disappears and becomes for the formative artist a complex of formative aesthetic accents, in colour-relationships, formal relationships, contrasts, tensions, etc. The fact that the environment which surrounds the animal (ground, air and background) belongs also to the complex of these relationships constitutes another difference from the manner in which the veterinary surgeon, the farmer, etc. see the cow. For them, the ground and the things in the environment of the object of the experience do not form a whole with the cow – at least not an organic whole; for the artist, however, they do; in the formative vision everything is equalized, i.e., enters into relationships, because by their nature the artist's experiences synthesize.

The last line makes this account dialectical. In the first move, the cow appears as an abstraction of itself, as commodity; in the second, it becomes a site of ecological relationships; and in a third, cow and environment are synthesised in the formal experience of the artist, a synthesis of mind, spirit and body. Borrowing Freud's vocabulary of the dream-work, that aesthetic synthesis is a work of condensation and displacement. Van Doesburg's *Composition* now appears as a screen: not a projection screen, but a kind of scrim deforming and reforming the sensed world of material bodies

Circa 1920, pioneers of abstract art (backed up by the Transcendentalist pioneers of ecosophical thinking) could appeal to the idea of a subjectivity very like a pre-Socratic panpsychism or a neo-Platonist *anima mundi*, a World Spirit. In the European tradition, from Goethe through Hegel and Steiner to the modernist mysticism of van Doesburg and his peers, the World Spirit unified male and female principles. When it spoke, it spoke a universal language of colour after 'the death of the word' announced in the first issue of *de Stijl* magazine and the refusal to be useful in the manner of Gropius' Bauhaus. De Stijl did not want to serve: it wanted to elevate – by making the cosmic Subject of the universal language present – and to draw the artwork's audience into becoming the subjects of that cosmic Subject and its language, speaking and spoken by it.

QR and Unhappiness

The post-1948 revolution in cybernetic theory displaced this animating Spirit with an enumerable world gradually evolving from the statistical models proper to early modernism's mechanical mass media towards computational patterns and connections proper to an informational regime. An open vision of this connectivity produced the utopianism of the 1990s cyberculture; its foreclosure in platform capital displaced its animating Subject into the profit-oriented logic underpinning logistical networks. This is why QR (quick response) codes, the visible edges of the computational universe where it touches on the physical world, bear a striking resemblance to de Stijl canvases of the 1920s, only with the colour removed. It is not just a metaphor to say QRs are colour blind. Stripped of de Stijl's red, yellow and blue palette, QRs lose not only van Doesburg's cosmic openness. They restrict his opposition of

white and black, totality and void, to their binary difference. What remains in QRs' unreciprocated act of capture is a new extension of colonial violence.

QRs' indifference to the embodied experience, aesthetics and aspiration – to van Doesburg's colour-coded mind-body-spirit trinity – belongs to a new universalism. Heir to colonialism's reductions of colonised people and places to statistical nullities, QR codes reduce everything to formal properties like device ID and GPS coordinates, universally equivalent and exchangeable. QRs override social categories and demographic taxonomies of gender, race and sexuality. They reduce the human to properties suited to equivalence and exchange (individual and device ID, geopositioning). As practical epistemology of capital, QR codes are Eurocentric in inspiration and universal in ambition. Incorporating Rob Nixon's 'slow violence' and the wreckage of progress piling at the feet of Benjamin's angel, this new Subject has modified the empty time of interest payments and calendars to fit the network condition it and we now inhabit: a homeostatic temporality of presence and totality.

The sense-organs of an otherwise otherworldly computation, QR codes are not designed to delight or mean or even to be seen by human eyes, but to capture data, abstracting categories and patterns from the world. When they look at us, we cannot look them in the eye: they 'see' us, but there is nothing for us to see. The philosopher Emmanuel Levinas believed the face-to-face encounter was the basis of all ethics. Like the veils and portals of abstract art, the blank look of a QR code orients us towards something beyond itself, sitting in the same ineffable position once occupied by the World Spirit, but of a very different order. Like neo-conceptual art, the art of information capital, what you can see is not what is there.

The basic elements of a QR are: (1) a field of encoded information marked by squares and spaces; (2) areas of the

coding devoted to meta-information about the code itself; (3) three large squares marking the boundaries; and (4) three or more alignment squares using anamorphosis, a geometrical transformation that maintains relations between points while distorting the distances between them, that instructs the camera how to correct for oblique views. Traditional artworks, including van Doesburg's *Composition*, and even complex physical machines with many parts and functions, are coherent objects and address us as coherent subjects. Analysing Holbein's 1533 double portrait *The Ambassadors* discussed in Chapter 3, Lacan describes the anamorphic skull as part of an artistic 'machine' that traps the viewer's gaze, making the image an object for the subject that it constitutes. The lens flare of *Infernal Affairs* is another such act of capture, a stain on the image that simultaneously captures and excludes the viewer's gaze. But where, as in QRs, there is nothing to see, anamorphosis marks not the place of the subject but the trace of its erasure. Engineered to be seen from any angle, the depthless QR code does not depend on a subject effect. It fails to fascinate. No trap is sprung. There is no coherent object that might construct a coherent subject to make sense of it or be positioned by it. QRs are receptors that take without giving back. And yet, here, outside the blank geometry of a QR code, there lies, unquantified and uncaptured, a remainder that now, outside computation, defines both natural and human worlds.

Rather than embrace the World Spirit in everyone and everything, QRs build an abstract model of the world, ejecting everything that does not compute. But they also seek out contingency. Recall that Shannon's statistical model excludes repetition as well as noise. The more ecologies and their humans are shaped by interactions with computational systems, the more predictable they become. As we saw in Chapter 3, in the first quarter of the twenty-first century, capital prefers

unpredictable shocks to managed risks and, like social media and surveillance systems, seeks out aberrations. QRs are at their most profitable when they produce the least likely data. We experience our exclusion from their symbolic universe as alienation: as stupidity and the emotional distress we feel at being left out, dumb and blind. Our incomprehension and alienation from QRs randomises our interactions with them. The same disaster capitalism that thrives on the climate catastrophes it causes also thrives on the epidemic of mental illness it provokes.

Van Doesburg's art sought to liberate subjectivity through universal visual language. Speaking and spoken by language, in 1920 subjectivity was consciousness in language, and its unconscious was structured like a language. In 2020, QRs operate a universal code that deflects vision. The new universal language, that speaks us even if we do not speak it, is code, and the contemporary subject's unconscious is no longer structured exclusively by language but also by code. To function at all in the twenty-first century is to be of necessity a data subject, 'a natural person … whose personal data is being processed' in the language of the European Union's General Data Protection Regulation (GDPR) of 2016, a condition that seems, to us data subjects, both inevitable and unchanging. The role of the word 'I' was defined by its grammar: it is a 'shifter', a word whose meaning changes according to when it is spoken and who by. The data subject can no longer anchor itself to even that drifting alias. It is, instead, 'dividual', a cloud of datapoints, activities and behaviours scooped up and endlessly reassembled in relation to other datapoints. No longer a linguistic shifter, the data subject is a floating point described by the precision of its initial capture but determined by its subjection to processing.

No single human invented a natural language, or maths, or logic. They are collective achievements. Proprietary code is

an enclosure of common knowledge, a contemporary coagulation of ancestral skills into machines as dead labour. Capture exploits the living; processing exploits the dead. The more we become insensible functionaries of ubiquitous computing, the more we are integrated into the apparatus. In the new formation, the unconscious of data subjects – which includes the whole ecology surveyed by data capture – is structured like code; but data subjects are themselves the unconscious of code. That turns everything remaindered by capture into extensions of technological dead labour: we become ancestral.

As unconscious, our task is to produce what code cannot make on its own. QRs have evolved to capture improbable data, behaviours that are supernumerary and wayward. Moderation and discipline cannot provide those levels of difference. Repression is no longer socially or economically useful. Even repressive tolerance seems to have been a transitional phase. Some years ago, lawyer Lawrence Lessig's stentorian warning 'Code is Law' seemed all too credible. Now it seems as if code is permission, seeking out the unconscious of the system in dividual gestures, aberrant decoding, improvisation, polysexuality. The queer, mobile dividual is no freer than the repressed subjects of factory discipline, as long as we data subjects are defined by the space we occupy, beyond the periphery. QR codes feed on what were once transgressions. Freedom under neo-liberal, cyborg capital universalises Nietzsche's aristocratic amorality. The unified male-female World Spirit circa 1920 has yielded to a post-binary Subject of code. This new Spirit, which the GDPR calls the 'controller', legally identifiable as a person, firm or government department, is dispersed across its functionaries and, like the data subjects it controls, no longer centralised. The hierarchy has shifted: in the new network condition where QR codes define the edge of computation, the periphery is everywhere and the

centre nowhere. Spatial metaphors no longer define computation. Simultaneity, not centrality, governs cyborg logic: the perpetual present of fantasy analysed in Chapter 3.

Abstraction appeared in European art during the Great War and the collapse of feudal empires, the most traumatic period of European history to that date. A hundred years later, after the Final Solution and Hiroshima and facing climate catastrophe, we realise once again, as colonised people have been saying for five hundred years, that the worst has already happened. The decimation of the Americas after 1492 created the surfeit of gold that made capital possible. The accumulation of wealth has never ceased to demand an unending pyre of the massacred. When the worst has already happened, and as we become ancestral functionaries of an apparatus that exceeds us, our equality is that of the dead.

Mortality and Distribution

In 1958 the philosopher Hannah Arendt proposed abandoning truth in favour of *doxa* – the variety of opinions, plural truths in dialogue. No truth can be taken for a universal maxim. Any truth, as soon as uttered, becomes an opinion among many. A single truth held to be absolute, says Arendt, is 'alive and therefore has a living and hungry face'. Truth is either suffered in isolation or the result of social consolidation so dense that no other world can appear, as it should, in the spaces between people. Reality becomes absolutely true only if there is no one to share it, or because a social contract makes it impossible for any independent world to insert itself against the massed agreement of a population. Computational abstraction adopts this model of universal standards for data capture. Van Doesburg's universal language, on the other hand,

emerged from what Arendt called 'inner emigration', withdrawal from a reality that, like Hitler's Germany, was too much to bear. Groups like de Stijl or Schönberg's Second Vienna School, cliques whose shared inner emigration made possible a reinvention of everything, negated consensus, but only by adhering so fiercely to their own purity that they revealed the isomorphism of their enclosed communities and the alienated society they sought to escape. Early modernist abstraction sought a resolution to the opposition between world and social formation in anthroposophical *Geist*, beyond social or ecological flux. Musical formalism remained rooted in the estrangement of composition from its sacred origins, those mystic abstractions that so attracted van Doesburg and Oram. Formal music's art of absolute pattern was a reaction against the increasing commodification of folkloric popular culture and its estrangement from nature's rhythms and harmonies. To the extent that popular song and dance celebrate embodiment and sensuality, they celebrate mortality. Avant-garde abstraction celebrates immortality, the source of its sacred calling, and of its alienation from the task of any other form of truth. The result was that in its struggle to escape commodification, aesthetic abstraction alienated itself from the embodied, ecological commons that commercialised popular culture had already been exiled from. This move from communion to immortality was a European affliction.

Goenpul (indigenous Australian) theorist Aileen Moreton-Robinson 'discusses an irreducible immortality at the root of her people's condition', which anthropologist Elizabeth Povinelli elucidates as 'The "inter-substantiation of ancestral beings, human and land" … the original "ontological relationship" through which all embodiment emerges' – that is, immortality is collective, and embraces the land as well as its human inhabitants. Mortality and love belong together. In

a critique of Levinas' theory that ethics begins in an encounter between individuals, liberation philosopher Enrique Dussel argues that individuality is a lie:

> The individualization of this collective personal experience is a European deformation derived from the bourgeois revolution. Each face, unique, inscrutable mystery of decisions not yet made, is the face of a sex, a generation, a social class, a nation, a cultural group, a historical epoch.

To which we could add that it is the face of animals, forests, rivers and everything that provides for us and demands our love and care. Like Moreton-Robinson, and echoing Oram's pulsing ephemerality of individuation, Dussel is adamant that the one thing that is neither permanent nor universal is the human self. Today, information capital's colonialism follows the track of Arendt's inner emigration to exploit every nook of human interiority and unhappiness. No longer structured like a language but distributed like code, desire, still unending, is now both diffuse and isolated from its world. But in a further twist, decentred data subjects, discovering the failure of desire to fulfil or even address them, pass beyond Levinas' individualism and humanism. In the moment they acknowledge their own abstraction, they confront and immerse themselves in the world's oceanic desire, inhabitants of the tideline between code's aspiration to universality and the actuality of edges marked by QR codes, a post-human existence first intuited for modernism as cosmic forces by van Doesburg and the early anthroposophical abstractionists.

Even a universal network, and perhaps a universal network more than any other, obeys Kurt Gödel's axiom that any system can be either complete or coherent but cannot be both. For the system, the world's desire is inconsequential but the

behaviours it inspires are essential, indicating that the system is incomplete, while its constant evolution shows that it is also incoherent. As we've just seen, the system's data subjects are incomplete and incoherent, implying that their controllers are too. The more capital becomes systemic, the more unstable it becomes. When digital historian Wendy Chun asks of John von Neumann's early cybernetic architecture, 'why does a logical calculus … necessitate the erasure of the actual functioning elements', the answer is that, in Marx's terminology, communicative rationality is a real abstraction: it is performative, it has consequences. One of those consequences is that capital's commitment to Shannon's diagrammatic abstractions inclines it towards crisis. Discovering the interactions of world spirit and human minds, these abstractions, despite themselves, create new political and subjective opportunities from the endless ecological communion of everything with everything else.

What remains true, a key term for my project, is what humans share with ecologies – that remainder that, so far, has not been colonised – and with technologies – the black boxes where capital has imprisoned our ancestors. To liberate ourselves we must liberate ecologies and ancestors. Substituting another Subject to sit in the place of *Geist* or cyborg is not enough: we need to reinvent place itself; and in the age of the fantastic present, to invent new modes of time: to learn from finance capital the skills of retro-performativity, to change catastrophe into crisis. The language of sustainability belongs to the timeless present. The first step must be, using a word from Chippewa First Nations scholar Gerald Vizenor, *survivance* – to live on. The ethical imperative of collective and ecological survivance leads towards an aesthetic politics that learns from these histories of abstraction that love exceeds mortality. Debarred from failed universality, ecological aesthetic politics must be posthumous.

5

Coda

The first principle of truth is distrust – first and foremost of my self and my desires.

Consideration

The problem with neo-populists is not that they distrust the media but that they trust them too much. They do not seem to distrust advertising, software, fiction and the Twitter feeds of billionaires. Their trust makes them angry, and the amplifications of their trusted media mobilise anger as hatred. 'Freedom' as war cry allows isolated, fearful and therefore combative people to feel they follow a common purpose, never noticing the paradox that following is unfree. On the other side, 'trusting the science' is as dubious as trusting the Lord: God and science have a sorry record of causing genocide and condoning ecocide from the Inquisition to Hiroshima. This is why methodical distrust is essential, why we need the analytic aspect of consideration *of* – to consider where we are, what we can do and what effects our actions might take – informed by consideration *for* – caring for, nurturing, loving.

Truth is in crisis because the social imaginary is in crisis. The political philosopher Cornelius Castoriadis argues that, if

causality explains everything, then history is a static system gradually unfolding its truth on the basis of ahistorical laws and there is no time. The alternative is that there are no 'laws' of history. Instead the social imaginary is a kind of magma, an underground, even unconscious force that never stops producing 'radical alterity, immanent creation, non-trivial novelty' in social formations. In every epoch, forces of domination seek to order and constrain this magma. At the time of Benjamin's Angel, progress was the dominant form of imaginary, what Freud would call projection, the desperate attempt to create a destiny without mortality: a repetition compulsion demanding the present be projected onto the unsure and ultimately fatal future. Among neo-cons, the dominant imaginary is nostalgia, a demand to return to the fantastical safety and stability of the past, a tragic and neurotic compulsion in an individual become destructive at the scale of mass movements. But society and stability are incompatible. Neo-cons seek not the end of the world (although they may cause it) but the end of history, held to have achieved its goal somewhere around 1949 (with only minor modifications for Putin's Russia, Modi's India and Xi's China).

The current crisis of the social imaginary comes about not because of projection or nostalgia but because of the dominance of fantasy, where the fantasist can enjoy every position in the fantasy simultaneously. Fantasy has two weaknesses, its individualism ('I' is always its centre even when 'I' becomes dispersed and distributed) and its timelessness. Abstracted from its immediate surroundings, self-involved to the exclusion of the rest of the universe, but containing times of permutation, narrative fragments and multiplying scenarios, as the now-dominant mode of social imaginary, fantasy has been industrialised in the timeless time of indifferent differences, the network pleasures of a dispersed subjectivity.

Fantasy feeds the Oedipal structure of nostalgia, making incompossible desires, like the desire to reach nostalgic stability through violent upheaval, soluble through the promise of a network satisfaction for every consumer desire.

Truth, in the fantastical language of the market and its neo-con functionaries, designates a world that conforms or should conform to its description, an indicator of how different cultural politics are from aesthetic politics. Truth statements are not lies or fictions but they are statements. Journalism, science, social sciences and humanities all produce statements, and communities who take them as true. The processed form of data as information is another performance – a type of truth statement, but for what community? It matters who pronounces a truth statement to whom and in what circumstances, whether the statement be in words, pictures or data. The observer problem persists among non-human instruments; the perspective problem haunts journalism and any representation; the abstraction problem is the specific challenge for informatics. These cases demonstrate that truth is not whole, stable, coherent, universal or eternal: truth is performed.

The digressions interrupting the progress of this book looked for the challenges that performance brings with it. Affects of disgust, trauma and the uncanny associated with the Feejee mermaid, angels and cats pose themselves as limits of truths defined by taste, harmony and universality. Sublimity generates ignorance, which implies its obverse: where knowledge ends, wonder begins. Pushed out beyond the limit of knowledge, wonder is our reaction to those interruptions of the system when psychic, spiritual or worldly ecologies, excluded from the system, force their explosive way back in and demonstrate the fallibility of the system and the existence of alternatives.

The perverse language of 'data' and 'givens' that masks the colonial exploitation of reality by the information regime also perverts desire. For information capital, magic and wonder are illusions created by the absence of intellectual property, which now defines knowledge. But humans are not as divorced from the natural world as capital pretends. Still thoroughly ecological beings, we feel oppression as repression, and experience our alienation worst when the repressed returns our dreams to us as putrefaction. That mad oxymoron 'intellectual property' is all we need to recognise information capital's imperial-colonial epistemology: the world as raw material for extraction, processing and property. Against this privative mode of knowing we need the ambivalence of a cat's gaze, at once canny and uncanny, knowing and unknowing.

Angels are always strangers, and the obverse is also the case: the stranger always brings some angelic message. Neo-nationalist ideologues are so scared of migrants because they are figures of hope, not only because they journey in search of better lives but because they renew whoever they meet, cracking open the homogenous present of debt and databases. What is truly given, such as the arrival of angels and migrants, will not fit into capitalist indifference. Capital finds it legitimate to rank billionaires in their orbital heavens but not to greet an angel on Earth. The human joins the commons, as Quijano has it, by agreeing that 'The idea of social totality … depends on the historical diversity and heterogeneity of society, of every society. In other words, it not only does not deny, but it requires the idea of an "other", diverse, different'. Again we can add that the commons extends beyond human society. Kipling's cat that walked by itself, both domestic and feral, welcomed in and chased away, dependent and independent, knowingly gives itself to be captured but still evades possession. A model for the hybrids we must become.

The more radical the interruption, as in the cases of the Feejee mermaid, the atomic angel and the uncanny cat, the less any system – psychological, domestic, economic, technical, scientific or ecological – can assimilate it unchanged. Any sufficiently repressed reality returns as disgust, trauma or uncanny. Like migration and climate politics, these encounters demand an overhaul of aesthetics – media and senses – and politics. The aesthetic politics of truth developed here takes non-identity as its core. The principle of allonomy – dependence on an elsewhere – and the challenges of anachrony, temporeality, temporamentality and chronoclasm show non-identity as a problem of place and change: the where and when of truth not only undecidable but constantly moving and morphing. Under non-identical conditions, aesthetics can no longer be the administration of taste, any more than politics can be reduced to the administration of public affairs. What breaks both open is the encounter, in itself traumatic, which not only destroys an order or determines a new one but makes possible. To make possible is the work of imagination, which is the work of ecocritical aesthetic politics: to imagine, beyond the terrible arrival, a world filled with, shaped by, capable of the good in whatever form it may take.

Manifesto

1. Truth becomes an object of fascination in a post-truth era in the same way that nature became fascinating only after its demise.

Truth is performed, verbally or otherwise, by one of the three orders: social, technological, natural. Both the concept and the

practice of truth become possible only after these orders have been estranged from one another.

2. History began when these orders were split apart. But ontologically they are of one kind.

Technology, blamed by many, only appears in the primal split between humans and the world, caused, depending who you read, by communication, cooking, or metalwork. Lévi-Strauss ties the split to negotiations with individual mortality, Arendt to the Greek invention of personal immortality. Only collective, social imagination can reconcile mortality and immortality as commons.

3. Technology is comprised of ancestors, nature of gods. The human is performed by gods and ancestors as much as it performs them.

Technologies, media and techniques, including language and code, are ancestral. The ancients knew that bodies and natural things were continuous: that Aphrodite was the goddess of roses and swans as well as love. Humanity is the struggle to achieve a commons with gods and ancestors beyond the end of history (which may be very soon).

4. Truth is always in play, at play, evolving; the only truth is the truth of process and change – until an instituting action sets up a single, universal and therefore permanent truth. Such truths have no intrinsic validity beyond fidelity to them. The same is true of untruths.

A common cause of crises is the assertion of a single truth (mass adoption of a cluster of statements) and the excess of faith placed in it. Nostalgia for exclusion, masquerading as nostalgia for cohesion, drives racism, fundamentalism and ecocide and is driven by them.

Eurocentric regimes of truth (power, knowledge and wealth) have learned to profit from what they exclude, including the tumult of neo-fascism.

5. The ceaseless play of random noise is no longer a site of truth since capital learned to assimilate contingency.

Indigenous knowledge tells us that communing with the world is still possible, but 2021's Cop26 environmental summit showed us that the masters of the world are no longer rational or capable of action. Governments, shareholders, popes and billionaires do not feel they have agency to alter the automatic and auto-destructive operations of the market. The truth is that truth has either become completely alien or that its only existence is what we make it.

6. Truth is in play because it is perpetually deferred, and we cannot but go chasing after it.

We may already be survivors (*survivants*, living after) in the afterlife that follows climate collapse, habitat and species loss, but we also live historically and communally because the future also survives.

7. Truth is dangerous the moment it stops playing.

Once established as group ideology or cultural hegemony, truths become performative: real abstractions with real consequences, the vast majority of them fatal.

8. Truth demands consideration, twice: of the complexity of the conjuncture, and the consequences of stating it.

Telling a neo-con they are deluded, vainglorious bigots may be a correct account of the facts but is unlikely to lead to even an ephemeral nirvana. Since truth is performative, even if it is not necessarily 'the

case', the ethical question of truth – what consequences arise from a particular truth-statement or performance – concerns its political responsibility and its aesthetic premium. Truth is worthless if it doesn't care.

Notes

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Links

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