

**The Old/New Observatory: An Artistic  
and Curatorial Enquiry**

**Sam Skinner**

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# **The Old/New Observatory: An Artistic and Curatorial Enquiry**

**Sam Skinner**

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## Abstract

My project explores the history and contemporary significance of the observatory through curatorial and artistic research, principally commissions for a thematic exhibition and an artist book. The key question guiding my research asked: What could an observatory be in the 21<sup>st</sup> century, in particular, one sited within a public gallery or imagined through an artist book? This research question was investigated via archive-based enquiry into the historic Liverpool Observatory, the co-curation of an observatory themed exhibition at FACT (Foundation for Art and Creative Technology), Liverpool, and the production an artist book.

The key objective of my project was to establish a practice-based enquiry, employing both curatorial and artistic modes of investigation, into the observatory and associated contexts of observational technoscience. By researching these subjects, moving from a situated analysis of Liverpool Observatory to the observatory's contemporary global significance, my project makes evident that the observatory, and specialised observational techniques and instruments more broadly, have become increasingly prevalent part of everyday life across the earth, and demand artistic engagement and reimagining. Furthermore, the project posits the observatory as an important touchstone and unique microcosm for our contemporary technologically mediated condition. Through practice-based research I demonstrate how the observatory's history is one of continual change and proliferation, shifting from assemblages of instruments primarily contained within a specific site, toward an exploded form, ever more distributed, networked, and enmeshed with human senses and nature. My research, particularly through commissioned artwork and the artist book, focuses in on the degree to which the observatory and observational technoscience is now embodied at societal, community, and individual levels.

I argue that developing and manifesting an 'old/new' observatory within a public art gallery, of the kind produced at FACT, entitled *The New Observatory*, functions as a useful method to simultaneously subvert and reflect upon the historic precedents and contemporary conditions of observation. The project explores how locally embedded and situated research, employing the tools of archival research, media archaeology, and the framework of new materialism, can bring forth what may be called *anachronisms of the contemporary*. *The New Observatory* exhibition's inherent fixity compared to the contemporary distributed character of observation is anachronistic, a contemporary chronological inconsistency, but this renders it with a peculiarly timely and subversive agency. Equally, the artist book I produced, inspired by study of observational notebooks and composed of a narrative drawn from historical and modern observational science, traditionally printed and bound, is an analogous act of contemporary anachronism. Accordingly, the project across book and exhibition, proffers itself as a method or case study for how alternative and anachronistic, yet nonetheless contemporary, observatories and analogous observational practices, may be brought forth and developed, through interactions between historical observatories and artistic practice in collaboration with socio-technical communities.

I propose the subject and history of observation as a key bridge between the arts and sciences, through an enquiry employing artistic and curatorial methods. In particular I utilise the public gallery and the medium of the artist book, to examine how the gallery and artist publishing poses unique affinities with the observatory and processes of observational inscription, rendering them useful methods to engage one another. Furthermore, the book and commissions in the exhibition, investigates how observational inscription, measurements, and data, are *real in themselves*, constitute phenomena in *their own terms*, and are not simply defined by that which they represent, value, or sense.

The results and practices employed in my project suggests that a practice-based enquiry of the observatory is aided by a transdisciplinary theoretical framework, which combines new materialism with the history and philosophy of science and technology. In turn, I articulate how this theoretical framework supports a practice-based study of the observatory, and how collectively they offer a useful means to explore a fundamental challenge at the heart of new materialist and posthumanist philosophy; how to move beyond singular subject-object relations and anthropocentric viewpoints. Finally, I demonstrate how the dual practices of artist *and* curator may cross fertilise one another, and aforementioned theoretical frameworks, which in turn catalyse the spaces of the gallery, the book, and the observatory, with a lively materiality.

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## Introduction

My project employs artistic and curatorial methods to analyse how the observatory and the technoscience of observation have become global and everyday phenomena. The key question guiding this aim and my research was: What could an observatory be in the 21<sup>st</sup> century, in particular, one sited within a public gallery or imagined through an artist book? The project comprised three stages (and the thesis follows this order analogously): beginning with a situated analysis of the historic Liverpool Observatory; moving to a series of curated artist commissions produced as part of *The New Observatory* exhibition at FACT, Liverpool (2017), which considered the contemporary status of the observatory and observation; concluding with the production of an artist book, entitled *Obs*, which reflects upon these subjects and my own participant observer status throughout the process and project.

Key points and arguments within the thesis and project are:

1. The observatory serves as an important touchstone and unique microcosm for our contemporary technologically mediated condition. The observatory's history is one of continual change and proliferation, evolving from stone circles to assemblages of instruments contained within a specific site, before later becoming an exploded form, as its instruments leave the building, moving out to sea, into space, into our homes, and pockets. Accordingly, the project seeks through its historical analysis, combined with new commissions and artworks, to investigate and articulate how the observatory and observational senses, both technological and human have developed and become ever more distributed and enmeshed in networked apparatuses and the production of data. This huge transformation and expansion of the observatory and accompanying activities of observation, requires up-to-date and contemporary enquiry that is as multi-lateral and transdisciplinary as the subject itself. In attempting to embody and experiment with the subject through my practice, for example the creation of new observational instruments via artist commissions or writing a fictional reflection upon the observatory, the project explores the degree to which the observatory and observational technoscience is now embodied at societal, community, and individual levels to such a degree that people may be said to act partly as *observatories of themselves*. Beyond this, I speculate whether on a macro level, through the proliferation of networked instruments and computational systems, the world has to some degree become, or is occupied by, a singular observatory. These characterisations that are simultaneously evidence-based and metaphorical, are developed within the thesis and practical components through an analysis of the observatory's growth and propagation across time, and how specialised technoscientific techniques and equipment become part of a globalised infrastructure and individual experience of what I term the *observe-atory condition*.

2. The project explores how locally embedded and situated research, employing the tools of archival research, media archaeology, and the framework of new materialism, can bring forth what may be called *anachronisms of the contemporary*. If the observatory today has become a distributed form, with instruments no longer principally contained within buildings, the act of manifesting a place-bound observatory, and populating FACT with instruments, follows more the archetypal form of the historic 19<sup>th</sup> century observatory. Thus, *The New Observatory* exhibition's inherent fixity compared to the contemporary distributed character of observation is anachronistic, a contemporary chronological inconsistency. But, my argument is that, it is this very situated specificity and out-of-time character that renders the place-bound observatory with a subversive relevance and agency, so long as it is open, public, critical, and creative. Accordingly, I propose that hybridised *old/new* transdisciplinary observatories of the kind materialised at FACT can serve as important spaces of assembly for art, technoscience, communities, and individuals, to engage with the contemporary *observe-atory condition*. (I use this term 'observe-atory' to suggest the observatory as both noun and adjective, to fuse the observational with the observatory, to emphasise it as simultaneously modifier and thing). Furthermore, if as I suggested in my first point, the observatory has become both internalised and externalised to such a significant degree, the act of

representing the observatory through artistic means, and of then enabling a public to step into and use it, allows observation of observation itself. Equally, the artist book I produced, with its roots in the history of observational notebooks and composed of a narrative inspired by both historical and modern forms of observation, printed and bound in a manner that has changed relatively little in 500 years, is also an act of contemporary anachronism. Thus, the project in the form of both book and exhibition, offers itself as a prototype for how alternative and anachronistic, yet nonetheless contemporary, observatories and analogous observational practices, may be necessitated, brought forth and developed, through interactions between historically situated and contemporary observatories, via artistic practice in collaboration with socio-technical communities. It is then an investigation into what subjects and techniques an observatory of the 21<sup>st</sup> century may work with and through. Furthermore, by bringing the observatory back into the city, into the public gallery, the project functions to represent the convergence of public life and observational science.

3. I argue that the subject and history of observation is a key bridge between the arts and sciences. My project undertakes an enquiry into this relationship by employing artistic and curatorial methods, in particular I engage the platform of the public gallery and the medium of the artist book. Principally, I seek to explore and articulate how the gallery and artist publishing poses unique affinities with the observatory and observation that make them useful and relevant methods to engage one another. For example, I demonstrate how FACT, as a technology-led public art gallery functions in a manner akin to the old Liverpool Observatory; both architecturally defined institutions in the heart of the city, using and developing new technologies in a mode that seeks to critically engage and empower the city, its community, and new forms of innovation. In this way both the early observatory, and also observational notebooks which influenced the development of *Obs*, may be seen as progenitors for the contemporary art gallery and artist publishing. In this way, the project functions as an enquiry into how the ‘two cultures’ of art and science co-evolve. How art, for example, which has traditionally been less concerned with observation that produces explicitly propositional knowledge compared to science, may relate to technoscientific processes of observation and knowledge production. I suggest that artistic and scientific thought and practice produces itself partly through an *apparatus of observational production*, that includes an assemblage of textual, visual, instrumental, and social practices. On a broader level, the project may serve as a case study for exploring the relations and systems of power at play between the arts and the sciences.

4. The artist book I have produced and distributed is the product of private notetaking, observation, and inscription, produced throughout the project, and is comparable to how private notebooks of early observatories and observational science often became public books functioning in critical and pedagogical modes. The book, building upon commissions in the exhibition, seeks to investigate and foreground how observational inscription, measurements, and data, are *real in themselves*, constitute phenomena in *their own terms*, and are not simply defined by that which they represent, value, or sense. Both the book and exhibition explore how observation and its accordant inscriptions may fundamentally constitute and enliven the world, in an eternal correspondence of *differentiating co-constituting entangled relationalities*. I suggest, building upon the work of Michel Serres, that observation may be the product of more-than-human agencies, whereby the observatory and its instruments, are part of a process of the *the world writing to and upon itself*. My project focuses in on this theorisation of observational inscription via my own practice and the production of experimental text-based artwork, what I describe as a *minor literature of dissensus*, augmenting concepts developed by Giles Deleuze, Félix Guattari, and Jacques Rancière. This practice also works through, and responds to, the *excluded excess* of the subject of any observation that is impossible to fully capture and must necessarily be ignored to render an observation, to ascribe a value, to enable a ‘useable’ measurement or observation to take place. My proposal is that art and creative enquiry has a responsibility to engage, critique, and enrich observational quantification and measurement in a process of *corrective affirmative immanence*, attempting to act *between* inscription *and* phenomena. This *corrective* method of *dissensus* applied to subjects and processes of observation at play within the *Obs* publication, returning noise, excess, and agency back to the world, links also to an attempt to address contemporary big data and surveillance contexts and affects. In particular, the unequal power relations



that exist between those subjected to observation, and the privileged position of the observer, and the networks of institutions and technologies that enable such inequalities.

5. The thesis and project advocates that research concerning the observatory, and the artistic and curatorial methods I employ, may be aided by a transdisciplinary theoretical framework that includes: new materialism, science and technology studies, media archaeology, and literary studies. In particular, each of these research methodologies have unique and important perspectives to offer regarding how observational devices employed within art and science may enact both divisions and relationalities between nature and culture, and add complexity to the relationship between matter in broad terms and more specific human agency. I employ new materialism as a space of live theory formulation and draw also on works that are important to its genealogy, such as Donna Haraway's conception of 'naturecultures', which my project develops in dialogue with the work of Karen Barad, to describe observation as an *entangled intra-action of naturecultures*. In turn I proffer a practice-based study of the observatory as a useful means to explore a fundamental challenge at the heart of new materialist and posthumanist philosophy; how to move beyond singular subject-object relations and singular anthropocentric viewpoints. Moreover, I propose the observatory as a site of posthumanist and new materialist naturecultural continuity *and* community building, of what I term the *material community*. This framework is discussed in more detail in the section on methods, and given further context and elaboration in the literature review, and subsequent chapters.

The thesis is comprised of 6 main sections: literature review, methodology, 3 core chapters, and a conclusion. The literature review establishes the relevance of my area of study for the thesis and practice-based components. I review literature on key subjects including; the history of observation and the observatory, prior relations between art and the observatory, philosophical contexts to the materiality of observational inscription and 'more-than-human' agencies of observation.

The section on methodology details the processes I employ within my practice. I describe my use and understanding of archival research and media archaeology, and how it was deployed in relation to the Liverpool Observatory. My curatorial practice is analysed and I outline how it employs frameworks of new materialism in conjunction with community art processes as a means to investigate technoscientific art, artefacts, and culture. Finally, I turn to my artistic practice of art publishing and bookmaking which is elucidated as a tool to explore my own participant observer status within the project, through speculative narrative and graphical enquiry, and how writing, image-making and publishing link to processes of inscription within observational science. Particular aspects of methodology are threaded through, returned to, and developed throughout the main chapters, which I will now introduce.

Chapter 1 undertakes a close analysis of the Liverpool Observatory. It focuses on its genesis in the mid 19th century. I explore it as an example of the observatory as an instrument of 'community building'. Throughout, I examine how this process of research fed into and coalesced with my curatorial and artistic practice. The emergence of striking parallels between FACT and the historic Liverpool Observatory, and an evolving conception of artworks as instruments is discussed. I analyse textual material associated with the Liverpool Observatory's founding and early operation, in particular rhetorical and promotional statements that perform a division between nature and culture and relate this to my own publishing and curatorial practice. Drawing on a new materialist philosophical framework I build an articulation of the observatory as a *strategically situated apparatus* alternating between co-constituted processes of *ascribing and inscribing* values to phenomena.

Chapter 2 explores the iterating character of the observatory and its ability to reproduce itself, through my co-curation (with Hannah Redler-Hawes) of an observatory themed exhibition; *The New Observatory*, at FACT in 2017, and the commissioning of artworks by artists James Coupe, David Gauthier, Kei

Kreutler & Libre Space Foundation, Jeronimo Voss, and Yu-Chen Wang, included within it.<sup>1</sup> I detail the commissioning process for each artwork, and analyse how they each respond to and reproduce the observatory in different ways, and how certain commissions were explicitly informed by my research into the Liverpool Observatory. David Gauthier's piece *53°32'.01N, 003°21'.29W, from the Sea*, was, for example, produced in collaboration with the Proudman Oceanographic Lab, Liverpool, which has its historic roots in the Liverpool Observatory. David's piece focused on a 'waverider' buoy in the Irish Sea, exploring how the observatory and its instruments proliferate across the earth. Yu-Chen Wang's *I Wish to Communicate with You*, was based closely on an engagement with the Bidston site of the Liverpool Observatory and accompanying lighthouse, engaging with how the observatory and its activities were defined by both its geography and community. Jeronimo Voss and Radamés Anja's work, *Applicate Against Time*, followed the Liverpool Observatory's method of working as a site for the development of new instruments, particularly those associated with temporality and clock time, producing a new piece of time management software. Kei Kreutler and Libre Space Foundation's, *Open Space Observatory*, comprised of a ground station for observing satellites, interrogated the politics of both proprietary software and hardware, and the nationalisation of space exploration and observation. James Coupe's *Watchtower (A Machine for Living)*, acted as a monument to observation used for both care and control, comprising a watchtower cabin occupied not by persons, but a computer linked to 16 screens, playing videos produced by 'mechanical turks' observing daily life from across the globe. The chapter concludes with a discussion of how the exhibition in a more latitudinous sense functioned as an 'observatory of observatories' and how the observatory may parasitically inhabit the gallery. Furthermore, I explore how if the museum is a memory maker, how the observatory may function as a point around which a system and a community may gravitate, and it may act as an imagination maker, a citizen maker, and a space for developing a critical understanding of observation and data gathering practices.

Chapter 3 investigates my production of an artist book, entitled *Obs*, and its relations to both my historical and philosophical research, and the curatorial process. It examines the relations between gallery and observatory, exhibition and book, curator and artist, measurement and writing, and how and where they meet within my practice in processes of experimentation, inscription, and quixotic *betweenness*. It introduces how experimental text-works produced at the early stages of the project informed my curatorial process, and later evolved toward a prose-poetry form and narrative focused on modes of resistance and exchange between a community and the observatory. The text in the publication is presented alongside a mixture of my own drawing and reworked found imagery, investigating the materiality and variety of observational inscription. I analyse the narrative and my authorial intent in detail and explore the medium specificity of the artist book and its relations to both historic and contemporary observational contexts. The chapter has a particular focus on how the narrative explores the affects and effects of observation in the form of state surveillance and 'big data' within social media and smart city contexts. It concludes with a discussion of how creative and resistant modes of observation-oriented art practice may function as a counter or corrective to the reductive character of contemporary observational technoscientific processes and environments.

In a conclusion I reflect upon key outcomes for the project and questions it poses for further research. Finally, the appendix includes key documents for reference. In particular; the booklet that accompanied *The New Observatory* exhibition, documentary photos of the exhibition, early text-works, and a copy of the final *Obs* artist book.

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<sup>1</sup> Twenty artists' projects were included in the exhibition, but it should be noted that in this thesis I focus on those that I was primarily responsible for and which were new commissions.

## Literature Review

This literature review establishes the significance of the general field of study for the thesis and accompanying practice-based elements, and situates its contribution to knowledge. I interpret the major themes and fields of study surrounding my topic, in particular; the historical lineage of the observatory, previous encounters between the observatory and art, and philosophical discussion regarding the act of observation. This review serves to contextualise the specific activities of my project and the discussion within this thesis.

### The Observatory Through Time

Today observation is a fundamental aspect of life, from state surveillance to scientific experiment, the world is awash with humans and instruments producing, gathering, analysing and distributing observational data. An important facet of observation is the observatory. Its evolution through history, and across different locations, functions as a measure and microcosm for the changing role and constructed nature of observation through time. It is both the pivotal role of observation in contemporary life, coupled to the observatory's unique character as crossroads and junction-maker of observation that catalyses this thesis and project, which this literature review supports.

Literature within the history and philosophy of science situating observational practices, includes: the key edited collection *Histories of Scientific Observation* (Daston and Lunbeck, 2011a); work on early modern scientific experience (Shapiro, 1999; Pomata and Siraisi, 2005); relations between art and science in early periods (Smith, 2004; Long, 2012); texts focusing on specific observational instruments and processes, such as *Leviathan and the Air-Pump* (Shapin and Schaffer, 2011), the microscope (Schickore, 2007), and weather prediction (Anderson, 2005); and works exploring the wider cultural implications of observational science, for example new conceptions of time and space (Kern, 2003). The observatory itself as a specific area of enquiry, approached via both art and science, has I would argue been relatively neglected to date. The majority of the literature has tended to remain contained within specific disciplinary fields and there is little work on its contemporary status. Key survey literature to date includes a short history of observatories, with a focus from the 17<sup>th</sup> century to the mid twentieth (Donnelly, 1973), an edited collection focusing on observatories in the 19<sup>th</sup> century (Aubin et al., 2010), and a study of the observatory in Islam (Sayili, 1960).

More specialist studies include work on the development of national observatories (Dick, 1991) and how observatory architecture was dictated by the instruments they housed, which in turn were often defined by the changing needs and expectations of astronomers and funders (Higgitt, 2014), and how observatories reflect their local cultures and politics (Wolfschmidt, 2015). Lee MacDonald describes how in the 19<sup>th</sup> century the observatory was 'transformed into what some claimed to be a "physical observatory" of the sort proposed by John Herschel – an observatory that gathered data in a wide range of physical sciences, including geomagnetism and meteorology, rather than just astronomy' (Macdonald, 2015). Architecture had a strong affect on how knowledge was transmitted, representing and catalysing the way observatories have traditionally remained disciplinary bound spaces (Forgan, 1994). An important departure from this is personified in the burgeoning role of the amateur observer in the 19<sup>th</sup> century, described in literature as a defining factor in opening the observatory up to new communities (Lankford, 1981; Chapman, 1998). Additionally, the development of public observatories, in for example Essen and Los Angeles in the 20<sup>th</sup> century has led to wider public engagement with and understanding of the observatory and its related practices.

My own curatorial act of siting of an observatory in a public gallery follows in this lineage of making observatories public. Furthermore, my interest in exploring how art and the exhibition can appropriate

the observatory and its instruments, is informed by, and a reflection of, how observatories themselves can be considered works and places of art, and often include ornate decoration. Standout examples include stucco work in the Florence observatory, or how artistic practices such as engraving were used at the Paris observatory to depict the surface of the Moon in the 18<sup>th</sup> century (Abbott, 2008). Thus the observatory may be considered an important site for the fields of art and science to overlap and co-constitute one another.

There is I would argue an absence of research on the observatory's most recent history and current status, and how it has evolved considerably in modern times. Today there are observatories for a wide range of phenomena, from Syrian human rights to gravitational waves. As articulated in one study, the term observatory can refer to an organisation that gathers data, as much as a physical site, such as the Smart City National Observatory project in Italy (Testa, 2016). The term observatory has also evolved today to be used in a metaphorical or descriptive sense, as Christof Koch uses it in his paper entitled *Observatories of the Mind*, describing work to map the mouse brain (Koch, 2012) or use of the term 'cybernetic observatory' to describe Visorama, a panoramic image visualization system (Parente and Velho, 2008). It is not surprising perhaps that the term observatory is used in such variety ways considering how evocative its history is, and how poetic many observatories names and activities are. Consider for example the Jülich Observatory for Cloud Evolution, and their often dramatic locations on mountaintops or in deserts, as depicted in Patricio Guzmán's film *Nostalgia for the Light* (2010), featuring Chile's network of observatories in the Atacama Desert. My own project and thesis attempts to address this contemporary use and relevance of the observatory, as both physical site and meaning maker, unpacking what the observatory has become, and how its associations continue to evolve.

### **Art and the Observatory**

I now turn to review literature and work examining relations between art and science, focussing on where this intersects with observation or the observatory, and how the works and projects cited create a space for enquiry within which my project intervenes.

The different projects I commissioned each relate to different aspects of the observatory and how it continues to resonate: James Coupe's *Watchtower* – architecture; Kei Kreutler's *Open Space Observatory*, a ground station for observing satellites – instruments; Yu-Chen Wang's drawing and film *I wish to communicate with you* – social and community dimensions; David Gauthier's installation *53°32'.01N, 003°21'.29W, from the Sea* – material phenomena and data; and Jeronimo Voss and Radamés Anja's *Applicate Against Time* – measurement and time. Furthermore, all these projects, except for perhaps James Coupe's, all sought to develop specific conversations between the respective artists and scientists. In so doing the project operates within a field of practice and literature between what has been termed the 'two cultures' of science and art (Snow, 1961). Practices and debates between these fields have a long history as evidenced by Pamela H Smith's work that demonstrates how much early modern science owed to artists and artisans, and vice versa, how rooted art theory and practice was in matter and nature, which we would recognise today as primarily scientific (Smith, 2004). More recent works survey a rebirth of artists' projects that engage with science and blur boundaries between respective fields (Ede, 2005; Wilson, 2012). In particular explicit collaborations between artists and scientists, for example *Strange and Charmed* (Ede, 2000), catalysed by organisations such as the Wellcome Trust, which funded the edited volume; *Experiment: Conversations in Art and Science* (Arends and Thackara, 1999).

My own project responds to and attempts to intervene within, the degree to which there is a balanced two-way conversation between the two cultures of art and science. The available literature would suggest that there is a power imbalance in favour of science. For example, a recent book by Arthur Miller entitled *Colliding Worlds: How Cutting-edge Science is Redefining Contemporary Art* (Miller, 2014), provokes the question; to what degree is the reverse true – is art redefining science? Cases where science engages art

via the prism of observation for example are few. One notable exception is a paper documenting an experiment at the National Observatory of Athens, in which artworks depicting sunsets were used as sources of scientific information on atmospheric abnormalities after volcanic eruptions (Gemtou, 2011). A key component of my commissioning process was to engender two-way conversations between artists and scientists, for example David Gauthier's residency at the National Oceanographic Centre, or Yu Chen Wang's engagement with former employees and the site of Bidston Observatory as a means to explore this, the results of which will be discussed in detail in chapter 2. Furthermore, the narrative of the publication I produced, discussed in chapter 3, is driven by an encounter between art and science, rationalism and the imagination.

The institution of the observatory is, I would suggest, a space of both rationalism and the imagination, that can, due to its proliferation across earth and through history, be considered as an example of what Hegel called 'objective spirit'. A product of mind that we produce in matter, the public manifestation of our deepest commitments, the representation of both deep subjective needs and our 'collective mindedness' (Kervegan, 2018). Within Hegel's conception: 'The autonomy of the self emerges from subjective spirit, but can only develop through its institutionalized expressions in interactions with other Selves.' (Boldyrev and Herrmann-Pillath, 2013). Hegel stated that in 'just' institutions, 'man must meet with his own reason' (Pippin, 2001:6), however, he also stated, such institutions have the potential to also possess a 'hollow, spiritless, and unsettled existence' (Ibid. p. 2). I believe the observatory today, in its different guises, functions variously as an institution of vibrant and 'just' enquiry on the one hand, and the 'hollow' administration of life on the other. Historically, observatories have both enabled imperialism and extraction from countries and communities that had little to no agency in this process, and served as centres of open scientific enquiry, which sought to observe rather than intervene. How art may combine with science and have agencies to affect these differing processes of observation is key to my study, and I will now briefly introduce a number of important artistic and textual precursors to my project.

The collection *Picturing Science, Producing Art* (Jones and Galison, 1998), engages with both historic and contemporary relations between art and science, focusing on vision and material practices, in for example the essays; *On Astronomical Drawing* (Schaffer, 1998a) and *Deanimations: Maps and Portraits of Life Itself* (Haraway, 1998). Jonathan Crary's *Techniques of the Observer* is an important work within this context for its unique focus on the construction in the 19<sup>th</sup> century of the observer themselves, and their autonomy, which in turn informed subsequent notions of subjectivity in modernism (Crary, 1992). This study was key to my articulation of the characters of Sandy and the Reading Group and how they augment with technologies of observation within the *Obs* publication. Crary writes for example, as if delivering the head of the observer on a stick, how new technologies and techniques relocate 'vision to a plane severed from the human observer.' (Ibid. p. 2). Furthermore, Crary articulates the tension between new observational technologies and aesthetics, and human observers stuck in limbo, which both the exhibition and publication build upon through their interplay of the old and the new: 'modernism is thus presented as the appearance of the new for an observer who remain perpetually the same, or who's historical status is never interrogated.' (Ibid. p. 5). Furthermore, my own project attempts to conduct such an interrogation and engage with the contemporary observer and observations, both citizen and professional, principally through its transdisciplinary study of the old Liverpool Observatory, the making of an experiential observatory themed exhibition, and production of fictional artist book.

Beyond academic literature we may cite a number of artistic projects that have taken inspiration from the observatory, but differ from my own through their respective focuses on land art, human relations to the cosmos, and installations situated directly within historic observatories. *The Observatory* by Robert Morris from 1971, located in Flevoland, is a work of land art in the Netherlands measuring 71 metres in diameter, comprising two concentric earth mounds, divided by trenches and three v-like openings, echoing monumental Neolithic earthworks. Rosalind Krauss described it as 'a massive project through which to think and to experience this culturally ancient notion of marking, which is to say, of entering into a text that one has not oneself written, and that will continue to be produced to the end of solar

time.’ (Krauss, 1994:12). This notion of the observatory as space of inscription, is developed through my engagement with the spatial and tabula rasa like qualities of both the gallery and book. Site specific works at historic observatories include the sound work *You are not alone* by Susan Philipz, produced in 2009 and based upon researching the Radcliffe Observatory, Oxford, where the observatory becomes a metaphorical frontier to the stars (Philipz, 2009); Adrián Villar Rojas’ *The Theater of Disappearance* at the National Observatory of Athens in 2017, where he emptied part of the old observatory and added new soil and plants, including corn, melons, artichokes, wild grasses and bamboo to the hill top, returning ‘nature’ to a site of ‘culture’, and intermittently populating it with vitrines containing replicas of ancient and scientific artefacts, suggesting visitors to look at the earth instead of the stars (Cigainero, 2017); and the site-specific *Observatory Project* at the Ladd Observatory, Providence RI, USA, where artists, musicians and scientists took over the Observatory for three days, described as focused on ‘bringing science to the public through the lens of art and activating the imagination in a way that gets people excited about art, space science, and what can happen at the intersection of these disciplines’ (‘Science and Art at Ladd Observatory,’ 2013). Each of these projects contrast with and underscore the paradoxical quality of my own interest in siting an observatory *within* a gallery.

Projects that attempt to produce their own kind of observatory, which in so doing bear similarities to my own endeavour, include Doreen Garner’s performance *The Observatory*, 2014, a one-hour performance featuring the artist encased in a vitrine filled with stuffed condoms, hair, petroleum jelly and glitter in which: ‘Garner creates a scene of subjection whereby the vitrine simultaneously resembles the staging of freak shows, scientific inquiry, and artistic aura’ (Richardson, 2017:82); the *Camera Lucida* project by Evelina Domnitch and Evelina Domnitch from 2010 characterized as an interactive ‘sonic observatory’ that converts sound waves into light by sonoluminescence (Domnitch and Gelfand, 2004); and Carsten Nicolai’s exhibition entitled *Observatory*, held in 2013 at Ibid Gallery, London, which included a group of prints showing dust particles and a video work of cloud formations, with no additional installation or exhibition design the observatory title was a paratext of sorts to the works themselves. Closest to my own endeavour perhaps is the *Anthropocene Observatory* project during 2013 and 2014 by architects Territorial Agency (John Palmesino and Ann-Sofi Rönnskog), artist Armin Linke, and curator Anselm Franke at HKW, Berlin, composed of an archive and a series of video-based installations, seminars, debates and cultural interventions: ‘Operating as an observatory, a composition of documentary practices, discourses and interventions, the project traces the formation of the Anthropocene thesis.’ (Haus der Kulturen der Welt, 2016). The project was though documentary video based and not a group exhibition of the scale of *The New Observatory (TNO)*, rather the work of a collaborative group, and its focus was specifically the Anthropocene, as opposed to the more discursive focus of *TNO*.

Beyond literature and artists’ projects engaging explicitly with the observatory, another important context to my project is that of the notion of ‘new media’, intimated via the use of ‘new’ in title to the exhibition, which I will now briefly address. The uses within the field of art of what most would recognise today as new media, beyond traditional materials of paint, paper and stone, began with the modernist adoption of film, photography, and performance in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. How modernism defined itself through its experiments with new science, technology and media, has been explored in a number of studies, including survey works (Banham, 1960; Poggioli, 1981; Bürger, 1984), to cultural specific studies of Germany and Russia (Herf, 2008; Danius, 2011), or media specific works, for example literature (Goody, 2011; Morrisson, 2016). A subset of modernist art practice was radically transformed into what is now often termed ‘new media art’ from the mid 20<sup>th</sup> century onwards, via experiments with new emerging technologies including video, computer software and hardware, electronic components, mechanical systems, and networked computing (Wardrip-Fruin, 2003; Rush, 2005). These aesthetic enterprises led to dramatically new forms and conceptions of art, which were time-based, multi-media, and interactive. I will now review further literature in this field relevant to my thesis, identify areas of research that the thesis develops and with which my practice engages.

As Wendy Hui Kyong Chun has chronicled, the term new media emerged during the mid 1990's to usurp 'multi', 'mass', and 'digital', as the de rigueur catch-all term for contemporary media interface (Chun and Keenan, 2006:2). In Chun's introduction to *New Media, Old Media: A History and Theory Reader* she details the term's enacting of a conceptual distancing from old terms and their associated enterprises such as dotcom or cyberspace. In asking 'What is new about new media?' (Chun and Keenan, 2006:2) Chun suggests the answer lies in how activity around the field has been defined by the redrawing of disciplinary boundaries and the term becoming increasingly synonymous with the conjoining of art and computation (David Bolter and Grusin, 2000; Wardrip-Fruin, 2003; Gitelman and Pingree, 2004). I build upon this conception in my thesis but extend it beyond a computer and computation centrism, toward the technoscientific to include both observation and instrumentation. Note I use the term 'technoscience' for its articulation of how applied technology and tool use works in combination with and is sustained by experimental and observational science, and the scientific method (Latour, 1988).

Most influential and systematic in approach to the aesthetics of new media has perhaps been Lev Manovich's *The Language of New Media*. This work focuses on formal properties associated with historic aesthetic forms, such as the rectangular frame, cinema, and mobile camera that combine with the programmability, interfaces, networks and databases of modern computing and telecommunication, to forge a new media milieu (Manovich, 2002). Manovich proposes numerical representation, modularity, automation, variability, and transcoding, as key features that define new media's novelty (Manovich, 2002:27–47). Like Chun, there is a computer centrism at play in Manovich's conception of new media, which is largely a product of the time – the early 2000's – in which they were writing, when the full impact of smart phones, Internet of Things devices, and big data, all phenomena bound to increased prevalence of instrumentation, sensors, and observational practices, had yet to emerge. Accordingly, chapters 2 and 3 of this thesis address these developments.

### **The Act of Observation: Philosophical Contexts**

Having now outlined key literature that has engaged with the history of the observatory and observation, and more specific instances and contexts of arts engagement with it, I will now turn to an examination of the literature that pertains to observation in a philosophical sense. This is crucial to situate both the core subjects of my chapters: Liverpool Observatory in chapter 1; artist projects and the exhibition in chapter 2; the artist book in chapter 3; and my engagement with new materialist philosophy, the history and philosophy of science, and other philosophical literature that form the theoretical framework of my enquiry. I begin with a discussion of positivism in relation to observation, which leads to an interrogation of dualist notions of observation, before concluding with an examination of new materialist philosophy in relation to observation. Please note that I include here several slightly longer quotations, which were influential upon the narrative and language I employ in the *Obs* publication. In particular I seek to draw attention to them for their important articulation of the constructed and interventionist character of observation. They also function to foreground the discussion of primary textual material relating to the Liverpool Observatory discussed in chapter 1.

Let us turn now to a discussion of the embeddedness of observation relating to the construction and veracity of scientific knowledge. As James Bogen and James Woodward write: 'According to a widely shared view of science, scientific theories predict and explain facts about "observables": objects and properties which can be perceived by the senses, sometimes augmented by instruments.' (Bogen and Woodward, 1988:303). The work of Rudolf Carnap and other logical positivists of the Vienna Circle during the 1920's and 30's is central to this view, proposing a binary whereby for an observation not to be 'unobservable' it must be 'directly perceived by the senses' i.e. with such properties as; 'blue', 'hard', 'hot'. (Carnap, 1995:225). But as Bogen and Woodward articulate in a discussion of the logical positivist, Ernest Nagel and his description of melting points, direct observation is not necessarily more objective or truthful:

‘Nagel appears to think that the sentence "lead melts at 327 degrees C" reports what is observed. But what we observe are the various particular thermometer readings – the scatter of individual data-points. The mean of these, on which the value for the melting point of lead reported by Nagel will be based, does not represent a property of any particular data-point. Indeed, there is no reason why any observed reading must exactly coincide with this mean value.’(Bogen and Woodward, 1988:308).

Bogen and Woodward conclude their 1988 essay *Saving the Phenomena*, by stating that: ‘the differences between phenomena and what is observable (that is, data) are both striking and important. Events which are accessible to the human sensory system are rarely the result of a single phenomenon operating alone, but instead typically reflect the interaction of many different phenomena.’(Bogen and Woodward, 1988:351). A more complex picture emerges in the work of Bogen and Woodward that challenges the applicability of the narrow logical positivist position, and which is a driving theoretical consideration throughout my project.

In the mid twentieth century a body of literature emerged by authors within the history and philosophy of science, including Thomas Kuhn, Norwood Russell Hanson, and Paul Feyerabend, which continues to add complexity to processes of observation, focussing on the potential bias of observation. In particular, it was argued by Kuhn and others that empirical observational evidence cannot be used to test a theory without committing oneself to the theory a priori, and hence before the act of observation itself (Bogen, 2017). Such theory may attach to observations and accompanying evidence, creating what has been described as ‘theory-laden’ observation and presupposition (Hanson, 1958). In Norwood Russell Hanson’s *Patterns of Discovery*, he proposes that what we see and observe is not what our primary senses receive, but is implicitly filtered sensory information, and the filter is defined largely by existing preconceptions and theory (Ibid.). Thus this underscores the necessity for critical reflection upon the ‘theory-laden’ character and potential bias, or filtering augmentations, of observation, which my own project engages.

More recent literature in the field of the philosophy and history of science, further unpacks the entanglement of the senses, augmentation, and instruments in observation. An important writer in this field is the historian and philosopher of science Hasok Chang, who writes that:

‘There is no necessary correlation between the immediacy of our access to something and its trustworthiness, although immediacy does often create a psychological feeling of certainty... Just as the reliance on certain instruments can be withdrawn by agreement, so can the credence in some human observers (declared insane), their specific modes of sensation (as colour-blind, hard of hearing, etc.), or specific instances of observations (as hallucinations). Still, we are pretty well stuck with taking the testimony of human senses on the whole as a starting point of our empirical knowledge.’(Chang, 2005:883)

Here Chang suggests that observational acts rely upon both subjective experience and something approaching faith. Ian Hacking’s work is also relevant in this regard, through his research exploring whether observers need even to know how an instrument works, or apply theory to it, in order to use it, produce, and interpret reliable data. In particular, Hacking’s *Representing and Intervening* provides the example that observations from the 19<sup>th</sup> century, through to this day, made with microscopes, are both trusted and empirically accurate despite biologists often having little understanding of the physics underpinning how microscopes work (Hacking, 1983:186–209). Further to this Bas Van Fraassen argues in *The Scientific Image* (1980) that theory should not be seen simply as an encumbrance to observation, but rather that the science of observation must be aware of its limits, its potential to produce confirmation bias and mistaken conclusions. Fraassen’s theory of constructive empiricism proposes that science aims at truth regarding observable aspects of the world, but does not aim at truth about unobservable aspects, instead theory is only empirically adequate (Monton and Mohler, 2017).



The above literature outlines the shifting, oscillating, co-constituting phenomena of observation that is constantly relocating phenomena and data between the senses of the observer, instruments, and the thing (under observation) itself. In such a formulation, the power of theory upon the human senses, and vice versa, is both problematic and undeniable. Furthermore, it provokes important questions about the comparability of observations and, crucially for this thesis and my own practice, the degree to which creativity or invention is at play. What is clear is that the lines of influence are multi-directional. My own project attempts to interrogate these factors of observation through the exhibition and publication, producing specific sites and situations for both experimentation and observation. In this way the project builds upon Dudley Shapere's theory of the 'observation-situation' that seeks to attend to this diversity of influence, temporality, and localisation of effects at play in observation (Shapere, 1982). Shapere asserts that the:

'... specification of what counts as directly observed (observable), and therefore of what counts as an observation, is a function of the current state of physical knowledge, and can change with changes in that knowledge... More explicitly, current physical knowledge specifies what counts as an "appropriate receptor", what counts as "information", the types of information there are, the ways in which information of the various types is transmitted and received, and the character and types of interference and the circumstances under which and the frequency with which it occurs.' (Shapere, 1982:492)

I extend the above to an investigation of the observatory, through the exhibition and publication, and this thesis – as a uniquely situated 'observation-situation'. In addition, one may usefully link Shapere's concept of the 'observation situation' to Donna Haraway's notion of 'situated knowledges' which develops a feminist orientated objectivity and empiricism (Haraway, 1988) that is lacking from the male dominated literature I have discussed up to this point. Haraway's work is important in the genealogy of new materialist philosophy, which offers much in regard to a transdisciplinary engagement with observation and the observatory, which I will discuss in more detail in later part of this review.

But to return to the key implications of the above body of literature for my project and thesis. It demonstrates that caution must be exercised regarding both equating the inability to observe something directly with a negation of existence, and the observation of some 'thing' with its a priori existence. This has particular implications for how today our bodily sense perception is co-constituted with a wide variety of technical sensors, apparatuses, and data, and how the notion of direct observation may be replaced by something more multi-lateral, dynamic, and diffuse. Artistic and scientific thought and practice produces itself through an *apparatus of observational production*, that includes an assemblage of textual, visual, instrumental, and social practices. This notion of the apparatus of observational production is an evolution of Donna Haraway's concept of the apparatus of 'bodily production' (Haraway, 1991:200), which she in turn developed from Katie King's term 'apparatus of literary production' (King, 1991), both emphasising the technologically and socially mediated and augmented charter of knowledge creation.

It is the powerfully *connective* and augmenting nature of observation, and by extension the observatory, which makes it a particularly useful subject and potent as means to study the wider relations between art and science. As Gianna Pomata writes, the observatory and observation has historically been a means to create 'thought collectives', 'instruments of community building' and 'tools for the establishment of a collective scholarly endeavour as a social and intellectual shared space' (Pomata, 2011). Within this networking and development of complex apparatuses of knowledge making, observational and instrument bound practices have had a significant affect on contemporary culture. As Simon Schaffer has written, technological rhetoric involved in scientific instrument making and use, has played an important part in dividing nature and culture, due in large part to their 'makers' quest for both kudos and profit. Schaffer writes: 'Technologies such as the telescope had simultaneously to be the unambiguous property of their masters, yet their lessons must be accounts of Nature's properties.' (Schaffer, 1998b:186). A focus on the observatory enables both an engagement with specific instrument based practices, but also

how instruments and wider social activities interact with one another. The observatory, and its artistic and curatorial reimagining within my project, functions as a site and means to explore these divisions between human invention, culture, and nature.

The work of Michel Serres offers an important framework to understand instruments and the observatory in more complex terms, as a place for nature to commune and overlap with culture, as an instrument less of man, but of matter. This inverted sense of the observatory and its instruments, as an instance of what I would describe as *the world writing upon itself*, is in evidence in Michel Serres' description of the gnomon<sup>2</sup> in his essay 'Gnomon: The beginnings of geometry in Greece' (Serres, 1995b). Vera Bühlmann provides this revised translation of an important passage in the essay and the action of the gnomon: 'The world renders itself visible to itself, and regards this rendering of itself: here resides the meaning of the word *theoria*. To put it more clearly: a thing – the gnomon – intermits the world through stepping in, such that the world may read on its own surface the writing it leaves behind on itself.' (Bühlmann, 2014). Here the gnomon becomes an artefact of inscription *and* more-than-human agency, a characterisation I believe we can extend to the observatory, which also acts as an inscription device simultaneously *of and upon* the world.

Articulated in these terms, the observatory can be situated within what Serres has described as the 'theatre of measurement' (Serres, 1982). Serres writes:

'The world represents itself, is reflected in the face of the sundial and we take part in this event no more and no less than the post, for standing upright, we also cast shadows, or as seated scribes, stylus in hand, we too leave lines. Modernity begins when this real world space is taken as a scene and this scene, controlled by the director, turns inside out – like the finger of a glove or a simple optical diagram – and plunges into the utopia of a knowing, inner, intimate subject.' (Serres, 1995b:82)

Interpolated in such a space, human and instrument become interchangeable, co-constituting the other and forging radically new understandings of and interactions with life. Steven Brown contends that in his work Serres begins to demonstrate 'both the crucial role of mediators, such as the gnomon, in the constitution of knowledge, and the fundamental in-stability of the positions of 'observer' and 'observed' (or 'sender' / 'receiver'; 'subject' / 'object'), Serres begins to make a sound case for suspending the traditional division between human and artifact.' (Brown, 2005:222). Within Serres' work and aforementioned literature, a scene emerges of the observatory as inscription device for the physics of the earth, a construction of earth or matter singing as much to itself, as humans banging the drum. There is though an absence within this literature, of an application to contemporary observation, and newer technologies, which my project and this thesis attempts to address.

For example, one important contemporary 'theatre of measurement' that my project relates to is the smart city, but although there is a body of literature on smart cities, there is very little that connects strongly to the history of observation or the observatory. Closest in recent times is perhaps the work of Orit Halpern, whose analysis of smart cities and big data's impact on vision and cognition connects to aspects of my thesis and is an important context to the observatory project. As Halpern writes of smart cities: 'These structures encourage the proliferation of ubiquitous computing infrastructure to the point where vision loses any function in producing identification or recognition between or within subjects. This transformation in population and subjectivity is about the shift from an observing subject to a "user".' (Halpern, 2015:240) In this 'many to many' space, interaction and observation on a 'one to one', and 'one to many' level, which may be enabled with the book and gallery, have a renewed currency and necessity for engaged theoretical enquiry and practice.

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<sup>2</sup> Gnomon is used variously to describe: the part of a sundial which casts a shadow, a line drawn perpendicular to another, or the increment between two successive figurate numbers including square and triangular numbers.

My project attempts to attend to the creation of these new subjectivities, affects, and effects of the smart city and other contemporary forms of observation and the observatory. Through both curatorial and publishing modes I simultaneously unpack observational contexts and seek to add a certain ambiguity or flux to the status of, and phenomena that define, the observatory. Both its matters of concern, for example tides or stars, and the instruments, from telescopes to coffee pots, and employees and communities that make-up its interior and praxis. In attempting to apprehend this complexity, and coupled to earlier literature I have reviewed, which seeks to question the boundaries between nature and culture, I will now turn to new materialist philosophical literature that is an important framework for my project.

W. E. Connolly describes new materialism as:

‘the most common name given to a series of movements in several fields that criticize anthropocentrism, rethink subjectivity by playing up the role of inhuman forces within the human, emphasize the self-organizing powers of several nonhuman processes, explore dissonant relations between those processes and cultural practice, rethink the sources of ethics, and commend the need to fold a planetary dimension more actively and regularly into studies of global, interstate and state politics.’(Connolly, 2013:399)

This statement though useful in its summary of various major tenants of new materialism, is problematic in its failure to mention the feminist roots of new materialism or point toward what such relations may be. For an articulation of this last aspect Iris van der Tuin and Rick Dolphijn offer this characterization:

‘New materialism shows how the mind is always already material (the mind is an idea of the body), how matter is necessarily something of the mind (the mind has the body as its object), and how nature and culture are always already “naturecultures” (Donna Haraway’s term). New materialism opposes the transcendental and humanist (dualist) traditions that are haunting cultural theory... [shifting] these dualist structures by allowing for the conceptualization of the travelling of the fluxes of nature and culture, matter and mind, and opening up active theory formation.’(Dolphijn and van der Tuin, 2012:48)

This emphasis within new materialism as a space of active theory formulation and Haraway’s conception of ‘naturecultures’ is integral to my project’s attempt to rethink the act of *observation as an entangled intra-action*<sup>3</sup> of natureculture. In so doing I attempt to evolve Lorraine Daston and Elizabeth Lunbeck’s conception of observation as ‘a highly contrived and disciplined form of experience that requires training of the body and mind, material props, techniques of description and visualisation, networks of communication and transmission, canons of evidence, and specialized forms of reasoning’ (Daston and Lunbeck, 2011b:3) toward more radical understandings and enactments of the agency of matter. Experimenting with how new observatories, and new understandings of observation, may become spaces of experience to train a new kind of materialist sense of agency and to reflect upon observation itself. In so doing, my project asks, can the observatory reroute preconceived and historic forms of observation through a more critical, creative and diffractive lenses? Forging a discursive space, extrapolating additional points of materiality and connectedness between different affects and zones of enquiry, enacting a process of ‘diffraction’ that as Haraway writes ‘train[s] a more subtle vision.’ (Haraway, 1992:300).

The observatory has historically been a site with a complex relationship to human agency. Observatory technologies and other imaging techniques both intensify and exclude human observation. Mechanical replacements of human inscription and observation, in particular self-registering devices have been championed and promoted as a means to overcome human bias and inaccuracy (Daston and Galison, 1992). This echoes Donna Haraway’s expounding of technology as a challenge to false distinctions between nature and culture, matter and technology, human and non, as worked through in her seminal

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<sup>3</sup>Intra-action’ is based upon physicist Niels Bohr’s work following the famous ‘two-slit experiment’ of inherent discontinuity in measurement suggesting ‘that one must reject the presumed inherent separability of observer and observed, knower and known’ (Barad, 2003), which ‘conceptualizes that it is the action between (and not in-between) that matters.... the mutual constitution of entangled agency’ (Dolphijn and van der Tuin, 2012:14).

'Cyborg Manifesto' (Haraway, 1991). Crucially my research seeks also to explore how measurement and its inscriptions may also fundamentally constitute and enliven the world. From the commissioning of David Gauthier's work, which included a trip out to sea to explore how a waverider buoy *lives*, to pages 128-132 in *Obs*, for example, which employ a mantra like evocation of how observation of phenomena *is and becomes* phenomena itself. In this sense my practice attends to Timothy Lenoir's articulation that: 'attention to the materiality of inscription themselves... demonstrate[s] the extent to which inscription devices actually constitute the signifying scene in technoscience... [which] does not lead to a flight from "reality" into a discourse that is speaking all by itself, a play of signifiers without signifieds, a reduction of subatomic particles to text.' (Lenoir, 1998:12–13). Rather my project explores how observational inscription, measurements, and data, are real in themselves, constitute phenomena in their own terms, and are not simply defined by that which they represent, value, or sense.

In this regard, I seek to explore and articulate how observation and the observatory are part of a posthumanist and new materialist naturecultural continuity *and* community. As such, the project responds to the ethical imperative of embeddedness within such a technoscientific scene, whereby, as Rosi Braidotti has written, there is a need to: 'define the critical posthuman subject within an eco-philosophy of multiple belongings, as a relational subject constituted in and by multiplicity, that is to say a subject that works across differences and is also internally differentiated, but still grounded and accountable. Posthuman subjectivity expresses an embodied and embedded and hence partial form of accountability, based on a strong sense of collectivity, relationality and hence community building.' (Braidotti, 2013:50). In response to these imperatives, I propose the observatory as resonant site for such posthuman community building.

My project proposes an articulation of an intra-active aesthetic process that challenges the bounded status of observed and observed, developed further in this thesis, and the exhibition and publication themselves. Such an approach is informed by an engagement with Karen Barad's materially situated and continually 'becoming' notion of observation, where: 'The point is not simply to put the observer or knower back in the world (as if the world were a container and we needed merely to acknowledge our situatedness in it) but to understand and take account of the fact that we too are part of the world's differential becoming. And... that practices of knowing are specific material engagements that participate in (re)configuring the world.' (Barad, 2007:91). In Barad's terms, informed by quantum theory, observation is *agential in itself*, before any human consciousness of, or engagement with, its inscriptions. To unpack the implications of this further, let me turn to one further Barad quote, as it is crucial to the overall context of the project and situating subsequent chapters, she states in her reading of Niels Bohr's work:

'Bohr argues that the indeterminacy of the measurement interaction is of profound consequence: Since observations involve an indeterminable dis-continuous interaction, as a matter of principle, there is no unambiguous way to differentiate between the "object" and the "agencies of observation." No inherent Cartesian subject-object distinction exists... Indeed, Bohr's term "agencies of observation" evokes his new understanding of the nature and role of agency in scientific practices, although this understanding is not developed in his writings.' (Barad, 2007:114)

It is here in this tantalisingly undeveloped area of Bohr's work that Barad has done so much to enliven, demonstrating how processes of observation radically affect the world and demonstrate its entangled agencies, that my curatorial and publishing processes and artefacts are rooted within. There is I would argue, an absence of literature or work exploring how such non- or more-than-human agency may relate to both contemporary art practice and new media cultures. As Rick Dolphijn and Iris van der Tuin write, new materialism 'proposes us to think the real without it first being represented in the human mind... proposing a radical anti-anthropocentrism, which refuses to see truth only in how it can possibly appear to the human mind.' (Dolphijn and Tuin, 2012:88). And they continue: 'New materialism wants to move away from the authoritative scholarly attitude and from everyday utilitarian common sense, and wants to

engross itself in what is “ontologically prior”.’ (Dolphijn and van der Tuin, 2012:92). However, what is left unresolved and demands further engagement is the degree to which this focus on the non-human, fails to meet the ethical, and some might say humanist, imperative that is now demanded by climate change and an increasingly technologically mediated world.

The commissions within *The New Observatory* exhibition and my own artwork, attempt in part to address these questions, and explore the truth or relevance of this possible lack. The project and this thesis seeks to bridge gaps, through an exploration of the links, betweenness, and intra-actions of the history of observation, contemporary art, and my own discrete curatorial and artistic practice. Exploring how such practices meet the ethical imperative to critique processes of observation and new materialism’s complex articulation and mapping of the agency of matter, within the context of emerging technologies. It is also an exploration of the degree to which there is, or is not, a two-way conversation between the art and science of observation. In this regard, my project echoes earlier relations between the art and science of observation, for example, following on from the above impact of Bohr on Barad, one may cite the influence of cubism on quantum science and Bohr himself, in particular Jean Metzinger’s painting *La Femme au Cheval* (1911-12), owned by Niels Bohr which it is suggested may have had an effect upon his non-intuitive complementarity principle (Schinckus, 2017).

I now turn to discuss in detail the methodology I employed within the project, as an artist and curator, researching the observatory, commissioning artwork, and producing text-based work for the publication.

## Methodology

I employ three principal methods in this project; archival research, curation, and art practice centred on creative writing and book making. It should be noted at the outset of this section on methodology that my project is a practice-based investigation undertaken with the intention to acquire new knowledge predominantly by the methods and outcomes of the practical components and the practice itself. In approaching the project in this way I am necessarily suggesting that the subject of the observatory and observation benefits from this methodological approach, as opposed to, for example, a purely theoretical text-based enquiry. The principal reason underlying this rationale is threefold. Firstly, my suggestion is that the physical practice-based materialisation of both exhibition and book enables others, principally gallery visitors and book readers, an experiential and experimental encounter with the subject of the observatory and observational technoscience, which the distributed and dematerialised character of the subject both eludes and necessitates. Secondly, that particular aspects of observational technoscience defined by processes of surveillance, data capture, and propositional knowledge, demand new resistant, obfuscatory, and counter strategies, especially those which are practice-based and operate beyond the purely theoretical or academic, which I argue the mediums and strategies of the public exhibition, printed artist book, fictional narrative, and aesthetic experimentation offer. Finally, the theoretical frameworks I employ of new materialism and posthumanism are both spaces of lively interaction between theory and method, particularly in the arts as evidenced by, for example, the practice-based PhD project *minoritarian ecologies: performance before a more-than-human world*, recently completed by mirko nikolic at the Centre for Research and Education in Arts and Media (CREAM) at the University of Westminster (nikolic, 2017). My own project and method seeks to relate to and feed into these current conversations and methods operating fluidly between theory and practice.

I will now introduce each element of my methodology, beginning with archival research, before moving on to discuss curation, and finally art practice centred on creative writing and book making. These methodologies and discussions will also be expanded upon them in subsequent chapters.

### Archival Research

The first phase of my project was defined by historical remnants relating to the Liverpool Observatory found in various archives, primarily Liverpool Records Office and National Museums Liverpool. This archival research functioned as a key device to produce material and organise ideas for subsequent phases of the project, including the historical context and thematics informing and present within the book and exhibition. It should be noted that at the outset of this research I was not undertaking it to serve a specific outcome and I did not know where it would lead. However, information and narratives I encountered within the archive began to direct the subsequent practice-based processes, outcomes, and wider theoretical research I have undertaken. In particular, the Liverpool Observatory's coming into being in the 1840's coupled to its subsequent evolutions toward a more distributed character, emerged as a defining focus of my research, and is reflected by my interest in developing a *new* observatory within the exhibition and book's narrative. Thus the archive, and its traces of the old observatory, became an artistic resource and catalyst for the extraction and recycling of new artistic outputs. In this way, my process became one of détournement or appropriation in an expanded, discursive form, seeking to translate the spirit of the historic observatory. Moreover, the Liverpool Observatory began to serve as a measure or reference point from which to analyse our contemporary *observe-atory* condition, notably, what has changed and what remains the same. As Kierkegaard wrote: 'We live forward, we understand backward.' (James, 1909:244) and equally my own project, like this thesis, is defined by historical reflection and contextualisation, coupled to contemporary and future orientated practices.

The archive is an accumulation of traces, a repository of primary sources, which can take many forms, as can methods for researching them. At the beginning I was working with and through the idea of ‘liquid agency’, a term born from my engagement with new materialist theory, of which a significant aspect is the foregrounding of the agency of matter, as discussed in the literature review.<sup>4</sup> Focusing on liquid, one of the four fundamental states of matter, I began my project by investigating its agency in shaping Liverpool, from contemporary alcohol consumption, to the history of seafaring and trade in the city. In so doing, I was attempting to combine new materialism with a more socially engaged and place specific research methodology. An early method I employed was to use variations of the term ‘liquid agency’ in keyword searches on the Google web search engine. For example, ‘liquid agency Liverpool’, led me to a Liverpool-based advertising agency called ‘Liquid’. This result suggested that perhaps the notion of agency is more synonymous with advertising companies, than the abstract notion of a material’s capacity to act or organise itself autonomously and shape a city, for example. Accordingly, I replaced agency with ecology, the closest term to my own use and sense of agency, searching ‘liquid ecology Liverpool’, which led me to the website of the National Oceanographic Centre in Liverpool, that had a history tab on its website detailing its origins in the Liverpool Observatory. In particular, alongside intriguing information on longitude, time balls, the One O’Clock Gun, there was an airbrushed image c. 1950, of a tidal prediction machine – see below. This image resonated strongly with me and I went on to search ‘Liverpool Observatory’ using the Google Image search function and found an equally powerful image of the observatory itself, photographed at a slightly oblique angle to capture both its street frontage and the instruments on its roof. I was immediately struck by a certain kinship between the Observatory and FACT – both community-embedded technology-led institutions.

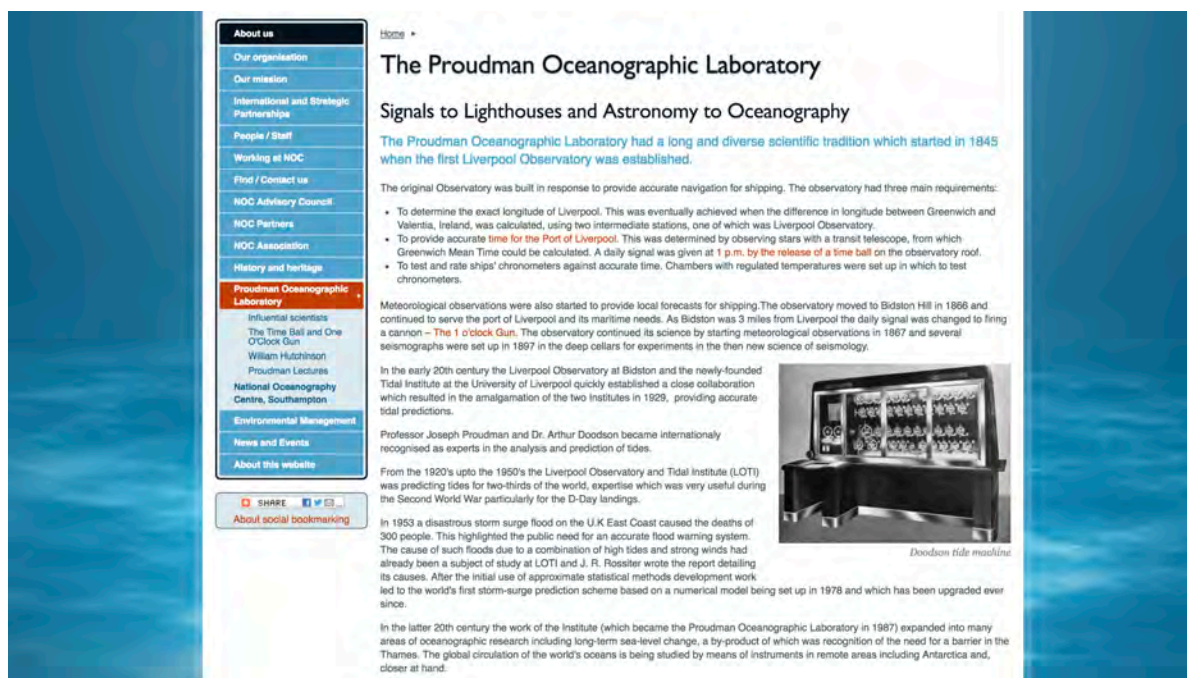


Fig. 1: Screenshot from Proudman Oceanographic Laboratory website: <https://www.noc.ac.uk> [accessed 01.08.2016]

<sup>4</sup> I should note that Zygmunt Bauman’s works, including *Liquid Modernity* (2000), *Liquid Love* (2003), and *Liquid Times* (2007) were not consciously at work in the development of this term, but having read some of his work may have had a certain agency and presence in my nonconscious.

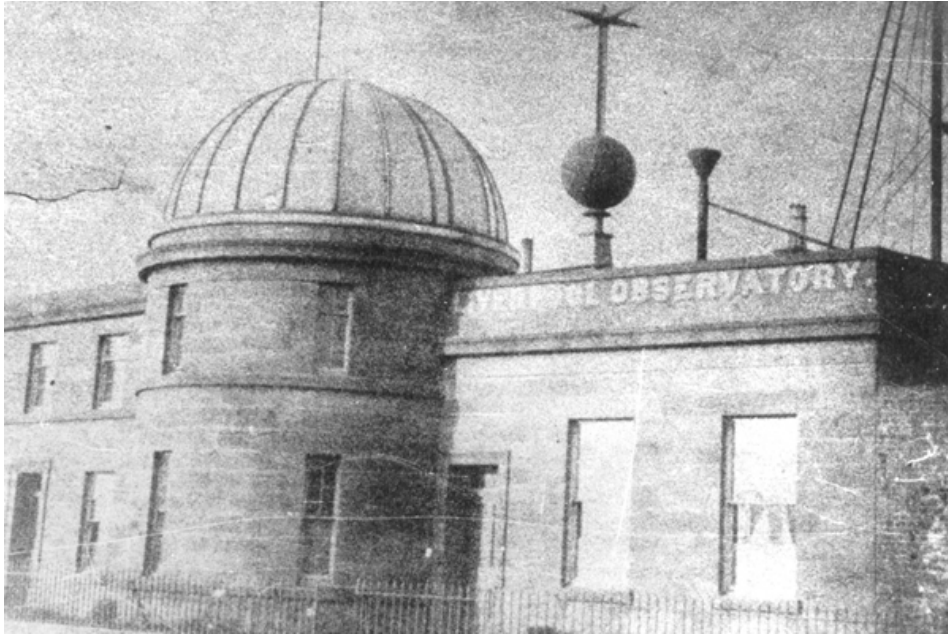


Fig. 2: Liverpool Observatory, c. 1850, courtesy Liverpool Records Office

The materiality of the images themselves had a certain power. The chrome shimmer of the airbrushed prediction machines, the bleached and grainy quality of the observatory image. The images possessed their own agency, and seemed to reach for me, as much as I reached for them. In this sense, the images and my reaction to them embodied Roland Barthes' concepts of 'studium' and 'punctum' as described in *Camera Lucida* (Barthes, 1981). Studium, describing my cultural and academic reading of the photograph, and punctum implying what Barthes articulates as a 'wounding', generating a close relationship with the the subject of the photo, and engendering 'a temporal hallucination' (Barthes, 1981:115). Here my method becomes *affective*. Affective method is an often under acknowledged part of knowledge production (Knudsen and Stage, 2015). It is a product of both an affective encounter and embodied process, and one that is a fundamental part of this project and my practice, from visiting archives to discussion with artists. It is a means to observe and give form to both my own affective experience, and the affective quality of the archive and textual material itself.

The affective character of my methodology, and in particular the use of the archive, catalysed my project and was intensified as I further researched the observatory, encountering its living history in the form of documents, artefacts, people, and places. During the course of the project I visited the Liverpool Records Office, National Oceanographic Centre - Liverpool, National Museums Liverpool, The Royal Society – London, Archive of the British Association for the Advancement of Science at the Bodleian Library Oxford, and the Royal Greenwich Observatory Archives at Cambridge University Library, in pursuit of material related to Liverpool Observatory. Each require processes of application, identification and the following of strict rules to their use, which peculiarly augments the historic character of the items. It is important to note also the variously civic, national, and royal character of these archives, which as Thomas Richards has written of the imperial archive: 'theirs was a paper empire: an empire built on a series of flimsy pretexts that were always becoming texts' (Richards, 1993:4). In this sense my research and its outcomes functions as another iteration of the observatory's continual becoming, and generation of more texts, from the gallery interpretation panel to an artist book.

This process of becoming, of the genesis of the observatory, its being brought into being, via the rhetoric of science, imperialism, and its associated documents, emerged as a central concern of the project via my archival research and method. This also influenced the curatorial conceit for the development of *another* new observatory in Liverpool, at FACT. This method of bringing forth, functions as a means to explore the Liverpool Observatory's original formation, and is translated into a key theme within my artist book; the genesis and growth of observatories. Underpinning this approach is an important question for the



project: to what extent is the archive controlling the future, which as Michel Foucault wrote, ‘defines at the outset the system of its enunciability’ (Foucault, 1972:129).<sup>5</sup> Where the archive ‘represents a kind of machinery or technology for asserting life against death, giving voice to the past by fixing the meaning of what it inscribes’ (Moore et al., 2016:4). Accordingly, the methodology of my archival research and the outcomes and inscriptions that flow from it - the exhibition and book - attempt to push at these limits of enunciability, inscription, and ideological constraint.

My processes of identifying, locating and interpreting relevant documents are presented in detail in chapter 1, and form the basis of briefs and conversations for artist’s commissions described in chapter 2. How the trace of the archive links to the materiality of inscription itself in the form of measurement and scientific and technical instruments, and my own methods of writing and book making, are examined in chapter 3. Threaded through all these processes and outcomes, and which I augment with my archival method is the complimentary practice of media archaeology. Media archaeology, developed out of Foucault’s concept of, and book entitled, *The Archaeology of Knowledge*, seeks to mine the system of rules that govern discourse (Foucault, 1972). More recently media archaeology has been developed by scholars including Friedrich Kittler, Eric Kluitenberg, Anne Freidberg, and Jussi Parikka, who analyse specific emerging technologies via their preceding iterations with a focus on the materialities and technologies of media themselves (Huhtamo and Parikka, 2011; Parikka, 2012a). Within the context of my own project’s reimagining of past technologies of observation, media archaeology’s additional focus on how the *imaginary* quality of technology affects its actual development, is particularly relevant. As Natale Simone states, ‘the question of how such feedback between technology and imagination actually takes place’ is axiomatic and on-going (Natale, 2012:525). Fundamental to my project and methodology then is to engage the archive and observatory, in conjunction with processes of media archaeology, as a tool to understand and highlight the relevancy of the old observatory to contemporary issues of technoscience, such as smart cities and big data.

Accordingly, my method and study seeks to articulate how observational technoscience has become ever more embedded within the sphere of media, for example through processes of data capture inherent within smart cities and social media platforms. Scientific processes and technologies of observation have migrated from operating primarily within the field of science, to operate more broadly within the fields of everyday communication and media. Media history, as opposed to media archaeology, has historically tended toward a narrow interpretation of the term media, focusing research on the production of mass media for broad audiences, such as newspapers, and concerning itself less with the media themselves or links to technoscience, than their social, cultural and political significance (Bösch, 2015:6). My own method seeks to consider the observatory within the fields of both technoscience and media. In so doing, my method is indebted to Marshall McLuhan’s approach to media history that considers the subject in broader terms, principally through the prism of bodily augmentation and extension, such as money or the wheel (McLuhan, 1964). However, neither traditional media history or McLuhan’s work go far, or are contemporaneous, enough, for the subject of the observatory, and thus I position my study primarily within the field of media archaeology for its lively present-day discourse and its closer engagement with the history and philosophy of science. As Jussi Parikka has written; ‘media archaeology is one answer to the need to think transdisciplinary questions of art, science, philosophy and technology [together]’ (Parikka, 2012b). Finally, within the context of staging an exhibition at FACT, this archaeological approach enables an unearthing and redirection of knowledge surrounding, and interest in, local history via the observatory toward contemporary issues and debates of observation, particularly for an older audience that may do not normally engage with new media art, ergo the valence of an *old/new* observatory.

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<sup>5</sup> For example, the *Superintendent* of the Special Collections Reading Rooms at the Bodleian Library which houses the British Association for the Advancement of Science Archive, advised that any further use of materials, including taking photographs, from within the archive requires the permission of the Chief Executive of the British Science Association, which was pivotal in the development of the first Liverpool Observatory. Thus the paper trail and influence of documents related to the Liverpool Observatory are still closely controlled 170 years after production.

## Curating – technoscience, new materialism, and new communities

As Terry Smith has written curatorial practice is no longer limited to exhibition or museum spaces and care of collections, but has expanded to include the production of ideas, with a new emphasis on the contemporary, and mediating between the viewer, the work, and the artist (Smith, 2012). Within this expanded space the lines between artist and curator have become blurred. For this project I define my role and methodology as artist *and* curator, as opposed to that of an artist-curator, which tends toward more of an amalgam of processes. In a grammatical sense, the conjunction ‘and’ functions to join items that are of equal importance, as opposed to that of hyphen for example in artist-curator, where the hyphen joins the words to indicate a more combined meaning. It is interesting to note how the Tate Glossary describes the role: ‘The artist-curator tends to remain outside the commercial art world, and within a community of artists – often ones with whom they studied, or of a similar generation – who are frustrated by the perceived impenetrability of the art world.’ (Tate, n.d.). This is I would suggest a flawed and partial description, but I include it as evidence of how the relationship between artist and curator may be described and the somewhat negative standing it holds for some. I do not describe my practice as that of an artist-curator, or am I using the method ‘artist as curator’, joined via the preposition ‘as’ to indicate somebody appearing to be somebody else, or describe the purpose or quality of someone (Jeffery, 2015; Filipovic, 2017). Constraining my artistic practice primarily to the publication enables me to some extent adopt the more traditional role and method of curator for *The New Observatory* exhibition who partially ‘disappear[s] behind the process of mediation’ and where the artwork takes precedence (Doubtfire and Ranchetti, 2015). This was also I believe crucial to enabling the effective co-curation of the exhibition with Hannah Redler-Hawes and to enable me to respond effectively to the pragmatic demands of staging an exhibition in a public gallery.<sup>6</sup> Although, returning to the affective methodology which I described earlier, I cannot of course split in two or make things disappear, and a certain discursive oscillation between these roles is fundamental to my method, and is returned to in chapter 3.

The chicken and egg causality dilemma, or duck rabbit illusion, is comparable to the conundrum of the dual practice of an artist and curator. It is a problematic method if linear causality is sought, less so if they can exist simultaneously in a dialectical relationship. How my methods of artist and curator inform, challenge, and constitute one another is a key question for my project, as is the extent to which historical precedents enable and inform these practices. As Celina Jeffrey has described, traditionally it is the artist not the curator who creates meaning, but new curatorial practices, in particular thematic group exhibitions of the type that *The New Observatory* is an example, trouble such definitions (Jeffery, 2015). My thesis, in particular chapter 2 that details artists’ projects, self-consciously employs a methodology which investigates how in depth archival research and curatorial concepts can be communicated to artists and collaborative relationships forged, which resist processes of curatorial instrumentalisation.

My own method follows in part that of the conceptual artists of the 1960 and 70’s who cleared a path for the increased independence of the curator in the 1980’s and 1990’s and a convergence between the curatorial and artistic practice (O’Neill, 2012). Demonstrated by the proliferation of group exhibitions and temporary projects with artworks cast as illustrative fragments that came to be understood as the creative work of curator-auteurs (Ibid.). In my engagement with a themed group exhibition, the project also follows in the lineage of curators such as Harald Szeemann and Kasper König, and more recently Okwui Enwezor or Lynne Cooke, known for delivering large-scale themed exhibitions defined by sizeable bodies of research articulated through assemblages of contemporary artwork (Altshuler, 2013).

My research seeks to evolve this practice using two principle methodologies, on the one hand a new materialist approach informed by my use of the term ‘liquid agency’ to guide archival research, which couples to the commissioning of artworks informed by histories of technoscience and new philosophy exploring the agency of matter. And on the other more socially engaged art practice that seeks to activate gallery space as a live unfolding space, where collaboration and co-authorship are promoted, in

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<sup>6</sup> See appendix for letter from Roger McKinley, Research Manager and my supervisor at FACT, for further detail on the curatorial process.

combination with the project's focus on local history. I describe the conjoining of these aspects as a *new materialist community arts praxis* or a process of *curating the material community*. Here by the using the term 'material community' I am describing a community of human and more-than-human entities, encompassing the technological to the biological. This terminology attempts to forge a dialogue and methodology via an encounter between community art practice and new materialist philosophy, exploring what each has to offer the other.

The dialogue between new materialism, and associated theory such as Object Orientated Ontology, and the arts to date has, I would argue, tended to focus on inert objects and traditional artistic media, appropriating its radical onto-epistemologies for more conservative ends, in particular a private gallery system defined by a network of objects sold to the wealthy. As the introduction to the recent *Realism Materialism Art* reader suggests:

'A chief attraction of object-oriented philosophy for the art field is that it reconsiders the art friendly term "object." Moreover, many of the curatorial and artistic responses to Object-Oriented Ontology (OOO) have focused on its ontological "flattening" of the traditional hierarchy of humans over nonhumans and decentring of the human subject, proposing that all entities distort relate in equal measure. Such claims accord well with modern and contemporary art's long-standing interest in the limitations of human perceptual and linguistic conditions of understanding, as they have also (sometimes contradictorily) advocated for a relative independence and internal logic for the artwork in its material and formal dimensions.' (Malik et al., 2015:27–28.)

These practices are in evidence in recent exhibitions such as *Resonance and Repetition* (2012) curated by Rivett art collective at Elizabeth Foundation For The Arts, NYC, *Things Matter* (2013) at Or Gallery curated by Klara Manhal, and *The Return of the Object* (2012-13) at Invaliden1 curated by Stefanie Hessler. These exhibitions predominantly comprise galleries filled with strange looking inanimate objects, to put it in crude terms, using new materials sometimes, but still essentially group exhibitions of sculptures, and accordingly the degree to which they herald or engage with the all the possibilities of a *new materialism* is questionable. I appreciate they did not set-out to do this, but rather I note this burgeoning curatorial milieu as a reference point for my own practice.

This somewhat constrained and conservative trend toward post-humanism within the art world is further demonstrated in the new materialism and arts reader entitled *Carnal Knowledge*, in which almost all work discussed is studio bound (Barrett and Bolt, 2013). While the studies therein provide new understandings of the complex relations between materiality, nature, culture, body, language and knowledge, there are no examples of what I would consider new materialist art or curatorial practice beyond the studio, instead it simply enacts a new materialist theoretical method of interpretation or re-reading of old forms. The collection fails to address a more participatory, socially engaged art practice. Why is this? Does the human component trouble a post-human or matter/object orientated stance and ontology? This question remains a touchstone for the project, and my own methodology seeks to work through these tendencies, enacting a less object orientated ontology, and instead exploring the possibilities afforded via an interaction between new materialism's more feminist and technoscience ethical leanings combined with new media, community-based, and site-specific art practices.

Beyond these methods and contexts, the exhibition was parasitical in its staging or hosting of an institution within an institution – the observatory within FACT. In this sense, it follows a lineage of institutional critique, which in its convergence of curatorial and artistic practice reflects arts own spatial housing and underlying administration, and the concept and social function of art itself. Such institutional critique has a natural simpatico with social constructionist approaches to the philosophy of science, explored for example through the curatorial projects of Peter Weibel and Bruno Latour at ZKM, Karlsruhe, to which my own methodology is somewhat indebted, including *Iconoclash*, in 2002, which was followed by *Making*

*Things Public: Atmospheres of Democracy*, in 2005. There is an approach that sees the exhibition as both aesthetic abstraction and real or useful tool, a laboratory of both observation and experimentation. Writing in the catalogue for *Making Things Public* Latour states 'The other half lies in the issues themselves, in the *matters* that matter, in the *res* that creates a *public* around it.' (Latour and Weibel, 2005:6) One can extend this play on the term matter to Karen Barad's influential work on 'how matter comes to matter.' (Barad, 2007).

Most recently Latour curated *Reset Modernity* with a team at ZKM in 2016. He writes in the *Field Book* which accompanies the exhibition: 'In this exhibition, we offer you to do something similar: resetting a few of the instruments that allow you to register some of the confusing signals sent by the epoch. Except what we are trying to recalibrate is not as simple as a compass, but this most obscure principle of projection to map out the world, namely Modernity.' (Latour, 2016). This use of the terms 'reset' and 'recalibrate' is interesting as a challenge to, or evolution of, the fashion, which I employ in my method, for *re-ing*; reimagining, reinventing, and refunctioning. Following Latour, my project can be articulated in part as exploring how the deployment of new materialist philosophy in combination with contemporary artistic and curatorial practice, can not only reimagine but also serve to recalibrate the observatory.

Connected to this, and another key method within the curatorial process was to consider the relationship between artworks and observational instruments, and how an artwork may both blur with, and function as, an instrument. As discussed previously an important conception within the project is the ubiquity of observational technoscience in everyday life, and accordingly the project investigates how the exhibition and publication can recontextualise the observational instrument, and make the observational everyday extraordinary for audiences. As Sarah Cook and Beryl Graham write of new media art, it is 'both resistant and constitutive of the dominant media' (Cook and Graham, 2010:28) and accordingly my curatorial method, artist commissions, and publication's narrative, has sought to both utilise and reveal these paradoxical qualities and tensions.

Finally, my curatorial method was informed by an interest in how instruments and art may augment sense, which has a significant history within art and design practice (Malnar, 2004; Dunn, 2017). During meetings with artists at FACT I stressed a concern with how their work might create new imaginative environments and explore the degree to which we can ever 'give' ourselves extra senses (Jacobs and Huck, 2017). In this way my method follows Katherine Anker's description of installation art, based on new technology and science, as a possible laboratory for the speculative mind and new senses, engendering 'a dynamic, connective observatory perspective' (Anker, 2010). Both the exhibition experience and my (co)curating of it was defined by an interest in producing a 'distributed experience'. Furthermore, as Joasia Krycia has written: 'In the context of network systems, might curating be usefully considered in terms of a distributed management system?' (Krycia, 2006:14). This chimes well with my curatorial subject and method in some senses, but as previously outlined, crucial to the concept of both the exhibition and artist book, which I will now go on to discuss, is that they were both housed within specific containers of the gallery and publication format, and were not, for example internet based projects.

### **Artist Book – Obs**

As discussed above, throughout the project I have adopted the specific methodologies of archival research, curation, and artistic practice. Alongside these processes I have produced text-based artwork during the project, including presenting work in exhibitions at Small Space Gallery in 2016, and FACT in 2017, resulting in the production of an artist book.

The book, entitled *Obs*, imagines an alternate world, very similar to our own, where the fictional community of Temo has been surveilled for a year as part of a trial by the 'Ob' run by big data researcher

Sandy. It tells the story of a reading group in the community who seek to obfuscate and challenge Sandy and the Ob's data gathering through a range of tactics, which leads to unexpected outcomes in the form of proliferating instruments and observatories, told through a mixture of prose poetry, typographic experiment, illustration, and adulterated found imagery. The form and content offers a means to explore the contemporary observational condition, in particular big data and smart city contexts, in relation to community, linking back to the old Liverpool Observatory's own data-driven site-specificity and historical contexts to observation. The figure of Sandy is inspired in part by Alex Pentland and his living lab programme which he describes thus:

'Let us imagine the ability to place an imaging chamber around an entire community and then to record and display every facet and dimension of behaviour, communication, and social interaction among its members. Now think about doing that for up to several years while members of the community go about their everyday lives. That is a living lab.'

(Pentland, 2014:9)

The title of the book, *Obs*, alludes to the word-forming element 'ob' in observation, meaning 'toward, against, across, down' also used as an intensive, from Latin *ob* (prep.) 'in front of, before; in the way of; with regard to, because of' (*ob-* | *Online Etymology Dictionary*, n.d.). 'Obs' is also a term used in hospitals as shorthand for observations, for example 'obs stable' meaning there are no significant issues with a patient's observations (Scott et al., 2011). Additionally, the title refers to: how obs is slang for 'obviously'; is suggestive of a plurality of observatories or observations; and its phoneme quality links it to sound poetry in which the phonetic character of human speech and subvocalisation are emphasised.

The pages and texts within the book are threaded through with imagery drawn from research on observational science and measurement and my own drawings and typographic experiments. In this way the method employed is akin to Ronald Johnson's long 'architectural' poem ARK from 1996 described by Johnson as 'a lofty Temple of words, images, and music... in the form of a spaceship, to carry mankind, along with the wonder of old earth, to the stars' (Burt, 2014). But where Johnson intended to entangle and engender delight in science, my own work and its method is more conflicted and obtuse. Splinters from my archival research and curatorial process disintegrate into reflections on contemporary big data contexts, in turn flowing back into the archive and gallery. This flow between different media catalyses and defines the project. As David Wellbery writes in discussion of Kittler's *Discourse Networks*, 'mediality is the general condition within which, under specific circumstances, something like "poetry" or "literature" can take shape.' (Wellbery, 1992:xiii). Thus the publication is a document of the mediality of both observation, the observatory, and my own research coalescing.

The method of illustrating the text with both found and hand drawn imagery seeks to represent both the process of the project and the subjects which have influenced the text. It seeks to foreground inscription itself, beyond the linguistic, to encompass graphs, spots, and spectra, produced by the 'inscription devices' of data gathering which transform 'pieces of matter into written documents' (Latour and Woolgar, 1986:51). Beyond this, imagery's movement from the gestural through to the magnified, and use of halftone and the risograph print process, abstracts it from its original purpose to resemble 'natural' forms such as the grain of wood. In this way it attempts to put the text of the prose poem into an encounter with other forms of inscription, suggestive of the world writing upon itself (Serres, 1995b) and push the sense that textuality and representation are characteristics of nature as much as culture (Kirby, 2011). The risograph style of printing on finely grained paper further intensifies the physicality of the publication, suggesting links between paper fibres and dendrochronology, the graphical and the geological perhaps. In this sense my method attempts to possess what Steve McCaffery calls 'protosemantic' writing, which he describes as a 'dimension of poetic language that is 'prior to meaning,' calling for 'a serious consideration of both a residual and a possible micropoiesis.' (Brown, 2017:13). Understood like this, writing and reading become a 'material scene of forces' (Brown, 2017:25) agitated by the protosemantic energies latent in both inscription and interpretation. Furthermore, these methods of inscription employed

intervene between how on the one hand, science and materialism is primarily tied to the limitations of instruments for epistemology, to figure the invisible, and on the other, the role that art has in speculating beyond this and its use of different instruments.

The book's narrative is at times discontinuous and invites, or perhaps compels, the reader to jump backwards and forwards within the text, *détourning* elements from my thesis, the archive, and the exhibition. Diagrams mediate between language and image, world and representation. In so doing, the method employed navigates on and off the path of Saussurean structural linguistics, shifting away from biographical, historical, formalism, toward a more Derridean understanding of the rhetorical nature of texts, in particular those tied to observation, and their plurality of meanings (Olson, 1990). My method of writing attempts to both reference and create a space where poetic form may bring forth an oscillatory immanence and non-referentially, rather than render observations fixed. Exploring how language and image entangle and share space, revealing and sometimes obstructing one another. This echoes the different spaces that the book may find itself in – in a room amongst other things, on a crumpled lap, between wrinkled skin, muscle, fat and bone, becoming light, occasionally focused onto the retina.

In some senses the book and my method of writing crystallises a kind of abject observation upon the excesses of observation that pervades modern life via for example; data mining, surveillance, micro targeting, machine readable cities, and the Internet of Things. The book situates this simultaneously degraded and intensified character of observation through its graphic layering of *observe-atory* text and image. The abstracted quality of the book's imagery and iterating texts is also expressive of the complexity of feedback loops and recursive systems of observation in cybernetics that sought 'the erasure of embodiment... performed so that "intelligence" becomes a property of the formal manipulation of symbols rather than enaction in the human life world.' (Hayles, 1999:xi). Furthermore, my own attempt at telling a story of the old, the now, and the new of observation and the observatory could be compared to Hayles' own method of 'rememory', which she herself appropriates from Toni Morrison, to reconnect that which has been disconnected (Ibid.). I attempt to emphasise through the book the situated character of observation, measuring as folksonomy, as well as taxonomy, and attend to Hayles' critique of the limits of computational systems to simulate the embodied world. The book is composed of a narrative where computation, both software and hardware is itself embodied, extensions yes, but not simply of humans, rather something more fundamental and complex – of nature, of matter. Gesturing for the reader to become a participant observer, acknowledging the impossibility of generating any truly firm universal theoretical foundations via observational science. Thus the book performs a resistance to observation that is similar to Paul de Man's 'resistance to reading', whereby: 'What we call ideology is precisely the confusion of linguistic with natural reality, of reference with phenomenalism' (Man, 1986:11). Accordingly, the book employs a lyrical and sometimes nonsensical narrative and tone, where the texts and images paired down and sometimes surreal form, are intended to mix with the reader's own experience and affect, of crashes between everyday and scientific observation. It is this mixing and clash of professionalised observation with the everyday that is I would argue, a significant part of the contemporary condition, within which the book seeks to intervene. This performative character reflects back also upon the enunciability of the archive, the ideology of its traces, and kinships with the exhibition's own texts and creeds, augmenting and undoing their own administering structures.

# Chapter 1

## The Observatory: Instrument of Community Building

As discussed in the above introduction, I posit the history and nature of the observatory as uniquely prescient to the contemporary condition of human enmeshment in observational technologies. In order to situate and unpack this theorisation further and provide background to my curatorial and publishing artefacts, I turn in this chapter to analyse the history of the Liverpool Observatory. It should be noted that although this 'history' is only *visibly* present in Yu-Chen Wang's large scale drawing in the *TNO* exhibition, discussed in chapter 2, and my installations at FACT and Small View Gallery, analysed in chapter 3, it is the fundamental foundation upon which the project is built. As discussed in the methodology section, my project is rooted in part in an affective methodology and the history of the Liverpool Observatory, and my embodied engagements with it, from the archive to visits to Bidston Observatory (which was an outgrowth of Liverpool Observatory) for example, were a powerful catalyst within my curatorial and artistic processes, in particular, producing a unique relation between old and new forms of observation. Somewhat paradoxically, an important outcome of this dialogical process is the postulation that the *combination* of a situated and architecturally defined observatory (that the *old* Liverpool Observatory embodies), with creative socio-technical experiment in a *new* media public gallery (as undertaken at FACT), *collectively* offers a cogent and useful apparatus – that is both *new and old*, an anachronism of the contemporary – for critical and participatory engagement with the distributed systems of observation, which define so much contemporary life. Thus my act of citing an observatory within a gallery, attempts to realize or at least experiment with the potential and cogency for such an *old/new* hybridisation.

### Observing the Observatory

As discussed in the previous methodology section, the degree to which I 'chose' the subject of the observatory is questionable, rather it could be said that it had its own agency that reached for, or instrumentalised me. One could say though, in keeping with the scientific method of observation, that I observed it is as a significant event and detected its relevance to my area of research. Also, those things which we observe, and which observe themselves, are often, by virtue of the character of observation, conspicuous or outward facing. Consider the domed shape of a classic observatory, or the watchtower, radio telescope or umpire, for example. The aesthetic appearance and technical characteristics of observational things have a way of alerting you to their presence, of making you observe them. Accordingly, the verb observe is defined in the Oxford English Dictionary as:

1. Notice or perceive (something) and register it as being significant.
  - 1.1 Watch (someone or something) carefully and attentively.
  - 1.2 Take note of or detect (something) in the course of a scientific study.
2. Make a remark.
3. Fulfil or comply with (a social, legal, ethical, or religious obligation)

(Definition of 'observe' in English by Oxford Dictionaries, n.d.)

I have through the course of my research undertaken each of these definitions and actions: I noticed the observatory in the first place as somehow significant, I watched carefully the project itself unfold, took notes and made remarks, some of which are evidenced in this thesis and others in the publication, and

finally observed the obligations of the project, inherent within the material fact of this thesis, and the particular demands of staging an exhibition, from funding obligations to the logistics of transporting artwork. The etymological origin of the verb 'observe' is late Middle English: from Old French *observer*, which in turn is from Latin 'observare', meaning 'to watch', and from *ob-* 'towards' and 'servare' meaning 'to attend to, look at', hence to observe the observatory has a certain meta-reflexive characteristic to it, where subject and methodology are embodied in one another.

The mass noun observation describes the act of observing phenomena and gathering quantitative or qualitative data related to it, using human senses and/or instruments. This once specialist scientific activity has now become an everyday part of life as new communication and internet technologies and our interaction with them constantly generates data. Equally the reasoning and situating of observations has evolved from being a specific philosophical and scientific practice, since at least the 3<sup>rd</sup> century BCE, when Aristotle describes a number of sources of observational evidence including animal dissection (Aristotle, 1987), to now, with the growth of the 'quantified self' movement and the widespread use of data analytics, observation has become an intrinsic part of modern life. It is this evolution of observation from specialist pursuit to its current ubiquity that catalyses my interest in the observatory. But crucially also how the growth in use of observational technology has not been met with an equivalent critical understanding of its ontological and epistemological character.

The citing of the curatorial component of the project in a public gallery was important for its emphasis on the relationship between creativity and criticality, but equally important to the project is how the gallery acts as a social and communal space. In this sense, situating an observatory in a public gallery is a means to open the observatory back out to the world, to reformulate it publicly. It can be argued that the roots of the observatory lie in the stone circles that are found in particular abundance in the UK. My project attempts to root the observatory back in such open communal spaces, through both the exhibition and through the narrative in the publication, focused on open and closed forms of observation. In this regard, it is notable that, what is believed to be one of the first structures used for the observation of time is situated only 300 miles from Liverpool – the Warren Field calendar in Aberdeenshire, Scotland. This Mesolithic monument dating from 8000 BCE, comprises 12 pits which appear to aid observation and tracking of lunar months by mimicking the phases of the moon, (Gaffney et al., 2013) and could be described as an early proto-observatory. No accompanying evidence exists of practices that accompanied it, but it was undoubtedly a place of gathering, of both rocks and people in the open. It is in the 8<sup>th</sup> century ADE that fully fledged observatory buildings emerge, first in the Middle East, as specialized research institutes comprising astronomical instruments and begin a process of rapid evolution (Aubin et al., 2010). It is this specialisation, increased technical complexity, and movement inside the observatory, coupled to its growing ubiquity, that my own project engages and intervenes in. Via the exhibition, which although 'inside' is defined by an outward facing engagement with the public and issues of observation, and through the publication with its narrative focus on how observation interacts with a community, notions of privacy, and a turning of an observatory inside out.

The birth and evolution of modern observation, instrumentation and data lies in the fact that many phenomena are unobservable via unaided human senses, thus observers employ what Hermann von Helmholtz called 'artificial methods of observation' (Holmes et al., 1997). It is this aspect of how artificial prosthesis may be used to observe the unobservable, that links artistic and scientific modes of observation. Both are driven to observe that which lies beyond the vanguard of their respective fields, the central difference being science's emphasis on verifiability and repeatability, and art's concern with difference and unrepeatability. Moreover, scientific instruments of observation tend to either measure in the case of thermometers, for example, or extend or enhance senses, in the case of a telescope and magnification. Artistic observation rarely attempts to measure in traditional units, but does engage in extension of the senses, most often beyond material phenomena, toward the emotional, personal or political. However, new media arts appropriation of scientific devices, such as Kei Kreutler's ground station for observing satellites which I commissioned for *TNO*, is a functioning scientific instrument of observation. Its key



difference is that it is operated by amateurs associated with the Libre Space Foundation who seek to challenge the nationalist underpinnings of much scientific endeavour. Thus we can *observe* it as observational art rather than science through its difference from the mean, and its situational context, but on a technical level it is unchanged. Equally, appropriating a scientific institution such as the observatory and *re-presenting* it within the realm of art enables a revaluation of its context's differences and similarities.

Furthermore, we may cite how scientific observation has extended to reveal that which is hidden beyond the limits of the human sensorium, such as magnetic fields, observed with a compass, and in the case of the quantum field the presence of the observer has been shown to affect and change the very nature of what is observed (Camilleri, 2009). Guiding my own project has been an enquiry into how art may be used as a means to observe that which is hidden within observation itself and how the presence of the observer *and* the observatory changes the nature of the world. Let us now turn then to consider how the Liverpool Observatory impacted upon Liverpool, and on a more micro level how it impacted upon my project and practice.

### **Liverpool Observatory**

The Liverpool Observatory, established in 1845, operates within a long history of observational modes and sites. It was initially defined by its mercantile system of patronage, through the Mersey Docks and Harbour Board (Ishibashi, 2014), and its focus on time standardisation, which later shifted focus to tidal prediction. In one sense, the Liverpool Observatory, functions as a non-quantum example of the influence tools of observation can have on a city. It functioned in many ways like a proto smart city technology. Its manner of operating as a city-centric technology and data-driven institution that aided the activities of the port, its ships and its workers, is echoed today, by Liverpool-based initiatives such as Sensor City, the technical innovation centre, and FACT's own community embedded programme of activities. These histories and contexts inspired many of my curatorial concepts, discussions with artists as part of *The New Observatory* exhibition, and the production of the artist book, thus it is important to detail some of its history and contexts that inform the larger project, and to serve discussion in subsequent chapters.

The Liverpool Observatory was founded toward the end of what has been termed the Romantic period of science, lasting between 1800 and 1840. Historian Richard Holmes describes four key shifts during this period in Britain: instrumentation began to play a more important role, there was a move beyond a mechanistic universe to something perceived in more dynamic and complex terms, science became less of a 'gentlemen's pursuit', guided instead by populist and utilitarian conceits, and the monopoly of the Royal Society began to be challenged with the establishment of new scientific institutions, of which Liverpool Observatory can be seen as one such example. In 1837 the annual meeting of the British Association for the Advancement of Science, founded in 1831 to aid the promotion and development of science, and modeled on the German Gesellschaft Deutscher Naturforscher und Ärzte, was held in Liverpool. At the meeting they urged the city to establish an observatory stating, in a collectively authored memorial to the council:

'Among the various objects of interesting inquiry which have been brought before the British Association on their visit to this large and enterprising commercial town, is the condition of Nautical Astronomy in the merchant service; the application of the science which is decidedly the most important to mankind. The loss of life and property which is annually caused by a deficient knowledge of this science, would astonish, were it publicly known... The objects of such an establishment [observatory] in a port like this, are the accurate knowledge of Liverpool time, and the care of chronometers while in port, including the correct determination of their rates, so that a captain when he sails may receive his chronometer, sure both of its error and its rate, which at present he cannot do.' (Thompson, 1896:15–16)

Here the language of the observatory as benefitting all ‘mankind’ reflects the romanticism of science during this age, which as Lisa Jardine and Andrew Cunningham have articulated seeks to function beyond its utilitarian and scientific ends, toward a greater good and ennoblement of self and community (Cunningham and Jardine, 2009). My own project and practice, undoubtedly performs similar rhetoric and explores how the observatory may once again benefit the community and enable awareness of the reliability and impact of technology.

Following lobbying by local and national groups, the Liverpool Observatory was established in 1845 on Waterloo Dock, within a few meters of the river wall, on latitude 53° 24’ 48” North, and longitude 3° 0’ 1” West of the Greenwich Royal Observatory.<sup>7</sup> The building comprised an Equatorial Room, a Chronometer Room, a Transit Room, and a Computing Room. This division of rooms and my study of other observatory floor plans was important to the formulation of the exhibition design. At one point I proposed that the exhibition design could follow this approach, housing commissions and loaned works in different rooms and clearly demarcating different uses. This was eventually dropped, but the inclusion of for example Wafaa Bilal’s library piece entitled *168:01*, which I proposed for inclusion, was a direct result of reading about the importance of libraries in observatories, seeing their presence on floor plans, and how publications such as star tables and notebooks were fundamental to and often moved between different observatories. *168:01* presents a library of blank books and a wish-list of books compiled by the Baghdad School of Art where 17,000 books were destroyed during the 2003 Iraq invasion. Visitors to the gallery and via the website can purchase books on the wish-list that accumulate in the gallery replacing the blank books which are given to donors. In this way the library ‘measures’ engagement with itself on a 1:1 scale. Over 200 books were purchased during *TNO* but it took over a year before permission was granted for them to be sent – observing laws and legal obligation can be a slow process, particularly when systems have been ravaged by violence and instability.

To return to the old Liverpool Observatory – its rooms included both astronomical and meteorological devices. A British Association guidebook details its contents as:

‘A transit instrument (telescope) of five feet focal length and four inches aperture, by Troughton & Simms, and equatorial (telescope) of twelve feet focal length, having an object-glass of eight-and-a-half inches aperture... constructed under the direction of Mr. Airy, the Astronomer-Royal. The object-glass, by Merz, of Munich, is an excellent one. The heavier parts of the mounting were made by Maudesly & Field, Engineers, and the graduations, micrometres, and all the finer parts by Troughton & Simms.... to them were added, in 1851, Osler’s improved self-registering anemometer and pluviometer.’ (Thompson, 1896:17)

There are important elements to this description that influenced both the curatorial and publishing components of my project. The sheer range of instruments, made by different manufacturers that required significant collaboration. But also the emphasis on craftsmanship. In studying instruments belonging to the observatory, and also through research at Greenwich Observatory, many items have an aesthetic quality that takes them beyond pure utility. Carefully turned wood stands or elaborate typography etched in brass. Here the aesthetic was fused with scientific functionality, and suggested a course for how curatorial concepts of instruments as artworks may be developed.

Alongside ascertaining the precise longitude of Liverpool and astronomical and meteorological observation, the fundamental role of the observatory was to rate ships chronometers and provide accurate clock time to the ships and mariners of Liverpool. Essentially it was an institution born of error. The chronometers of the 1840s did not work like clockwork, or rather they did in the true imperfect and error-prone sense of clock mechanisms. In particular, they were fallible and prone to losing or gaining time by several minutes each day, as Caitlin Homes has described in her work on time-signalling and

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<sup>7</sup> I should perhaps note that my own process of securing an exhibition at FACT required its own forms of lobbying!

chronometer rating (Homes, 2009). When taken to sea and used with astronomical tables, charts, compasses, sextants, and the night sky, chronometers could become a weak link, causing errors in navigation by several miles, leading many shipwrecks close to shore as ships approached ports (Rosenkrantz, 2005). Only in a well-equipped observatory could accurate clock time be maintained and enable the precise rating of chronometers, as is articulated in this account of a trip to the Liverpool Observatory in 1849, by an anonymous author in the *Edinburgh Journal*, describing how the ‘astronomical clock had been checked 965 times in a period of five years, or once in about every forty-six hours, by this transit instrument – no small testimony to the zeal of Mr. Hartnup.’ (‘The Liverpool Observatory,’ 1849:266). Mariners could then use ratings to adjust chronometers at sea and improve navigation, however the extent of this accuracy was a contested topic as evidenced by debate during this period documented in correspondence with Liverpool’s Reverend Sheepshanks, soon after the establishment of the observatory (‘Correspondence respecting the Liverpool Observatory between Mr. - and the Rev. R. Sheepshanks.,’ 1845). In some sense the *TNO* exhibition produced a similar exchange – to make individuals and communities aware of the fallibility of observational devices. Additionally, within the *Obs* publication this is manifested and explored through the reading group’s attempts to articulate the fallibility or problematic aspects of their own observation and surveillance.

The chief reason for the Liverpool Observatory’s founding, as described in the British Association’s memorial promoting its establishment, was safe travel at sea and scientific ingenuity, but more critically the observatory and others of its type can be understood as a tool or weapon of imperial and economic power (Vlahakis and et al, 2006; Aubin et al., 2010). Understood in this way, the observatory becomes a means to appropriate celestial mechanics for the benefit of chronometer mechanics, and in turn ship navigation and the effective exploitation of overseas territories. In direct response to this is the curatorial conceit of my commissioning process within *TNO*, which was to ask critical questions of the observational devices we use today, and how they appropriate and refunction places, communities, nature, technology, and data to different ends.

The appropriation of nature as temporal instrument, as enacted at the Liverpool Observatory, can be seen as part of a larger shift toward so-called ‘time discipline’ during the 19<sup>th</sup> century, described in the work of E. P. Thompson as a tool of industrial capitalism, where life evolves to become ‘time orientated’ rather than ‘task orientated’ (Thompson, 1967). But where Thompson locates ‘time discipline’ as a revolution of factories and the 19<sup>th</sup> century, according to Samuel Macey, as detailed in *Clocks and the Cosmos*, it in fact originates a century earlier in practices and technologies of ocean navigation and astronomy (Macey, 1979). Accordingly, the Liverpool Observatory is poised between these networks of ocean navigation and 19<sup>th</sup> century industry and commerce. *TNO* and the observatories within the *Obs* publication seek to unpack both how they are situated between technology and finance, and how observational instruments are the product of both human and non-human materialities and agencies.

Carlene Stephen’s study of Harvard Observatory in the mid 19<sup>th</sup> century, articulates the importance of complex human and non-human assemblages in relation to what she calls ‘clock-consciousness’ via time-keeping’s role in standardising railway signalling through a network of clocks and telegraphs (Stephens, 1989). She describes Harvard Observatory as a tool of community building and quotes its director William Bond, stating in 1853 that time had: ‘become such an important element in the rapid movement and business operations of the community, that it will not rest satisfied with anything short of the utmost attainable accuracy’ (Stephens, 1989:23). Liverpool Observatory, like Harvard, offered to bathe the city, and the networks with which it was connected, in accurate time, in both a pragmatic and semiotic sense. This emphasis on accuracy of time, can be seen as a precursor to the 20<sup>th</sup> century’s love affair with speed. The philosopher Paul Virilio has described the emergence of a ‘logistical modernity,’ that is the result in part of the ‘time-discipline’ that the observatory enables, where ‘the universe is redistributed by the military engineers, the earth “communicating” like a single glacia, as the infrastructure of [a] future battlefield’ (Virilio, 2006:85). Additionally, as with the work of Macey, Virilio sees this as beginning at sea ‘because the naval glacia naturally presents no permanent obstacle to vehicular movement of planetary

dimensions' (Virilio, 2006:73). So, like the first tetrapods, evolved from Sarcopterygii lobe-finned fishes that walked on land, technologies of the sea eventually make their way to dry land. Equally, the Liverpool Observatory housed on the shores of the Mersey, empowering ships to navigate more effectively, can be re-thought as a liminal space functioning at the thresholds between earth, ocean, and sky. David Gauthier's commission that involved travelling out to sea to film a 'waverider' buoy was an evolution of his residency arranged for him at the Proudman Oceanographic Lab, which itself evolved from the Liverpool and Bidston Observatories.

One of the questions this history necessitates for a new or contemporary observatory becomes; how can it resist becoming a tool for domination of human and more-than-human territories? Or producing, as Benjamin Bratton writes in the introduction to Virilio's *Time and Politics*, 'dromocratic machinations that exceed their constitutions and incorporations', building communities yes, but for the benefit of a 'machinic species... working on the bodies of the masses as a practical material that can be strategically designed and deployed' (Virilio, 2006:14–15). The commissioning of Jeronimo Voss and Radamés Anja's work that sought to use time management software for the effective management of a new housing cooperative in Frankfurt, was one way to respond to and invert the logic of this *observe-atory* 'dromos'<sup>8</sup> of life.

At the time of the observatory's founding Liverpool was alone and preeminent as a UK provincial city able to maintain accurate time. Nothing could compete with its technological assemblage. Only linking clocks in the city to Greenwich via the newly invented telegraph threatened to compromise its chronomatic centre of power, but this proved economically unfeasible at the time. An anonymous report authored in the year of the observatory's founding, by the Royal Astronomical Society (established in 1820 to support astronomical research), articulates its status:

'But the principal and most interesting object of this establishment is, that of giving true time to the great port of Liverpool; an object which is of high national importance, and which has hitherto been almost unaccountably neglected... A ball similar to that at Greenwich is let fall every day, except Sunday, precisely at one P.M. Greenwich time, and the whole arrangement is so complete, and the longitude so well known, that the dropping of the balls at the two observatories may be considered to be simultaneous. It is evident that an observatory furnishing exact time will be of greatest utility to all makers of *good* chronometers, and a hindrance to the vendors of those which are indifferent.'

*(Report of the Council of the Royal Astronomical Society, 1845, cited in Correspondence respecting the Liverpool Observatory between Mr. John Taylor and the Rev. R. Sheepshanks, 1845)*

This almost celebratory image of balls dropping simultaneously as if British technoscience has hit puberty is aligned to how Simon Schaffer has written, as discussed in the literature review, that such technological rhetoric has done much to divide our sense of nature and culture, due to the 'makers' quest for both recognition and income (Schaffer, 1998b:186). The above personifies a particularly macho appropriation of nature – as if the observatory was inventing time all by itself. Although as Albert Einstein later proved in his work on spacetime and the theory of relativity, in particular 'time dilation', this was somewhat truer than they knew at the time (Einstein, 1905). The commissioning of Kei Kreutler and Libre Space Foundations's *Open Space Observatory*, that establishes a network of ground stations across the globe in a collaborative, non-nationalistic mode, attempts a similarly collaborative endeavor, but eschews the macho posturing claiming invention through the ground stations construction according to its use of 'open source' software and hardware.

Within the Liverpool Observatory – this aim and act of synchronicity between Greenwich and Liverpool becomes an *a priori* moment that aligns Liverpool ever after with centres of power both political and

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<sup>8</sup> Dromos - Greek for avenue or race course.

scientific. In this sense the Observatory functions as an *episteme* or *apparatus*, in Michel Foucault's theorisation of the terms, but within what I would extend to an additionally localised and situated sense, that, to conflate Foucault's conceptions with Donna Haraway's notion of 'situated knowledges' (Haraway, 1988), we may describe as a 'situated apparatus'. To develop this further still, we may cite Karen Barad's development of Haraway and Foucault's work in relation to Niels Bohr's as pertinent to the situated and localised character of any observatory or act of observation, when she describes how:

'According to Bohr, theoretical concepts (e.g., "position" and "momentum") are not ideational in character but rather are specific physical arrangements. For example, the notion of "position" cannot be presumed to be a well-defined abstract concept, nor can it be presumed to be an inherent attribute of independently existing objects. Rather, "position" only has meaning when a rigid apparatus with fixed parts is used (e.g., a ruler is nailed to a fixed table in the laboratory, thereby establishing a fixed frame of reference for specifying "position"). And furthermore, any measurement of "position" using this apparatus cannot be attributed to some abstract independently existing "object" but rather is a property of the phenomenon—the inseparability of "observed object" and "agencies of observation"' (Barad, 2003:814).

Thus Greenwich time ascertained at Liverpool Observatory is never wholly simultaneous with Greenwich, nor are observations made at *TNO*, or by characters in the *Obs* publication. Instead we may say that observations like 'position' and 'momentum' *become* part of the world, through particular apparatuses and accordant phenomena. In this sense, use of the term 'furnishing' in the Society's report, describing the Liverpool Observatory as 'furnishing' time on the city, chimes with Barad's statement, especially if we consider the Germanic etymological root of 'furnish', being 'frumjan', meaning 'forward movement, advancement' and to 'fit out' – suggestive of an emergent act of concocting *new materials and phenomena*, not simply divining *a priori* knowledge. Understood in this way, the Observatory's emergence is an example of what Barad calls an 'intra-action', where:

'...phenomena do not merely mark the epistemological inseparability of "observer" and "observed"; rather, *phenomena are the ontological inseparability of agentially intra-acting "components."* That is, phenomena are ontologically primitive relations—relations without preexisting rela... [and] *apparatuses are dynamic (re)configurings of the world, specific agential practices/intra-actions/performances through which specific exclusionary boundaries are enacted.* Apparatuses have no inherent "outside" boundary. This indeterminacy of the "outside" boundary represents the impossibility of closure—the ongoing intra-activity in the iterative reconfiguring of the apparatus of bodily production. Apparatuses are open-ended practices' (Barad, 2003:815–816).

Accordingly, I would suggest that the apparatuses at work in the Liverpool Observatory, *TNO*, and the observatories in *Obs*, all act as both boundary makers and catalysts of intra-action. The Liverpool Observatory for example, I would argue, manifested an observatory themed exhibition at FACT over a hundred and fifty years after its founding and also these words I write now. But however much the observatory and observations *intra-active becoming* has the potential to be open-ended, it is important not to lose sight of its specific history and primary set of effects. In its founding years it sought to make matter matter in a very specific way: to assert temporal authority. In this sense we might return to Foucault's more degraded sense of the 'the strategic apparatus which permits of separating out from among all the statements which are possible those that will be acceptable within, I won't say a scientific theory, but a field of scientificity, and which it is possible to say are true or false' (Foucault and Gordon, 1980:197). The Liverpool Observatory, and observatories more generally, may then be articulated as *strategically situated apparatus*. In the case of the Liverpool Observatory it divined accurate time that served to bathe the city in a new light, a new scientific precision, beyond mariners and watchmakers, to all that inhabit it. Accurate time provided by the Liverpool Observatory functioned beyond its prescribed use to operate within and mould larger discursive systems. This is the observatory as an instrument of infrastructure and place making, seen less in terms of its telescopes and what it contains within, but rather as a totality or

*gesamtwissenschaft* – an assemblage of architecture, technology, people and material forces. The observatory acts as a prosthesis to not only Liverpool, but also broader technoscientific networks from which it was born, including adding increased currency to Greenwich Observatory (where its first director Hartnup previously worked) (Betts, 2018:61), through the use of their catalogues, as this anonymous section of a report by the Council of the Royal Astronomical Society articulates:

‘The Observatory of Liverpool has figured very conspicuously in the records of our proceedings, and has fairly honourably earned its European reputation... Such is the truth and steadiness of the mounting, that Mr. Hartnup can almost always employ stars of comparison from the Greenwich twelve-year catalogue, and thus produce at once complete and accurate determinations... The determinations made at this Observatory would do credit to any establishment, and to any instrument.’

*(Report of the Council of the Royal Astronomical Society, 1845, cited in Correspondence respecting the Liverpool Observatory between Mr. John Taylor and the Rev. R. Sheepshanks, 1845:17)*

Here the text expresses how observatories, like my earlier discussion of archives, become mutually reinforcing institutions, forging networks of information and technology between one another. For example, John Hartnup the director of the first Liverpool Observatory developed the practice of using a ‘hot box’ to heat chronometers to temperatures of between 50 and a 110 degrees Fahrenheit (Howse, 1980). These exposed chronometers to temperatures they would experience when at sea in hotter climates and was adopted by Greenwich Observatory for its own rating procedures. The practice of rating also extended to rating the watchmaker himself, and furthermore conflating the watchmaker with mariner and the astronomer, as Hartnup writes in a text that sought to document and promote his work at the time:

‘The makers will exert themselves to the utmost, to supply the astronomer with a good chronometer, because they know that he can test its qualities, and appreciate its value; and that he will not be unreasonable in his expectations.... He is called upon almost daily to exercise his judgment as to the degree of confidence which he is justified in placing in his instruments; and a knowledge of the imperfections to which they are liable is the only thing that can guide him to correct conclusions in these, to him, very important matters.’ (Hartnup, 1857:11)

The text-work pictured below, ‘There was one calm day in the year’, which I exhibited at Small View Gallery in 2016, is a subjective statement quoted from one of Hartnup’s observations, and represents how science begins a transformation of subjective experience to the empirical and quantitative plane (Crary, 1992:81) that is played out at scale and in everyday life today. Although Hartnup is referring to meteorological conditions, it is a nonetheless somewhat anthropic and subjective observation of what constitutes the weather, which I would argue could be seen as a progenitor of sentiment analysis, social observation, and surveillance that defines much contemporary data gathering today. This enmeshing of subjective experience and instruments of reason, become important for both my curatorial concepts in *TNO* and modes of writing within *Obs*. The use of aesthetic modes to address technoscientific observation reveals their shared modes and propensities, of mediation by instruments and for constructing narratives and authoritative voices.

\*There were 19 calm hours  
in the year.

+There was one calm hour  
during which 0.054 of an  
inch of rain fell.

Fig. 3: Text-work included in exhibition at Small View Gallery, 2016. (Digitally printed 33x48cm)

A picture emerges of the Liverpool Observatory, that I sought to translate within the *TNO* commissions and the *Obs* publication, of very different instruments, individuals, and forms of matter communicating with one another – telescopes, clocks, catalogues, and ships, conversing with gravitationally bound systems of planets and stars and the earth's hydrosphere. Liverpool as node within this was the 'western gateway' for raw materials and goods, and a significant imperialist force in Britain developing trade links with North and South America, West Africa, the Middle and Far East, and Australia. The Liverpool Observatory was then a node within a node, funded by the Dock Trustees and their successors, the Mersey Docks and Harbour Board, part of the port's dock system which by the end of the 19<sup>th</sup> century was known as the 'iron shore' and spanned more than seven miles of the Liverpool waterfront.

### **The Move to Bidston**

The focus of my research and its translation into the curatorial exhibition concept and commissions has been the observatory's nascent history, but I will now turn briefly to its later life. The expansion of the docks eventually forced the Observatory to relocate across the Mersey to Bidston Hill on the Wirral, with observations beginning there in 1867.<sup>9</sup> Here its activities shifted more to meteorology, seismology and later tidal prediction. The first tidal prediction machine, a Roberts-Légé machine, was purchased by Arthur Doodson, the then head of Bidston Observatory, in 1929. A second machine, known as the Doodson-Légé, was a development from the earlier Roberts-Légé machine and designed by Doodson in the late 1940s and manufactured by Légé & Co. around 1948-49 (Schofield, 2006:123). These early analogue computers could be programmed with harmonic tidal constraints to process records of previous years to produce accurate future predictions. At its height Bidston was processing tidal data for two thirds of the world's major ports. Alongside these core activities, the observatory also began studying offshore and earth tides, deploying instruments onto research ships and seismology instruments deep within its cellars. In the 1960's numerical modelling using new electronic computers including an IBM 1130 and a

<sup>9</sup> Note that *The New Observatory* exhibition at FACT marked the 150<sup>th</sup> anniversary of observations beginning at Bidston. Thus the exhibition served as a quasi time-keeping device of sorts.

Honeywell 66/20 replaced the old analogue machines. In 1969 the telescopes were removed and the ‘One O’Clock Gun’ (a cannon that was fired everyday in lieu of the time-ball that would not have been visible from Bidston) was fired for the last time. By the end of its life the site was measuring very little locally, instead instruments were deployed across the globe, analysing micro-plankton distribution, using radar to measure surface currents and waves, and tidal measurements were made at stations on remote islands such as Tristan da Cunha in the Atlantic and Signy in Antarctica, among many other activities (Schofield, 2006). In 2005 the site was vacated and operations moved to the University of Liverpool Oceanographic Department.

The Observatory annual report of 1940 details the observatory’s evolution during the early 20<sup>th</sup> century and its shift away from astronomy and chronometer rating:

‘the increasing use of photographic methods in astronomy necessitated considerable expenditure if the equipment was to be modernized so as to facilitate photographic observations of stars... In the early part of the century it was decided that the atmospheric conditions did not justify the expenditure and that there were no special advantages to be gained from the development of astronomical work at Liverpool... The advent of wireless telegraphy also had a very great effect upon the Observatory, as there was little necessity to rate the chronometer whenever a ship was in port, and independent determinations of time became unnecessary.

(*Liverpool Observatory and Tidal Institute Annual Report*, 1940:9–10)

This changing role for the Observatory is of great significance to my own project, and catalyzed a question guiding my project: what activities and lines of research within Liverpool and observational techniques more generally are becoming outmoded and what new materials and processes might an observatory of the 21<sup>st</sup> century work with and through? Particularly one located in a public art gallery, or more specifically FACT. Aligned to this question is the context of how other observatories across the world do different things in different places and time periods – engaged in a vast range of different activities dependent as much upon the political climate of their location as current scientific concerns (Aubin et al., 2010). Furthermore, today observing technology has become decentralized and distributed across the globe, via satellites, smart phones and autonomous drones, ergo how does an observatory located within a building like FACT work with, and simultaneously embody, embrace, or eclipse this anachronistic character?

Beyond the evolutions of science and technology, the fortunes of the Liverpool and Bidston Observatories have been closely aligned to its finances and development of local infrastructure. Its founding was a slow process that lasted through the 1830’s and 1840’s (Dearden, n.d.; ‘Observatory Committee Minute Book: 1836 – 1856.’ n.d.) but when eventually established it benefitted from the wealth of the docks, administered first by the Liverpool Dock Trustees, which in 1858 became the Mersey Docks and Harbor Board (Storrie, 2012). In turn this growth and profitability of the port which led to its founding also led to its move to Bidston, to make way for the redevelopment of the dock. The new Bidston building was a significant size, larger than the previous observatory and benefitting from the wealth of the Harbor Board. Today the building is in a process of transformation into an artistic research centre.<sup>10</sup>

The short history described here, in dialogue with the development of the exhibition and publication, serves to highlight key aspects of the observatory’s coming into being – that is the Liverpool Observatory, *The New Observatory*, the observatories within the *Obs* publication, and even the rebirth of Bidston Observatory as an artistic research centre. This history alongside aforementioned philosophical

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<sup>10</sup> The new owners were introduced to the site via Mike Stubbs the director of FACT, who became aware of Bidston through my research. Upon first discussing my project with Mike I had suggested that FACT should try and buy the observatory and we had shown the site to the assistant of a wealthy patron, luckily perhaps they were not interested! The new owners/residents participated in two events during *The New Observatory* exhibition, and the observatory’s ability to reproduce itself is a theme within the *Obs* publication. Beyond this I should state that discussing Bidston’s new life is beyond the scope of this project. I have enjoyed the owners’ hospitality at Bidston, am excited by their plans, and look forward to further dialogue in the future, but I have also left them to their own devices!



theorisations, seek to articulate the observatory as a *strategically situated apparatus that iterates itself*, continually oscillating between the status of old and new, and processes of ascribing and inscribing.

Defined thus, the observatory emerges as unique in history, for both its ability to evolve and proliferate, and its defined structure coupled to a growing network, which serves as a powerful space to engage with scientific research and material phenomena. As Gillian Beer writes regarding Darwin's *Origin of Species*, but which is applicable to other new scientific discoveries and spaces of reception, it is: 'Not what is said, but the agreement as to constraints on its reception [that] will stabilize scientific discourse.... The enclosing within a community is a necessary condition for assuming stable signification.' (Beer, 1988:44). The Liverpool Observatory was connected to the city through its provision of accurate time, with this transmission defining its role, but as I go on to discuss in chapters 2 and 3, communities may also function to destabilise technoscientific discourse and the role of institutions such as the observatory. Accordingly, the observatory is a tool of community building, but also as Gerard Delanty writes: 'Community is not an underlying reality but is constructed in actual processes of mobilization.' (Delanty, 2010:95). This mobilization is sustained by the autopoietic engine of matter, that mobilizes new relationalities, including for example new observatories. In this sense rather than simply an underlying cultural framework it is helpful to think also of an underlying material framework at play in the observatory's evolution.

The observatory's later history and development, on both a local and global level, demonstrates the fundamental aspect of the life of any observatory – the continual evolution of its activities. Stating this can be seen as a sign of its success, of science's dynamism, but rather I note this for another reason, to underscore the constructed and instable nature of scientific endeavour, in particular of measurement and observation, that will be a feature of the next chapter. As Bruno Latour argues, there is a 'disorderly mixture revealed by science in action' (Latour, 1988:15) and at the core of this project is an exploration of how the observatory and its material assemblages continue to live, and may be reordered in the future. Equally, the genealogy of the observatory with which this chapter has engaged, compels both close observation and creative reinvention.

## Chapter 2

### A New Observatory: Situating the Curatorial and Commissioning Process

The archive has an agency. It resonates with the materiality of the inscriptions contained therein. The inscriptions are both scaled renderings of, and scaffold to, the individuals, institutions, materialities, and networks with which they are entwined. A photo of the old Liverpool Observatory, first fixed to the photographic paper,<sup>11</sup> was later scanned, fixed to the webpage of the National Oceanographic Centre, parcelled up in fibre optics cables, to screen, scanned again by my cornea, fixed again to the retina, transduced again, along its fibrous optic nerves to the occipital lobes. Then mixing in the mind and linking to an image of FACT, in my hippocampus perhaps, which I had been building and delineating via initial research. Both singular buildings defined by their relations with technology and place, in particular the constructed and error prone characteristics of devices and media that their respective communities used, or continue to use, to navigate.

Just as the old Liverpool Observatory's moment of genesis lay in the mid 19<sup>th</sup> century, as outlined in the preceding chapter, so my project's moment of genesis lay in 2015 and 2016 as the two institutions of FACT and the Observatory met, catalysed by a confluence of archives, art, and academia via experiments between both the historical method and situated practice-based artistic and curatorial research. As Hans-Jörg Rheinberger writes of experimental systems: 'they are systems of manipulation designed to give unknown answers to questions that the experimenters themselves are not yet able to clearly ask' (Rheinberger, 1997:28). Accordingly, the spirit of the observational and the experimental is generative, materialising both unforeseen answers and questions. As Henri Bergson wrote: 'Spirit borrows from matter the perceptions on which it feeds and restores them to matter in the form of movements which it has stamped with its own freedom' (Bergson, 1911:332). This is akin to my articulation of how through the act of observation processes of ascribing transform into actions of inscribing, into matter, fundamentally altering the constitution of the world.

My emergent experiments with the term 'liquid agency', attempts to ascribe different values to the observatory, lead to new inscriptions, to an old observatory, to a new observatory, to further questions: what could a new observatory be, one located in a public gallery like FACT, how might we transform FACT into an observatory, or rather can an observatory inhabit FACT, one institution parasitically in another? How could such an observatory relate to contemporary contexts of big and open data or the smart city, and how might curatorial and artistic practice operate within and through such a nexus?

This chapter explores how my historical research as outlined in chapter one is translated into commissioned artworks, and how such a practice becomes a means to manifest the future, whereby as Andreas Huyssen has written: 'Nostalgia can be a utopia in reverse' and the 'architectural ruin is an example of the indissoluble combination of spatial and temporal desires that trigger nostalgia.' (Huyssen, 2006:7). This mixing of past, present and future was a key feature at the outset of the project. Below I include the first one-page proposal document I sent to FACT in September 2015, and a subsequent artist brief document from February 2016 as evidence of my project's emergent roots.

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<sup>11</sup> It is interesting to note that John Hartnup, the first director of Liverpool Observatory and a member of the Royal Astronomical Society would likely have met John Herschel, who collaborated with Henry Fox Talbot to develop a technique employing sodium thiosulfate for fixing some of the first photographic images. Herschel was President of the RAS between 1827–29, 1839–41 and 1847–49.

## THE LIVERPOOL OBSERVATORY >> a proposal by Sam Skinner for delivery 2017/18 @ FACT, Liverpool

### INTRO

What could an observatory be in the 21<sup>st</sup> century? In particular a community / place centred observatory? How can it bring together a diverse range of data, from tidal measurements to public health, crime to climate change – forging an expanded view of place that informs its future?

### CONTEXTS, QUESTIONS & OPPORTUNITIES

Once the Liverpool Observatory (est. 1845, but now defunct) provided accurate time for the ships and people of Liverpool, predicted the tide, and looked at the stars. How can the history of observation, a significant site for intersections between art and science, and the unique activities of the former Liverpool Observatory, relate to contemporary data practices and a new observatory?

How could an observatory connect the general public of Liverpool, all their devices and data, with existing research and data gathering activity located in university departments and public services throughout Liverpool and beyond? How can innovative artist projects function within these networks?

Finally, how can FACT function as a crossroads for this activity, potentially as the observatory itself? Uniquely situated and skilled to develop and deliver such a project, or at least nurture its genesis.

The observatory has the potential to create 'thought collectives' that put the gathering of data to good use – linking amateurs and professionals, consumer devices and public interfaces. Engaging with research around smart cities, open data, and digital commons. Reimagining what a place is or can be, while all the time critiquing contexts of big data, surveillance, and the quantified self/place.

This is a project rooted in the history, identity and future of the city, that everyone will want to or has the potential be a part of. To tell a story of Liverpool, of our contemporary relationship to data, the technologies and networks we inhabit, and forging new modes of observation, collectivity and agency.

### POTENTIAL STRUCTURE / FORMAT

I envisage The Liverpool Observatory taking the form of an exhibition, website, publication and events programme, with three main elements running through and connecting it:

1. *Survey of Surveys* – Bringing together a diverse range of datasets and research on Liverpool, traversing the geological to the judicial, economic to the cultural, from both amateur and professional observers, for example: Centre for Public Health LJMU, Liverpool Amateur Astronomy Society, Sociology and Geography departments Liverpool University, Heseltine Institute, Proudman Oceanographic Lab, Liverpool Council, Ordnance Survey, Office for National Statistics, The Liverpool Telescope and National Schools Observatory. FACTLab to facilitate additional amateur observations and data gathering and option to collaborate with Sensor City.
2. *Artist Commissions* – Newly developed or siting of existing works that process data. Existing/forthcoming projects could include: A Moeda – Liverpool Edition (collab between FACT, CADA Lisbon and Broken Dimanche Press, Berlin), Mixed Reality Lab and Rachel Jacobs 'Prediction Machine', Open Data Institute 'Data and Anthropology' artists, including Thompson and Craighead. Others could include Domestic Data Streamers, Citizen Sense, Lise Autogena & Joshua Portway, Shin Seung Back and Kim Yong Hun, Paolo Cirio, Burak Arikan, Loren Madsen.
3. *Observatory Architecture, Interfaces and Events* – Physical exhibition and website design are key components and opportunities to link the above elements and define the project's success and innovation. Events programme - a space to collectively explore the outcomes of the observatory and its possible futures – in terms of both the specifics of its findings for future development of the city and its relationship to data, and the ongoing potential of the observatory itself.

For a history of the original observatory see: <http://poc.ac.uk/content/downloads/2011/proudman-history.pdf>

Fig. 4: Proposal Document sent to FACT Director Mike Stubbs and Head of Research Roger McKinley, September 2015.

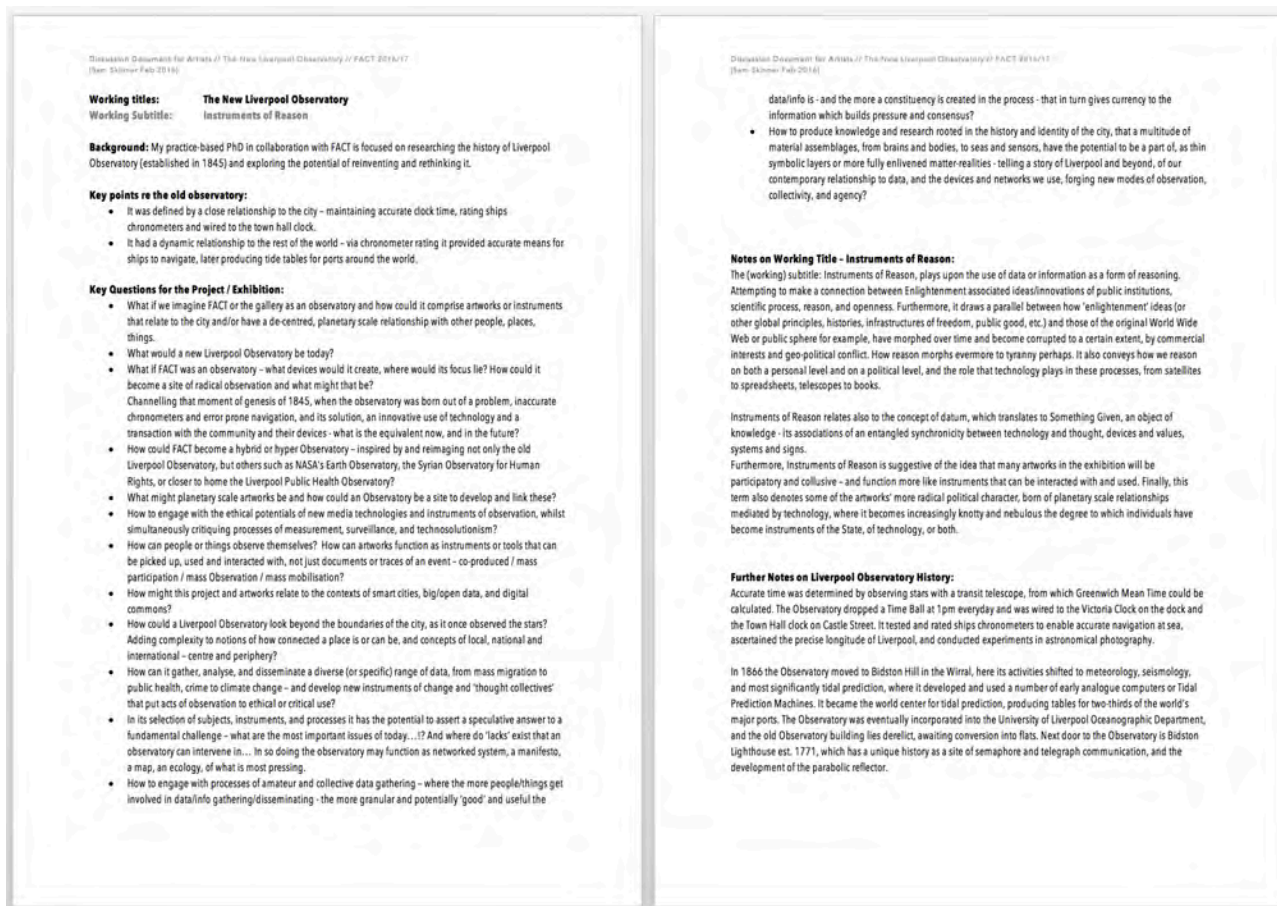


Fig. 5: Artist Discussion Document circulated to commissioned artists, February 2016.

The final exhibition developed considerably from the first proposal document, namely focussing on a group exhibition comprising artist's existing or commissioned work, with the 'survey of surveys' aspect and website beyond the scope of the project. In this chapter I discuss five artworks that I commissioned for *The New Observatory (TNO)* exhibition by artists James Coupe, David Gauthier, Kei Kreutler & Libre Space Foundation, Jeronimo Voss and Radamés Anja, and Yu-Chen Wang. In total there were works by 20 artists in the exhibition, with myself and co-curator Hannah Redler-Hawes each managing roughly 10 artists each. My collaboration with Hannah was confirmed in January 2016, and it was the idea of Mike Stubbs to partner us based upon our shared interests and an existing relationship between FACT and the Open Data Institute, where Hannah was based. Of the 10 artists whose projects I oversaw, 5 were new commissions and thus I focus on them within this thesis to offer means to explore both my curatorial practice within the project and resultant artworks.<sup>12</sup>

To briefly sketch the different projects' curatorial points of departure: The first two projects by David Gauthier and Yu-Chen Wang were based upon a close dialogue with former Bidston Observatory employees and research at the National Oceanographic Centre in Liverpool. Jeronimo Voss' work was produced via a collaboration with resident Radamés Anja at FACTLab (FACT's workshop and residency space), in relation to Liverpool and Bidston Observatory's practices of time standardisation. Kei Kreutler & Libre Space Foundation's *Open Space Observatory* was commissioned for the project's engagement with live instrumentation, observing satellites, and the ability to make the exhibition a live space for data gathering. Their project was already significantly developed prior to commissioning, but it had not been

<sup>12</sup> It should be noted that although I had laid a certain amount of groundwork to the exhibition's 'observatory' concept via initial research, the final exhibition was very much a shared curatorial endeavour with Hannah Redler-Hawes. Accordingly, for purposes of the thesis, to avoid conflicts of authorship, and to clearly articulate my 'contribution to knowledge' I focus on only 5 commissions I was responsible for. I am extremely grateful for the collaboration with Hannah, from whom I learnt a great deal, and much could be written reflecting upon our discussions! But alas it is beyond the scope of this thesis. The booklet that accompanied *TNO* is located in the appendix and may be referred to. It is a significant document which serves to represent the scope and character of the wider exhibition and our collaboration. Please also see appendix for Roger McKinley's (FACT's research manager and my supervisor) statement on process and division of work document.

shown in a gallery environment before. James Coupe's project was defined by my curatorial provocation to transform FACT into an observatory and explore both the more affirmative aspects of observation, where it can be an act of care, and its relationship to more insidious forms of surveillance.

The commissioning and curatorial process began with in depth research of artist practices, followed by initial Skype or face-to-face meetings, a circulation of the above 'artist discussion document', residencies in some cases, and further correspondence and meetings. This chapter situates how artists responded to the curatorial concept, and documents how commissioned artworks evolved and enacted a shift from close engagement with the history, contexts, community and sites of Liverpool and Bidston Observatory, toward a more discursive engagement with the observatory in both archetypal and atypical senses, and how each contributed to an old/new observatory manifesting within FACT's galleries.

**When instruments leave (and return to) the building**  
**David Gauthier – 53°32'.01N, 003°21'.29W, from the Sea**

David Gauthier's commission responds to my research question of what could an observatory be in the 21st century within a public gallery, by bringing a waverider buoy used for measuring wave height and frequency at sea, back to dry land and into the gallery. In so doing, and alongside his film of a similar buoy on the water, he draws attention to the distributed character of the observatory today, whilst enabling audiences to experience such an instrument of observation up close. Thus his commission articulates the potential for a how a *new* observatory, sited *within* a public gallery, can function to *observe observation itself*, and be a space for diverse publics to reflect upon the changing character of observation.

At its heart the piece asks; what does a waverider buoy alone at sea feel like? Equally, what does the sea that the buoy floats upon feel? Not feel 'to touch', in a human sense, but feel in itself, ontologically, as a more-than-human assemblage? These questions were posed by David Gauthier's work *53°32'.01N, 003°21'.29W, from the Sea*, for which the artist travelled out by boat into Liverpool Bay to film a single waverider buoy.<sup>13</sup> From this raw footage, he 'steadied' the buoy itself in the frame using image stabilisation software, relocating the movement of the sea upon the camera, to the video-frame itself which rocks and sways, in equal and opposite reaction to every displacement of the camera. In a further 'hack' Gauthier extracted the 'values' from the software of the camera's and the buoy's movement and translated this into sound using a bespoke synthesiser – turning liquid waves into sound waves. In a final act of extrapolation and commensuration, he presented a real waverider buoy in the gallery alongside the CEFAS (Centre for Environment, Fisheries and Aquaculture Science) data visualisation of it, depicting a sample of the data it gathers and transmits, including wave period, height, and direction.

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<sup>13</sup> See excerpt here: <http://gauthier.info/533201N0032129W-from-the-Sea/>



Fig. 6: Installation view: David Gauthier - 53°32'.01N, 003°21'.29W, *from the Sea*, 2017. Photography: Gareth Jones.

The work was born out of an initial two-week residency by Gauthier at NOC (National Oceanographic Centre) in Liverpool, where staff and activities from Bidston Observatory relocated following the site's closure in 2004. Fundamental to the observatory's cessation was the fact that observational instruments were no longer contained within the observatory building itself. They had left the building, distributed up into the sky in the form of satellites or out at sea, like the waverider buoys. Such instruments and their data had become shared resources between institutions. Distributed to such a degree that the world itself could be said to have become one big observatory. And furthermore today when we observe the world, look at the sky or out to sea, the infrastructure of observation, such as satellites, or instrument-laden buoys, are more and more a feature of the landscape, the earth, the sea, and our field of vision. *53°32'.01N, 003°21'.29W, from the Sea* performs an act of meta-observation, observing the observer. Representing computation in the 'expanded field', in which, as Jennifer Gabrys writes, 'networked environmental sensors make it possible to listen in on a planet that has always been "talking to us" but which we can now only begin to hear.' (Gabrys, 2016:7).

I was introduced to the artist David Gauthier through our joint participation in working group 1 of the COST Action on New Materialism.<sup>14</sup> He had previously worked with metrological survey equipment for the *Critical Infrastructure* (2014) installation, with Jamie Allen, and other works of his explore human and technological modes of sense, for example *CIDZYI* (2012) comprised a 7 metre-long tapestry featuring patterns composed of capacitive sensing electrodes that react to body movements to produce an interactive sound-work. These pieces, and others, all engage strongly with the relationship between observation and instrumentation, and the role of human and technological sensing between these domains. Coupled to this, Gauthier's strong interest in new materialist philosophy, in particular Donna Haraway's notion of naturecultures, which articulates nature and cultures' inseparability in ecological relationships that are both biophysically and socially formed (Haraway, 2003), became a strong basis for commissioning him to produce work for *TNO* and ongoing conversations.

Gauthier's resultant work was striking for its articulation of how the observatory is no longer contained within the walls of a singular building, but has become deterritorialized, and whereby the act of turning a gallery into an observatory – a single site with instruments contained therein – becomes an anachronistic gesture. But equally in a world awash with data and devices, it suggests how paradoxically an old/new observatory may serve as a useful space to reflect upon this profusion of neoteric technological milieus and datafied landscapes we now inhabit, and critique the cogency and agency of accordant instruments,

<sup>14</sup> See: <http://newmaterialism.eu>

measurements, and representations. As Gauthier writes: ‘the piece foregrounds those elements of information-gathering which are lost by numerical and geographical data depictions: the wild forces of the world, and the angst of the instruments that face them’ (www.gauthier.info, 2018). The buoy, like the gnomon discussed by Michel Serres and referred to in the literature review, cracks and ‘intermits the world’ (Bühlmann, 2014) and: ‘Modernity begins when this real world space is taken as a scene and this scene, controlled by the director, turns inside out.’ (Serres, 1995b:82). Instruments of measurement are also instruments of reason, caught in a fold between human inscription and invention and the world writing itself. This fissure and friction is a central concern for Gauthier when he describes a key aim of the project to ask:

‘...how is data co-constituted with the world in the first place, as opposed to how it is interpreted “after-the-fact.” The piece puts forth an anti-representation, tracing how a measurement is produced in time and space rather than how it is read or how it represents this or that. That is, how an instrument is materially constituted, deployed and situated within the material weft of the world and how the world physically modulates it (and vice versa). In this sense, the project seeks to exhibit the “operational milieu” of oceanographic instrumentation as a place where matter translates itself from one form to another.’ (www.gauthier.info, 2018)

This points to a key question for my project – if data is the product of ascribing value to phenomena, how does the resultant inscription, the data itself and accompanying instruments used for its creation in turn become phenomena, and part of the world, which are then measured and ascribed a value? Producing – an endlessly iterating situation that results in the world being full of observational devices and their inscriptions, observing and replicating themselves ad infinitum. How is this process playing out at scale and in multiple – with the world becoming slowly enveloped by instruments and data? What Gauthier’s work enables through its focus on a single instrument alone at sea, is a view in microcosm of the colonisation of the world with measuring instruments. Furthermore, the multiplicity of viewpoints we are afforded in the gallery via the triptych of stabilised video, gods-eye cartographic view, and the buoy itself or rather its doppelgänger, all bound together with low frequency sonics, fractures any singular standpoint. This stands for a posthuman decentring of the human subject performed principally by the machinic assemblages that encircle the earth, enabling distributed forms of observation, coupled to the effect of climatic ruptures produced by industrial capitalism. But the earth, unlike the waverider buoy is not a steel sphere yet, but it is becoming ever more a ‘technosphere’.<sup>15</sup> In Gauthier’s work the strength of the waves coupled to the instability of the camera and cameraman, translates to the synthesiser’s pitch bends, putting the viewer, artist, and camera ‘in the same boat’ and together with the buoy all ‘out to sea’. Creating a strange multi-species more-than-human<sup>16</sup> ‘naturecultural’ assemblage (Haraway, 2003). As Gauthier writes: ‘rather than talking of human observation my piece speaks of non-human transduction, that is, the process by which matter is able to... translate the forces, energies, and intensities it effects and is affected by. In this way, through the notion of transduction, 53°32'.01N, 003°21'.29W, *from the Sea* suggests a type of worldly sensibility in and for itself that does not have as a sole vantage point the reified figure of the human gaze’ (www.gauthier.info, 2018). But as we discovered in trying to loan a waverider buoy for the exhibition from the Dutch firm Datawell, they very much do have a human ‘maker’ as do all forms of technology, however much their authorship and manufacture is born of an entanglement of nature *and* culture.

The work revels in, and pushes to the extreme the ‘theory-laden’ quality of observation, as discussed in the literature review, where technoscientific observations offered by waverider buoys for example, are always observations a priori theory (Popper, 1959). Furthermore, the theory and its accompanying technology that the buoy is expressive of is defined by the paradigm (Kuhn, 1970) from which it emerges. Thus Gauthier’s engagement with the buoy asks new questions of the relationship between

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<sup>15</sup> Technosphere describes a new technological sphere interacting with other Earth spheres, including biosphere, atmosphere, and hydrosphere. See for example the Technosphere HKW, Berlin project: [https://www.hkw.de/en/programm/projekte/2015/technosphere/technosphere\\_start.php](https://www.hkw.de/en/programm/projekte/2015/technosphere/technosphere_start.php) and accompanying magazine: <https://technosphere-magazine.hkw.de/>

<sup>16</sup> I use the term more-than-human, as opposed to non-human, for its more affirmative maximalist character.

instrumentation, data, and the material world. Just as theories of ‘social constructivism’ and ‘new experimentalism’ led to new practices and critique of science, so Gauthier’s work I would argue engenders a small, but nonetheless paradigm shift toward a new materialist technoscientific aesthetic.

In our discussions about the project when Gauthier was first looking at waverider buoys, I shared with him David Cartwright’s statement, in *Tides: A Scientific History*, that ‘the global aspects of tidal science... do indeed seem to have reached a state of near-culmination’ (Cartwright, 1999:4) and how this seems to, all too conveniently, suggest that the sea is smooth and corresponds only to the observed data, forgetting how the unruly surface of the sea and its waves, of which no two are alike troubles this image of oceanographic consummation. Similarly, Gauthier’s journey to the buoy is symbolic of how scientific knowledge itself is arrived at. It takes a particular route, one from an infinite amount of possibilities, that like Rheinberger’s experimental apparatus for ‘unknown answers’, discussed earlier, is still very much a constructed apparatus, limited in what it may generate, akin to what Nancy Cartwright has called ‘nomological machines’ (Cartwright, 1983). Such machines may enable the measurement of phenomena and the ascribing of laws, but the degree to which these laws hold beyond the machine is unknown and unverifiable (Cartwright, 1989). Further still, as Ian Hacking suggests, it is less the case that we have learnt to understand the workings of the world, rather instruments and the world have been made-to-measure, and the world is ever more customised and made consistent with instruments and observation (Hacking, 1983). Against this grain, Gauthier’s work seeks to less rock the boat, than rock our sense of what rocks the boat, and make material-discursive waves, both sonic, liquid and epistemic. Just as the tools of observation have changed how we see the world, so artworks of observation change how we see observation itself. This is the meta dialogue that aspects of *TNO* sought to enact. Whereby just as new instruments and data provoke new questions and answers, so the embedding of an artist such as Gauthier at NOC provokes further unknown questions and answers.

### **How is an observatory defined by its emplacement?**

#### **Yu-Chen Wang, *I Wish to Communicate with You***

Yu-Chen Wang’s commission, like David Gauthier’s, engages with technologies of observation local to Liverpool, but Wang’s commission was focussed on tracing specific histories related to Liverpool and Bidston Observatories. Wang combined processes including redrawing a map of Merseyside featuring key observational infrastructure, including the observatories, with face-to-face interviews with former observatory employees, subsequently translated into film. By representing this historical and social research within the gallery, Wang enabled the observatory within FACT to become a place for audiences to engage with the living history of observation in the city and explore shared practices between observational science and artistic methods, such as the use of inscription devices and symbolic language.

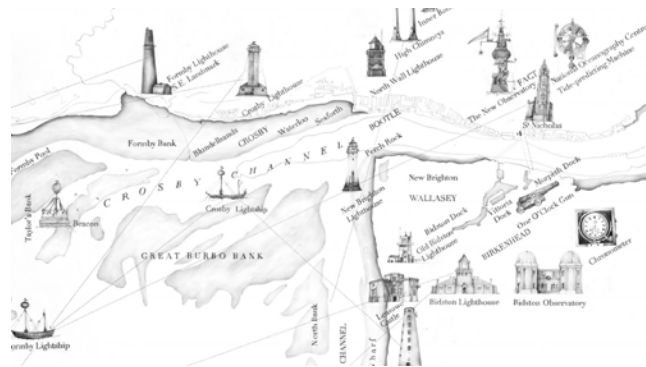
Yu-Chen Wang’s project followed most closely, of all the artists’ commissions, in the footsteps of my initial phase of research, visiting many of the archives, people, and places connected to Liverpool and Bidston Observatory. Her previous work exploring the entwinement of ecological- and technological-systems, and where these intersect via machines and their operators, made her well-placed to explore the tidal prediction machines used at Bidston and observational communities of the past, present and future. Her resultant commission comprised: a large drawing reworking a 19<sup>th</sup> century etching of the coastline around Merseyside with additions including Bidston Observatory and Lighthouse, and *TNO* at FACT; a series of flags representing FACT, NOC, Bidston Observatory and Lighthouse, given to the the owners at the opening of the exhibition and flown from the lighthouse for the duration;<sup>17</sup> and a new film comprising footage from Bidston, NOC and reworking interviews with former observatory employees.<sup>18</sup>

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<sup>17</sup> Due to building work at Bidston Observatory it was not possible to fly the flag from its roof.

<sup>18</sup> See artist’s website for video extract: <https://www.yuchenwang.com/the-new-observatory>





Figs. 7 & 8: Installation view (photography: Gareth Jones) and detail of drawing from *I Wish to Communicate with You*, 2017

The first phase of my research that Wang used as a starting point had built a detailed picture of the history of Liverpool and Bidston Observatory, but also its living history and what I term *observational communities* – those who have worked at the observatory, and the related sites of Bidston Lighthouse and NOC. But also those who live in proximity to Bidston and become part of the observational community by association, for example the local school, The Observatory, the students who attend it, and who along with other local young people, often gather atop Bidston Hill, performing hybridised observation, gathering data from its vantage points, mixing bodies and light, smart phones and megabytes.<sup>19</sup> Wang choose to focus on former observatory employees, the prediction machines at NOC, Bidston Observatory and Lighthouse, and how each were entangled meeting points between materiality and technoscience.

To briefly provide some additional historical context to Wang’s commission. Liverpool’s growth was defined by its proximity to the sea and manufacturing in the north of England, significantly catalysed in the 18<sup>th</sup> century by the slave trade, its development of the world’s first commercial wet dock in 1715, and new rail and canal links. Its wealth and power functioned both symbolically and financially to endorse the establishment of the Observatory first in Liverpool and later Bidston, as suitable sites of technoscientific utility and knowledge production. The signalling flags echo the way these places were ‘claimed’ in the first instance as sites of technoscience, and in later phases, including by processes of artistic research – as in my case, Wang’s, and the new research centre at the site. Equally it links to, and appropriates, how flags oscillate between being a utilitarian form of communication and symbolic act of ownership.

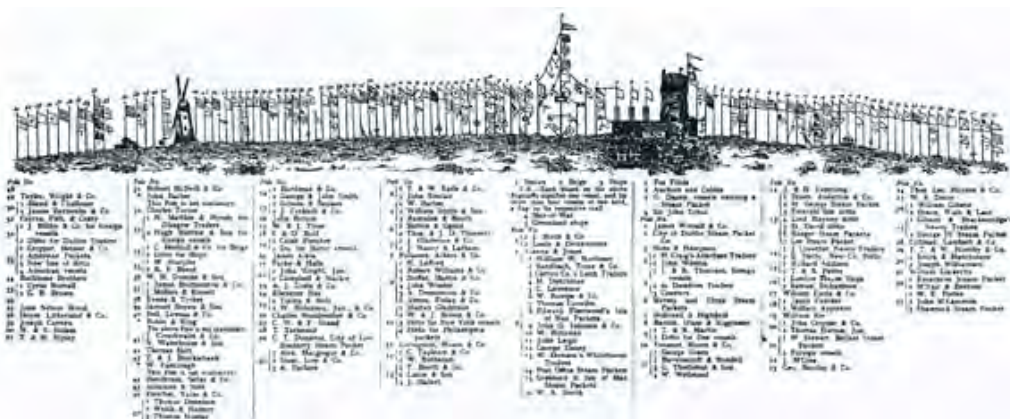


Fig. 9: Etching of Signal Flags atop Bidston Hill c. 1820 from Holden’s Tide Table 1826

Bidston Hill was established as a flag station in 1763. Lookouts could identify ships approaching from the Irish Sea and raise the respective shipping company flag, and alert the port, which would ready dock workers for unloading and ensure workers were paid for the absolute minimum of time, a system that

<sup>19</sup> I met Lewis Mahoney aged 14, a student at The Observatory school, at FACT while he was on work experience and he attended a TNO programme meeting. I also attempted to develop a project between artist Rachel Jacobs, FACT’s Learning team, and The Observatory school, but this did not come to fruition, although Rachel did include her ‘Prediction Machine’ in TNO.

precedes later technologies of observation employed in industry, such as Amazon's tracking of warehouse workers.<sup>20</sup> In the 19<sup>th</sup> century Bidston became part of the Liverpool to Holyhead semaphore and later electric telegraph system. When walking on Bidston Hill one can still find holes carved into the sandstone that supported the huge 30ft high pine flagpoles. Often filled with water they reflect the sky above like an obsidian mirror.

An initial idea before speaking with Yu-Chen was to explore how flags might be resurrected at the site. At an early stage in the project I was in touch with the art organisation A/Political who commissioned Santiago Sierra's *Black Flag* project, which involved the planting of black flags at the North and South Pole.<sup>21</sup> My curatorial conceit was whether the project could be relocated to Bidston and the possibility of installing the flags in multiple atop Bidston Hill, and in so doing link *Black Flag* with Sierra's *Black Posters* project where he posted up thousands of posters in London, Berlin, Istanbul, Madrid and Basel between 2008 and 2015. Following an initial site visit with A/Political and interest in the idea the conversation broke down due to competing commitments and schedules. Still keen to connect to this history of flags at the site, this aspect was rekindled with Yu-Chen's commission whose resultant work was a complex assemblage of drawing, flags, and film, mapping the diverse observational communities, technologies and sites in Merseyside.



Figs. 10 & 11: Flag from *I Wish to Communicate with You* flown at Bidston Lighthouse (photography: Yu-Chen Wang) and Yu-Chen Wang with Kym Ward of Bidston Observatory artistic research centre, and their flag, at launch of *The New Observatory* (photography: Gareth Jones).

It was an important moment in the genesis of the project when at the opening of the exhibition Wang's flags were given to Bidston Observatory and Lighthouse.<sup>22</sup> An earlier idea of mine for the exhibition at FACT was based upon a more explicit engagement with the history of the observatories and related sites, technologies and communities, but not only did this not make sense in terms of the collaboration with Hannah Redler-Hawes and the ODI, being too specific to my own research, but this history was already being transmitted in displays at the Liverpool World Museum, NOC and Bidston Lighthouse. Instead local historical contexts and sites were linked to through commissions, the public programme, and signposting via exhibition interpretation and marketing material.<sup>23</sup> This expanded, networked format of the exhibition was also suggestive of how important social, informational, and technological networks were to observatories and processes of observation more generally. Wang's flag flew at Bidston Lighthouse for the duration of the exhibition, and the Lighthouse gave tours every Saturday, which were promoted in the exhibition booklet and FACT's website.

Wang's drawing served as microcosm of this network across time and place, reworking an historic chart entitled *Approaches to Liverpool* from the 'Best and latest Surveys for Fargher's Edition of Jefferson's Almanac', 1862, locating the lighthouses in their actual positions and adding aforementioned details such as NOC, FACT and Bidston Observatory. The drawing was located in the entrance to FACT and served

<sup>20</sup> See for example the 2018 Amazon patented designs for a wristband which tracks the position of warehouse staffs hands and employs vibrations to point them in different directions (Solon, 2018).

<sup>21</sup> A/Political is a commissioning agency and collection founded by Russian businessman Andrei Tretyakov. See their website for details of *Black Flag* <http://www.a-political.org/> for further info.

<sup>22</sup> For further details of respective sites see: <http://www.bidstonhill.org> and <http://www.bidstonlighthouse.org.uk>

<sup>23</sup> See appendix for exhibition booklet and full details of the public programme.

to both highlight the historical context to the exhibition and particular elements within it linked to other artworks in the exhibition, such as the Taylor's Bank buoy to David Gauthier's waverider buoy, or a marine chronometer to Voss and Anja's work based on time standardisation. The drawing also served as a sister work of sorts to my own installation upstairs on the exterior wall of gallery two reworking archive material and imagery, which I will discuss in more detail in chapter 3. Each acted as bookends to the historical context to the exhibition, and comprised shared imagery of the One O'Clock Gun and tidal prediction machines.

Just as the flag flying and linking to open days at NOC and Bidston Lighthouse sought to create a live network beyond the walls of FACT during the exhibition, Wang's film continued to be developed during the exhibition, further folding it into the fabric of the sites and communities that inspired it, and serving to blur the lines between static exhibition and live observatory. Wang's process involved actively observing and gathering data, including filming of the flag hoisting at Bidston Lighthouse following the exhibition opening, for example. In this way the work also connected to other live components such the ground station for observing satellites and Rachel Jacobs' weather station connected to the *Prediction Machine*, both active on the roof of FACT throughout the exhibition. The text of Wang's film was produced in collaboration with Nathan Jones, a Liverpool-based artist and poet whom I have collaborated with regularly, that transformed Wang's textual research and interviews with former NOC employees, in particular female 'computers' who operated the tidal machines, into a musing on the nature of time and observational science. In a further enfolding, for the premiere of the film we invited Sylvia Asquith a former Bidston Observatory 'computer', Prof. Philip Woodworth of NOC and formally Bidston, and Stephen Pickles of Bidston Lighthouse to speak at the event.

Wang's project maps the multitude of technoscientific instruments, communities and places, that form and circulate as 'immutable mobiles' (Latour, 1986) within Merseyside that defined its observational communities. Her work's cartographic elements also draws attention to the active flows between these sites and observational science, where as Callon and Law write 'circulation has become more important than fixed positions' (Callon and Law, 2004:9), and shows Liverpool and Merseyside as fixed sites that catalyse networks and movement globally. The observatory is depicted as a founding node within today's high speed information networks, and what Manuel Castells calls a 'space of flows', which he defines as 'the material organization of time-sharing social practices that work through flows' (Castells, 2004:147). Thus in Yu-Chen Wang's commission Merseyside and the observatory are shown as complex networks that in turn energise broader networks. In many ways, this echoes how my own assemblage of research, was plugged into by Wang and redeployed via her own practice. But crucially just as Liverpool's ships went to sea, and were involved in complex trading networks, they returned home. So too Wang's work returned to the fold of the exhibition. Equally, my curatorial practice shares something of both the aforementioned mercantile and informational movements, that seeks to create a 'space of flows', building networks that function and catalyse at micro and macro scales.

### **Can time-standardisation be a tool for 'good'?**

#### **Jeronimo Voss and Radamés Anja- *Applicate Against Time***

Jeronimo Voss and Radamés Anja's commission *Applicate Against Time* was defined at the outset by a conviction that an observatory located within a gallery should be a live space for active experimentation with, and the development of, new instruments for observation. But crucially, that these tools act and reflect critically upon pervasive observational technologies, such as time management software, which became the focus of their project. This approach was also enabled through the FACTLab element of FACT's programming and infrastructure, which offered a physical space, tools and support for the development of new work.

I began to research Jeronimo Voss' work based upon his dome projection *Inverted Night Sky* (2016) that was included in *TNO*, but which I will not discuss at length as it is not a new commission. This work combined drawings of the Milky Way by Anton Pannekoek produced in the 1920's, and subsequently used in Zeiss Planetarium projection systems, with Voss' own footage of modern day workspaces at the Anton Pannekoek Institute for Astronomy, Amsterdam, and a text by Voss, circling the dome, addressing relations between work and time.

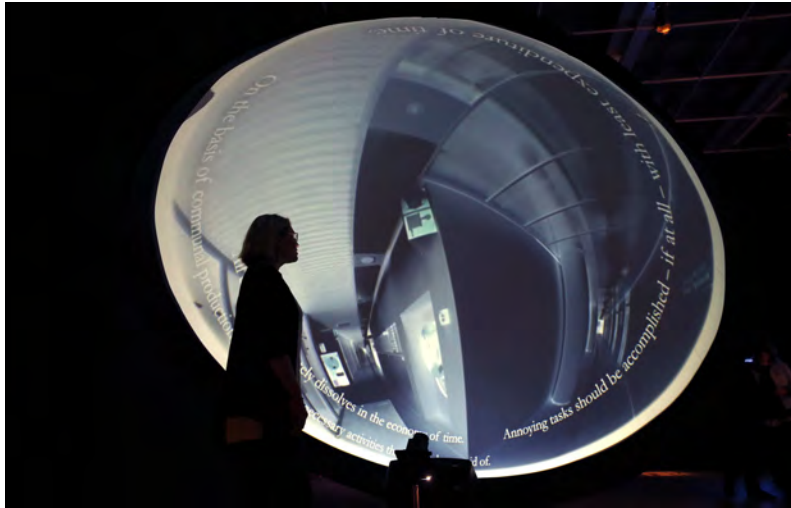


Fig. 12: Installation view: *Inverted Night Sky*, Jeronimo Voss at *The New Observatory*, 2016. Photography: Gareth Jones.

There were strong affinities between Voss' project and my own research questions, in particular: what forms does contemporary observation take today, analogously how does the observatory of today manifest and operate, and how might this be both represented and reconfigured within a contemporary art gallery. Striking within Voss' film was its focus on the cluttered desks and washing up left in sinks by astronomers. This detritus of the everyday accompanied the institute's work on the origins of life and high-energy astrophysics, defining its life and activities as much as mathematics and instrumentation. The text itself muses on the relationship between clock-time and spacetime: shifting between everyday clock-time standardisation employed within work; 'timelines mark necessary activities that we need to get rid of', with that of space-time, where; 'absolute time is pure, repetitive, abstract and mathematical time'. There were strong resonances between this piece of work and Liverpool and Bidston Observatories' history as institutes defined, at least in their early life, by time standardisation and measurement, linking astronomy to utility. Furthermore, my own more socially-engaged research including interviews with former observatory employees, suggested that the observatory 'operations' were characterised as much by social life at the observatory as its technoscientific processes and results.

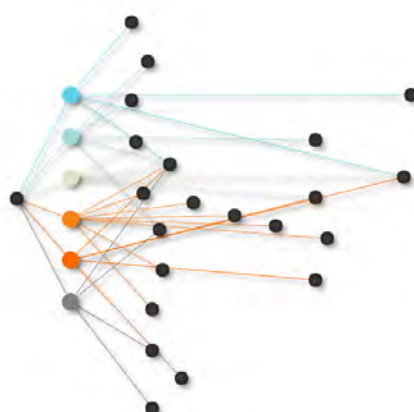
During the early stage of the commissioning process I shared specific research with Voss on the rating of chronometers, exploring how a new work may relate to this, in particular we discussed the use of a 'time-ball' attached to the roof of the Liverpool Observatory that dropped at precisely 1pm, allowing ships to check the accuracy of their chronometers. I also introduced him to textual accounts of the 'One O'Clock Gun' at Bidston Observatory, which in its new location was too far from the port so used a cannon to signal 1pm instead of a time ball. Alongside this contextual history I was keen that he engage with the project less in the normal sense of an exhibition and more as an active observatory, inspired by the former observatories activities as a site of invention, in particular Arthur Doodson's development of tidal prediction machines. In particular, I asked if he may like to collaborate with FACTLab and their resident technologist Radamés Ajna, to develop a tool or instrument of time-based observation. In addition, we had begun a conversation about the notion of networked institutions and how observatories linked together. Voss was a member of the Nika Haus<sup>24</sup> housing collective, transforming an office block in

<sup>24</sup> For further info see: <https://nika.haus>

Frankfurt into cooperative housing, and I suggested it would be interesting if there was a way to link the institutions of FACT and Nika, via an observational instrument. Voss and Anja conducted initial research into time management tools and identified a desire to develop an open source tool more in-line with their ethics.

Following skype calls and email correspondence between myself, Voss, and Ajna, it was agreed that they would work towards developing an open source time management software tool, in an echo of the former Liverpool and Bidston Observatories development of time standardisation tools. Voss wrote in an initial outline he wanted to explore the: ‘conflict between the absolute (astronomical / Newtonian) regime of time in the capitalist present and a communal planning initiative that needs to adjust time to its qualitative subjective goals.’<sup>25</sup> Voss spent a week in November 2016 as a resident at FACTLab developing the tool with Ajna, exploring different possibilities before deciding upon a system using Keystone.js, an open source framework for developing database-driven applications, and Vis.js, a browser based visualization library. Alongside this research Voss and I explored issues and histories relating to the architecture and ‘furniture’ of the observatory, and the art of scientific instrument making and where this intersects with sculpture. In particular, how might the tool being developed be installed within the gallery/observatory, in a form that oscillated between sculpture and installation.

Following the residency Voss began testing and utilising the time management software for tasks at Nika Haus alongside development of the works sculptural housing and an additional video work. The resultant work produced, *Applicate Against Time* (2018), explored the observing and management of time within contexts of precarious work, bringing together living room furniture, media displays and software. The work comprised three principal components: firstly the ‘NIKA.app’ was shown on a video screen with a link to download;<sup>26</sup> secondly Voss and Anja produced a montage of adverts and idents for time management software apps, exploring their typology. This was followed by images and a short text related to Austrian architect Margarete Lihotzky’s cataloguing of homeless settler shacks in 1920’s Vienna which were discussed at forums with lantern slides, this seemingly incongruous aspect of the film sought to connect Voss project, and Lihotzky’s work, with contemporary issues of the precariat, housing, and tools of observation and knowledge production. Finally, the screen was housed in a hybrid furniture-frame inspired by both the architecture of the observatory and its fusing with instruments, and experiments in utopian modular living, in particular Ken Isaac’s *Super Chair* (1974), and Stafford Beer’s and Gui Bonsiepe’s *Cybersyn Operations Room* (1971).



Figs. 13 & 14: Installation view of *Applicate Against Time* (photography: Gareth Jones) and screenshot from work-in-progress time management software (image courtesy: Jeronimo Voss and Radamés Anja).

<sup>25</sup> Email correspondence between author and Voss, September 23<sup>rd</sup>, 2016.

<sup>26</sup> See: <https://github.com/radames/NIKAapp>

The work was situated within the ‘learning space’ of the exhibition, where other furniture including chairs and tables for activities were located. Also in this area were other ‘functioning’ instruments and tools including Rachel Jacobs *Prediction Machine*, Citizen Sense’s *Dust Boxes* and *Frack Box*, and *Datacatcher* by the Interaction Research Studio.

The project succeeded in making a contemporary link to the Liverpool and Bidston Observatories historic engagement with time standardisation up to date, and render *TNO* a ‘live’ space for the development of new tools, community, and network building. It examined how time management tools, with a legacy in Victorian science and trade, and used today predominantly in a commercial context, may be built and used for more socially responsible ends, such as the effective running of a housing cooperative. Thus the project subverted the common understanding of time management tools for ever more efficient modes of exploitation, toward a more radical sense of time measurement and organisation. At time of writing the tool continues to be used at the cooperative.

### **What new phenomena may we measure today and how can we measure differently?**

#### **Kei Kreutler and Libre Space Foundation – *Open Space Observatory***

Alongside making the observatory within FACT a space for the development of new and alternative instruments for observation, I was interested in exploring how an observatory could become manifest within a gallery through commissions that gathered live data throughout the duration of the exhibition. The *Open Space Observatory* achieved this through collecting telemetry data from satellites. Receiving data from the roof of FACT it served to refunction the gallery’s architecture toward new forms of observation. Furthermore, in this way it is an echo of the former Liverpool Observatory that was defined by instrumentation and devices such as time balls and telescopes, which augmented its architecture.

As part of my research into new and alternative networks of observation I attended a workshop in the summer of 2016 on blockchain at Furtherfield, London,<sup>27</sup> and met the designer and developer Kei Kreutler, who in a breakout session described her nascent project developed in collaboration with the Libre Space Foundation, entitled *Open Space Observatory (OSO)*, which had strong affinities with my own research. In one sense, my project had become an observatory of observatories. Examining how they proliferated across the earth, first in building-bound forms, and later as itinerant instruments gathering and sending data to a vast network of observatories and nodes, co-constituted with one another through shared data and instruments.

New materialist philosophy proposes a radically decentred notion of the human subject, engendered to a significant degree by the power of new technology that has both distributed itself across the world and enabled accordant distributed human agencies. Furthermore, new materialist perspectives assert that technology itself has its own agency, which acts beyond simple mediation but is performative (Jonsson et al., 2009). In such a milieu, instruments and humans become entangled and networked forming complex assemblages with a ‘sociomaterial’ character (Suchman, 2007). One particular example of this is the network of approximately 1500 artificial satellites that orbit the earth, observing it with a range of instruments and enabling principally: communication, navigation, media broadcast, weather prediction and measurement, weapons systems, and surveillance.

*OSO* explores how, to quote from an initial proposal, within ‘projects like Copenhagen Suborbitals and SatNOGS, the future of satellites could be more evenly distributed. Drawing inspiration from educational astronomy clubs to artist collectives such as the Association of Autonomous Astronauts, *OSO* looks toward building a satellite skywatch and a way to bring the arts and engineering together – installing infrastructure

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<sup>27</sup> Furtherfield Gallery and Lab, active since 1996, is led by artists Ruth Catlow and Marc Garrett, and located in London’s Finsbury Park: <https://www.furtherfield.org>.

for space observation in public spaces and repurposing old observatory sites.<sup>28</sup> My commissioning of *OSO* was the first time the project had a public facing outcome. Following the exploration of various ideas, including a design fiction festival and ‘satellogy’ workshop, it was agreed that a networked ground station for observing satellites on the roof of FACT would be pursued for the commission. The ground station would capture telemetry data from low earth orbit satellites, publish this data to a public API and online interface through the SatNOGS network software,<sup>29</sup> with additional information on satellites’ historical, orbital position and status, and in the gallery itself present a second ground station and an onscreen visualisation in the gallery produced by Kreutler. The ground station linked to 6 other ground stations across the earth.<sup>30</sup> Alongside this screen based visualisation was a second ground station to enable gallery visitors to see the technology itself, and a handout and QR code vinyl graphic enabling visitors to link to the website of the project.

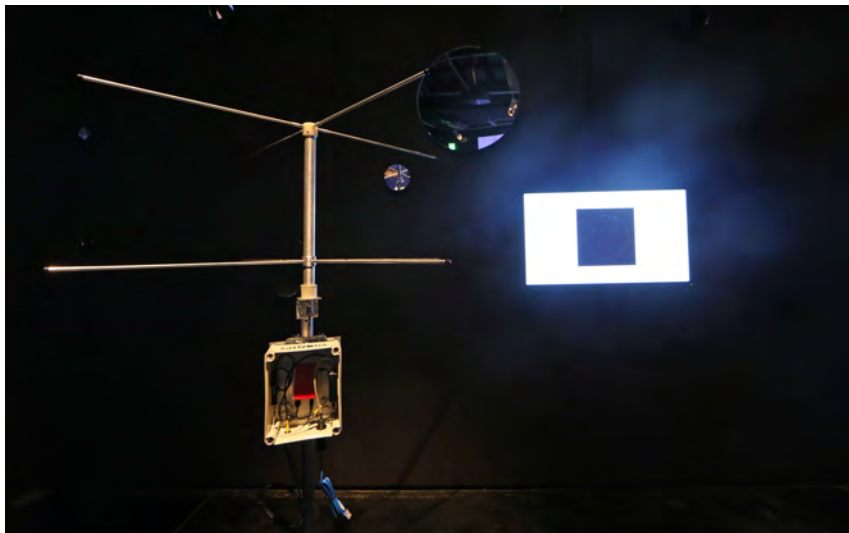


Fig. 15: Installation view: Kei Kreutler and Libre Space Foundation, *Open Space Observatory*. Photography: Gareth Jones.

In the spirit of making both *TNO* and the *Open Space Observatory* live data gathering and community generating observational endeavours, Pierros Papadeas from Libre Space Foundation, presented the Ground Station at the Liverpool Maker Fest, including tracking of the International Space Station from the roof of Liverpool Library. In addition to this Kei Kreutler participated in the *Theatre of Measurement* symposium we held in October, 2017. In a final act, the ground stations were gifted to local creative technologist Jo Hinchliffe, to enable a long term ground station to be installed in the UK and continue to be operated today.

<sup>28</sup> Proposal sent to the author 23<sup>rd</sup> October, 2016

<sup>29</sup> See here: <https://db.satnogs.org>

<sup>30</sup> The network can be seen here and at time of writing totals over 14: <https://satnogs.org>



Figs. 16 & 17: Libre Space Foundation track the International Space Station and demonstrate the ground station at MakerFest, at Liverpool Central Library, June 24 2017 (photography: Mark Wright). Right: Jo Hinchliffe's daughter installs the ground station in their back-garden in North Wales, 2018 (photography: Jo Hinchliffe).

Once a significant network has been established across the globe, the ground station network will be able to offer continuous monitoring of satellites and to synchronise data collection between them. Potentially in the future such ground stations will enable access to research data beamed direct from satellites and also the potential to be transformed into transmitting as well as receiving devices, this combined with new open source satellite technology, could create powerful independent data networks. In so doing the project turns space observation both away from state or corporate ownership that has defined it to date, putting tools into the hands of amateurs. But it also sets up a distinct analogy – when once we looked to the stars, now instead we may look to constellations of satellites. Echoing how David Gauthier's work depicted the colonisation of the natural world with instruments, so too this work visualises the satellites that encircle the earth. Crucially though, the act of observation with *OSO* takes a participatory and egalitarian form. The ground stations themselves are produced from open source designs and software, and are made from easily accessible hardware. The project then also functioned in line with Jeronimo Voss' commission, and restaged works in the exhibition such as those by Rachel Jacobs, Julie Freeman, and James Coupe's which I will now discuss, that functioned as live data gathering instruments, rendering the exhibition a 'real' operational observatory.

**A monument of observation for care, for control**  
**James Coupe – Watchtower (A Machine for Living)**

For *TNO* to successfully transform *FACT* into an observatory, and fully explore how an observatory could inhabit a gallery, it had to perform a 'takeover' of sorts. This was achieved firstly by the number of works included, enabling the show to fully inhabit the main galleries, foyer area, and extend to the roof with instruments such as the *OSO*'s ground station and Rachel Jacobs weather station, and collectively create an intensity of spatial occupation and liveness. James Coupe's installation delivered much in this regard through the sheer scale and bold incongruity of its 40-foot-high occupation of the main atrium at *FACT*.

I began dialogue with James Coupe based upon his previous work: *On the Observing of the Observer of the Observers* (2013), which employs computer vision algorithms to detect, profile and track people as they move through installations designed to represent a psychology testing room, director's office, screening room, chapel, and classroom, in the Phillips Museum of Art, Franklin & Marshall College, Pennsylvania. Other CCTV cameras are set up elsewhere in the campus filming non-gallery rooms and the resulting



footage is algorithmically edited, alongside staged footage, into a film using text from a novella, *The Assignment*, by Friedrich Durrenmatt, with a new version being generated every few minutes and replayed in the galleries.

What resonated with the curatorial concept, and here my conversations with the co-curator Hannah are significant, is how Coupe's representation of observation within the university campus, explored, and blurred lines between, both positive and negative forms of observation. Suggestive of how it can be both an act of care, as in a teacher's close observation of a student's learning, or as expressed in religion when it is associated with acts of solemnity, such as prayer or meditation. Hannah's development of Jon Thomson and Alison Craighead's project for *TNO* that explored state surveillance, had served at an early stage of our dialogue as an important crucible for articulating how we wanted to move beyond a paranoid 'us and them' aesthetic in relation to surveillance, that we felt had characterised much new media art following the Edward Snowden revelations of 2013.

When first speaking to James about a new commission, I stressed that I was interested in these blurred lines of observation, between care and control. But also my provocation to him was to turn FACT into an observatory, to inhabit it and make it a live space. Our first face-to-face conversation was held in the café area of FACT by the atrium and it was there that I pointed toward the atrium and asked whether he could 'take this over... how could an observatory inhabit this space.... how could it be 'real-time' and connect to other observational systems across the earth?' James' resultant work *Watchtower (A Machine for Living)* was modelled on fire lookout towers in Washington State where he is based, and more archetypal watchtower forms. But the work subverts expectations: the watchtower cabin is occupied not by persons, rather by a computer that links to 16 screens, playing videos produced by 'mechanical turks' observing daily life.<sup>31</sup>

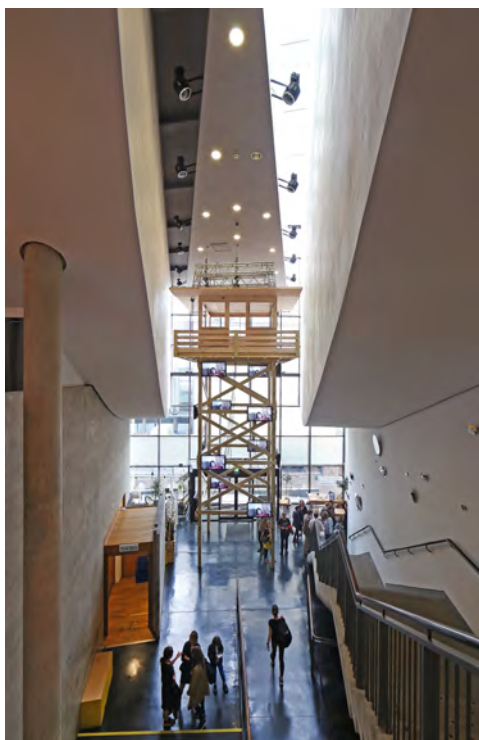


Fig 18 & 19: Installation views of James Coupe – *Watchtower (A Machine for Living)*, FACT atrium. Photography: Gareth Jones.

The watchtower's computers were programmed to automate a number of processes, including: request MTurk workers to upload videos, pay them \$0.50 per video, add subtitles sent by workers to the videos, and sequence to allotted time. The advert for MTurk workers requested videos of daily acts of

<sup>31</sup> The work uses MTurk an on-demand task management service by Amazon that allows account holders to hire human workers to complete small-scale tasks (surveys, captcha identification, basic image analysis) that computers cannot successfully perform, also known as 'artificial artificial intelligence'.

observation, including prayer, meal time, exercise, commuting, retelling dreams, and the view from a window. Intriguingly, and symptomatic of social media ‘oversharing’ perhaps, many people chose to film themselves describing the view out the window, rather than the view itself. Furthermore, and in echo of this occluded view, although the advert for the work stated that videos would be used for an artwork, the precise form and location of the work was not disclosed, making viewers of the work complicit in a form of observation that echoes other forms of online ‘one-way’ voyeurism. As Coupe writes in reference to the work: ‘Surveillance is no longer an external mechanism, but a domesticated one, seamlessly integrated into the rituals and environments of home, work and leisure.’ (James Coupe Website, n.d.).

At an early stage in the development of the project James was keen to explore the possibility of someone living in the watchtower itself during the exhibition, to be both surveilled and surveiller. This became unfeasible due to building regulations and budget, but I was committed to making it as much a living breathing structure as feasibly possible. The exhibition designer’s Ab Rogers and the technical team at FACT were fundamental to realising it also. Its resultant form was a ‘monument’ to observation, on an individual and technological level. It materialised the towering presence of data collection and analyses in our lives, both utilising and zooming in on the machinic assemblages and infrastructure of camera, computer, internet, and the individuals that enable and maintain it. Also, by virtue of it not being physically inhabited, but rather functioning as a platform for remote ‘others’, its apes contemporary forms of ‘platform capitalism’ such as Uber, which owns no cars, or Airbnb which owns no properties (Srniczek, 2016), where there is a shift to what Yann Moulier Boutang calls ‘cognitive capitalism’ that emphasises ‘invention power’ over traditional labour power and goods (Boutang, 2012).

In Coupe’s work the anonymity of online labour is given a face, enabling MTurk workers to represent themselves. The watchtower’s girders make physical the grids of a database. And just as Geoffrey Bowker and Susan Leigh Star emphasise how categories of classification are proactively made and kept invisible in *Sorting Things Out*, their study of how classification systems influence worldviews and social interactions, Coupe renders this digital scaffolding materially and monumentally (Bowker and Leigh Star, 1999). Adding complexity, where online labourers show themselves not as numbers, but immeasurable, individual, and often inchoate. In a broader sense, the MTurk workers, worked alongside myself and other artists and members of staff at FACT to ‘operate’ the observatory.

### **An Observatory of Observatories**

The act of placing a watchtower within a gallery, a building within a building, is suggestive of the pervasiveness of surveillance and observation. One could also describe it as an observatory within an observatory. Many works individually operated as observatory’s of observatories – and in this sense the exhibition collectively functioned on a macro scale as an observatory of observatories, in a homunculus or fractal-like experiment with scale and recursion. Comparable to the way fractal patterns possess an ‘expanding symmetry’ of ‘self-similar’ character (Mandelbrot, 1982). But crucially, rather than the perfect symmetry of fractals, *The New Observatory* at FACT functioning as another iteration of the growing web of observatories across the world<sup>32</sup> can be seen as a part of a more differential, complex, and emergent system. The specific examples I have given arising from my practice and research attempt to simultaneously critique and promote acts of observation – suggesting what it works with, and against, and where ambiguity or potential lies. Works in the exhibition, to use a cybernetic analogy, act as points of negative and positive feedback within the system. Introducing moments of ‘positive feedback’ that promote change and local variation, ‘negative feedback’ that promotes stability, but also with the potential for collapse of the system if left unchecked (Zeigler et al., 2000:55).

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<sup>32</sup> As an indication of the growth of observatories: The Minor Planet Center, a service of the International Astronomical Union, assigns each registered observatory a 3-digit code in the range 000 to Z99, and there are currently 2077 observatories listed. Each code serves as a unique identifier for observations of minor planets and comets. There are currently over 150 million such astrometric records in existence (*List Of Observatory Codes*, n.d.).

In this sense the exhibition can be described as attempting to manifest a feedback loop of sorts, which Norbert Wiener described as ‘the chain of the transmission and return of information’ (Wiener, 1961:96). To take this further I would describe my curatorial practice as seeking to create a moment of *observational homeostasis*, to use a biological term, or in a more mechanical sense *an equilibrium of observation* – a point around which a system and a community may gravitate. To this I would add a notion from second-order cybernetics, also known as new cybernetics, which articulates a shift from ‘observing systems’ to ‘observed systems’ (von Foerster, 1997) whereby the participant observer is affecting and present in any system and any measurement, whereby ‘your ecosystem, your organism-plus-environment, is to be considered as a single circuit’ (Brand, 1976).

More broadly the commissions discussed above sought to feed into a collective *re-ing* – to refunction, reimagine, and reformulate what observation and the observatory can be. Though a dialectic of rendering it critically, but also differently, or to use Maria Hlavajova’s term, to ‘institute otherwise’ (BAK – Instituting Otherwise, n.d.). Where the observatory may become new again, proposing it as a useful and meaningful creative space, with a recursive quality that watches the watchers, measures the measurers.

As discussed in chapter one and above in relation to David Gauthier’s work, a key feature of the changing nature of observatories through history, is one of an ever increasing network of instruments and data, first principally located within buildings, and later instruments ‘leave the building’ and are deployed at sea and into orbit, with observatories sharing instruments and data, as is the case with the CEFAS data and waverider buoy appropriated in Gauthier’s project. Furthermore, this material decentring and distributed agency of the observatory, is mirrored by the ideological character of data driven technoscience which shifts from an embryonic enlightenment phase (Headrick, 2002), to an adolescent romantic period of the Victorian period (Holmes, 2009), to its profoundly pervasive cybernetic posthuman condition of the 20<sup>th</sup> century (Hayles, 1999). This cybernetic character of ‘[p]ostwar design and communication sciences, believing the world to be inundated with data, produced new tactics of management for which observers had to be trained and the mind reconceived’ (Halpern, 2015:17) and that has led to ‘new techniques of calculation, measurement and administration’ (Ibid.). My own project and practice attempts to engage and develop an alternate vision or observation of this new emergent scene. Halpern writes that ‘contemporary forms of observation and perception may not even be linked back to single bodies or unified subjects.’ (Ibid., 20) and describes contemporary data visualizations as ‘the formulation of an interaction between different scales and agents – human, network, global, and nonhuman’ (Ibid., 22). Accordingly, *TNO* commissions functioned as a means to explore these different nexuses of observation through situated research and in three-dimensional space, engaging additional senses of touch and hearing, as well as vision.

How the commissions represent contemporary technoscience within a public space, is an echo of how stereoscopes, and all manner of devices, particularly those that augmented visual perception, were found in public exhibitions in the 19<sup>th</sup> century (Stafford et al., 2001). These innovations mark a new accessibility and agency of both the public’s engagement with science, but also of new tools available to the arts, within the context of new emerging publics and urban centres, catalysed by electricity, combustion, manufacturing, advertising and leisure. In a sense the act of bringing the observatory into the city, into the public gallery, functions to represent the convergence of public life and observational science. For although observatories have appeared to move from city centres to remote mountain tops, and satellites, or even underground, they have not left the city or social life, rather they have become too diffused or simply big, and enveloped places in a global network.

In some senses the various instruments and contraptions I have discussed have an unwieldy and alien quality; a huge watchtower, a large map, a large chair and frame with time management software embedded, a ground station, and a ‘waverider’ buoy – the last two of which are not explicitly intended for display in a gallery. Many of the works also combined the functional aesthetic of observation and its instruments, such as ground stations, domes, and towers, with more traditional art-based media devices,

including screens, synthesisers, and drawing, all collected in the overarching observatory apparatus. In this way the project attempts something akin to Bruno Latour's exhibition *Iconoclash* (2002), of which he wrote 'subverted the primacy of objects, generating an assemblage of scientific and cultural artefacts that create a mutually translating and networked exhibition environment.' (Latour, 2002:28–29).

Another intention was to enable audiences to get up close with the instruments, infrastructure, and their representations that define our contemporary information age and digital culture, and question their validity. In this regard I would echo historian of science Joseph Rouse, who has stated: 'I want to encourage doubt about the presumption that representations (that is their meaning or content) are more accessible to us than the things they supposedly represent.' (Barad, 2007:49). In this way the project explores how, if the museum is a memory maker, how the observatory may be an imagination maker, a citizen maker, and a space for developing a critical understanding of observation and data gathering practices. After all, if climate change is to be communicated to us through both nature and observational science then modes of inscription and reception, and dialogue between these matterings and sensualities, are fundamental. As Claire Colebrook writes: 'Nature, now, offers its own narrative and frames the human species, placing it within the scale and register of earth system science.' (Colebrook, 2017). The NASA Earth Observatory currently predicts that average surface temperatures of earth could rise between 2°C and 6°C by the end of the 21st century, how we engage with these deviations, change our ways, and go beyond the numbers is fundamental to the future.

Allan Sekula's essay *The Body and the Archive*, describes the 'new instrumental potential in photography: a silence that silences' (Sekula, 1986:6), during its nascent period in the 19<sup>th</sup> century. In particular he analyses the French police officer and biometrics researcher Aphonse Bertillon, who described how 'each observation or each group of observations is to be defined, not by its absolute value, but by its deviation from the arithmetic mean' (Ibid., 34). In opposition to these modes of observational subjugation, Sekula describes works of art, including Martha Rosler's video *The Vital Statistics of a Citizen, Simply Obtained* (1976) that work at the level of 'counter-testimony and counter-surveillance' (Ibid., 62) which seek to 'act in solidarity with, the polyphonic testimony of the oppressed and exploited... [and] prevent the cancellation of that testimony by more authoritative and official texts.' (Ibid., 64). *TNO*, and the above commissions sought to continue this critique of determinist observation, with creative modes of measurement, sense, and prediction. As such it also follows in the lineage of works such as the *Mismeasure of Man* by Stephen Jay Gould, which critique 'reification', the 'tendency to convert abstract concepts into entities', 'ranking', and the 'propensity for ordering complex variation as a gradual ascending scale.' (Gould, 1981:56). To what degree this reification of measurement has become internalised, where the image of observatories within observatories, or the world becoming an observatory, morphs to individuals becoming observatories of themselves, will be discussed in the next chapter, alongside discussion of my artist publication, produced alongside the exhibition's curation.

## Chapter 3

### **Obs: The Book of the Exhibition of the Observatory**

There is a certain paradox in attempting to interpret and situate the publication, entitled *Obs*, which is on one important level an exercise in resisting interpretation. As Jean Baudrillard articulated in *Forget Foucault* (1998), there is often a desire *not* to be interpreted or expressed in the terms that an interpretation employs. Furthermore, the interpreter is often an agent of a dominant social code and the interpretation reproduces the material of that code (Brinkley, 1983). Nonetheless, this chapter attempts an interpretation of sorts, which is intended to aid the understanding of the contexts surrounding, and processes employed during, the publication's development, and provide additional analysis of the themes and narratives at play within it. The chapter builds upon my discussion of my oscillatory process of working as both an artist and curator, and employment of the artist book, as discussed previously in the thesis. This chapter, and the *Obs* publication itself, also further develops my articulation of the observatory and observation today, in particular the impact of contemporary contexts of surveillance and big data, and how modes of inscription employed within technoscientific processes of measurement and observation, link to artistic modes of writing and publishing.

The book, like the gallery and the observatory, is a container of things, a space of assembly, and a tool of inscription and communication. But the book is also a uniquely intimate and mobile artefact, unburdened by the utility and fixity inherent within buildings and institutions. My own practice and this project embodies the relations between gallery and observatory, exhibition and book, institution and individual, curator and artist, measurement and writing, science and art, and how and where they meet, in processes of experimentation, inscription, and observation. The *and* between each of these subjects and processes is fundamental to the project, and will be discussed in more detail in this chapter.

As discussed previously, my early curatorial process was led and inspired by the relations between FACT and the observatory, and how an observatory may become manifest within its galleries. However, FACT, as a publicly funded institution has specific operational remits regarding accessibility and audience engagement, which had to be factored into the commissioning and curatorial process. These remits catalyzed a process of refining the exhibition toward a succinct and nuanced message, the development of a meaningful collaboration with co-curator Hannah Redler-Hawes and the ODI, and a focus on audience experience and development, exhibition design, and public programmes. These creative, but often pragmatic considerations, worked dialectically, and at times enacted moments of creative destruction with my core research. The shards and splinters that flew off through this process, which eluded representation in the exhibition, alongside fictional writing and graphic work evolved from historical, philosophical and curatorial research, became material to be refined further in an artist book. Entitled *Obs* (see appendix) it combines an account of a fictional observatory told through prose poem form, which I will now turn to in this chapter, first analyzing its methodological background, before moving on to analyze writing process, narrative, characterisations, contexts, material form, and links between the scientific notebook and artist book.

#### **Text-works Between the Artist AND Curator**

Throughout the project and development of the publication it was not simply a binary relation between either in or out, gallery or book, but rather that concepts migrated between these different zones of enquiry. For example, one text-work, 'measure for measure for measure for measure for measure...'

which was adapted for a section of the book (p.41)<sup>33</sup> was adopted by David Gauthier, in a reduced triplicate form as: *Measure for Measure for Measure*, for the title for one of his artworks,<sup>34</sup> following my description of it to the artist, and its relation to his work during its development. The original text-work was the result of a number of interests and processes including, for example; research on metrology, notions of equivalence and the lack of any absolute measurement system, a riff on the title of Shakespeare's play *Measure for Measure*, and Gertrude Stein's famous line 'Rose is a rose is a rose is a rose' from her 1913 poem *Sacred Emily*. Inscribed first as handwritten sketch in a notebook (I filled over 2000 pages of handwritten notes through the course of project), and later typed up on my laptop, the staccato slip of the 'copy and paste' function on publishing software encouraged me to repeat it *ad absurdum* toward *ad infinitum*. In a manner akin to how as Friedrich Kittler has said, 'it is we who adapt to the machine. The machine does not adapt to us.' (Armitage, 2006:36). Thus, the process of writing on paper *and* laptop, working as an artist *and* curator, with other artists *and* communities, between gallery *and* observatory, fact *and* fiction, history *and* philosophy, is fundamental to the construction of such textual fragments, and the content of the book, which is fundamentally co-constituted with curatorial research and exhibition making.

As Giles Deleuze writes, 'a multiplicity is not defined by the number of terms', rather what defines it is the 'and' that is used as a conjunctive between two terms or practices:

'even if there are only two terms, there is an AND between the two, which is neither the one nor the other, nor the one which becomes the other, but which constitutes the multiplicity. This is why it is always possible to undo dualisms from the inside, by tracing the line of flight which passes between the two terms or the two sets, the narrow stream which belongs neither to the one nor to the other, but draws both into a non-parallel evolution, into a heterochronous becoming.' (Deleuze and Parnet, 1987:34–35).

Deleuze's perspective here comes from a critique of Georg Wilhelm Friedrich Hegel's theorisation of dialectics, finding fault in the analysis of how difference emerges, what 'makes the difference', or to quote Gregory Bateson; 'the difference that makes the difference' (Bateson, 2000:xi). As Greg Lambert states: 'Deleuze writes at many points that contradiction is less and not more profound than difference... [whereby] difference that appears via the negative or negativity... is only the phantom or epiphenomenon of difference... as the "shadow of a more profound genetic element"' (Lambert, 2002:73). Accordingly, my own practice and project seeks out these productive differences, within my chosen subject of observation and the observatory, via different couplings and methods, and the lines of flight between them, primarily between the spaces of gallery and book.

The process of curation involves writing in many forms, from curatorial concepts to interpretation panels, site visits to archival research, funding applications to emails. Fundamental to my own practice is to extend this further into the production of more experimental text-based artworks, that function in a manner akin to an epiphenomenon or phantom as described by Lambert above, but in a more affirmative sense, to the broader project and exhibition phase. In this regard, my practice has a Jekyll and Hyde character to it; less concerned with dualisms of good and evil, but sharing something of Jekyll and Hyde's embodiment of divisions between public (gallery) and private (book) spheres, and 'outward respectability and inward lust', that the novel has been interpreted as addressing (*Nightmare: The Birth of Victorian Horror*, 1996). Thus, my project may be interpreted as exploring and performing the outward facing respectability of the curator and public gallery, and the inward excesses and affordances of the artist and book, and by extension the accompanying spaces of the (public) observatory and the (private) act of reading.<sup>35</sup>

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<sup>33</sup> Please note *Obs* page numbers referred in this chapter relate to page numbers of the publication itself, not this thesis, due to page layout.

<sup>34</sup> This piece is not discussed in the thesis due to length restraints, but is featured in the exhibition booklet in the appendix.

<sup>35</sup> For background to this aspect of my practice and research interests see *The Act of Reading* (2016) project and publication I co-directed and edited, exploring embodiment, affect, and the physical space of reading and writing in a post-digital context: <http://torquetorque.net/publications/the-act-of-reading>.

For example, on page 35 of the publication are the names of alternative observatory like institutions or processes, such as ‘The organic observatory of demasurement’, which were made as part of a process of developing the title of the exhibition and were shown at a curatorial meeting at FACT. Here, the *and*, in artist and curator, which enables unique ‘meta’ moments of quixotic *betweenness* that are continually escaping and folding back into material, is crucial to the production of knowledge and work within the project. This Janus-faced character is comparable to the duckrabbit optical illusion, being simultaneously both things, and different things, or Marcel Duchamp’s door *Door: 11, rue Larrey*, hinged between two frames, and three rooms, both open and shut. An apt metaphor for my project perhaps: three spaces – the observatory, the gallery, the book; two frames – the artist, the curator; one two-sided door – art and science.

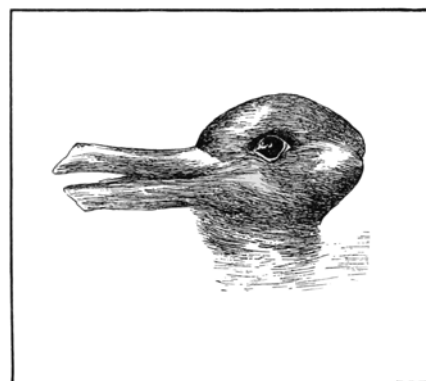


Fig. 20 (left): Marcel Duchamp, *Door: 11, Rue Larrey*, 1927. Collection Arman, New York. Photo: Arturo Schwarz.

Fig. 21 (right): Optical illusion of a duck or a rabbit head, 1899. Popular Science Monthly Volume 54 (Jastrow, Joseph: "The Mind's Eye", p.299-312)

In an essay that discusses Deleuze’s focus on the conjunctive ‘and’ in relation to ‘transversality’, which is relevant to my practice as artist *and* curator, Anja Kanngieser writes that ‘transversal modes do not signify a permanent interdisciplinarity but instead create temporary mutant coalitions through a movement of accumulation (not absorption), inherently changing the fields and institutions in the process. What is important to remember is that this “and” simultaneously negates mass unification, as well as factionalisation and splintering.’ (Kanngieser, 2012:279). My own project attempts its own mutant coalition of sorts between the gallery and the observatory, reformulated through processes of archival, curatorial and the artistic, which may also be described as a process of ‘intermedial translation’. A term used by Mieke Bal and Joanne Morra to describe how to “translate across” is to work within discourses and practices of intertextuality, intersemiotics and interdisciplinarity, which can lead to movements across genres, media, bodies of knowledge and subjects.... [and] is concerned with the marginal, the gaps, fissures and contradictions of working in the interstices between these various boundaries.’ (Bal and Morra, 2007:7). Thus the relation between the medium of exhibition and book is not simply a binary unidirectional movement, but played out as a constant transversal movement back into and between different intermedial translations.

In the first phase of the project as text-works began to emerge, during and after time spent in galleries, archives, and observatories, I began pushing the texts further, building a counter story for their creation, counter institutions, parallel worlds, which catalysed further writing, artwork, book- and print-making experiments. In part this was a reaction to the practical demands of the public gallery and of co-curation as discussed above, but also the medium of the book and the potential of fictitious poetic prose and graphic forms offered a space to translate and transform my research and more esoteric interests. It also served as a medium to engage more resistant modes and subjects of unruly immeasurability that I felt was necessitated in a world of increasing quantification produced by observation orientated technoscience. Crucially this duality of book and gallery, on a medium specific level, meant I did not attempt to foist all my interests and concerns onto artists, expecting their commissions to deliver my ‘vision’, a common problem I would argue of the artist *as* curator. Instead, the book serves as a para-text (Genette, 1997) to the exhibition at FACT, and vice versa the exhibition to it. Telling the story of *other* para-observatories,

serving as a para-textual ‘undercommons’ (Harney and Moten, 2013), an observatory beneath an observatory beneath an observatory.

*Obs* is an experiment in how a narrative of resistance, or more specifically obfuscation (Nissenbaum and Brunton, 2016), may combine with its own textual form, which does not seek to seize instruments of power, but works through, around, and below, via forms of creative subversion. In this way I propose it as a work of ‘minor literature’ to use Deleuze and Guattari’s term, whereby: ‘a minority constructs within a major language’ employing three characteristics and methods: ‘the deterritorialization of language, the connection of the individual to a political immediacy, and the collective assemblage of enunciation.’ (Deleuze and Guattari, 1986:18). And to extend this further, where Deleuze and Guattari promote Franz Kafka’s use of ‘becoming animal’ as a device of minor literature, I translate this within the narrative to becoming ‘instrument’ or becoming ‘observatory’.

Text-works, illustrations, and found imagery, act circuitously with the main body of the text. Each element grew out of a mix of curatorial conversations, archival research, contextual research, and earlier exhibitions and experiments.

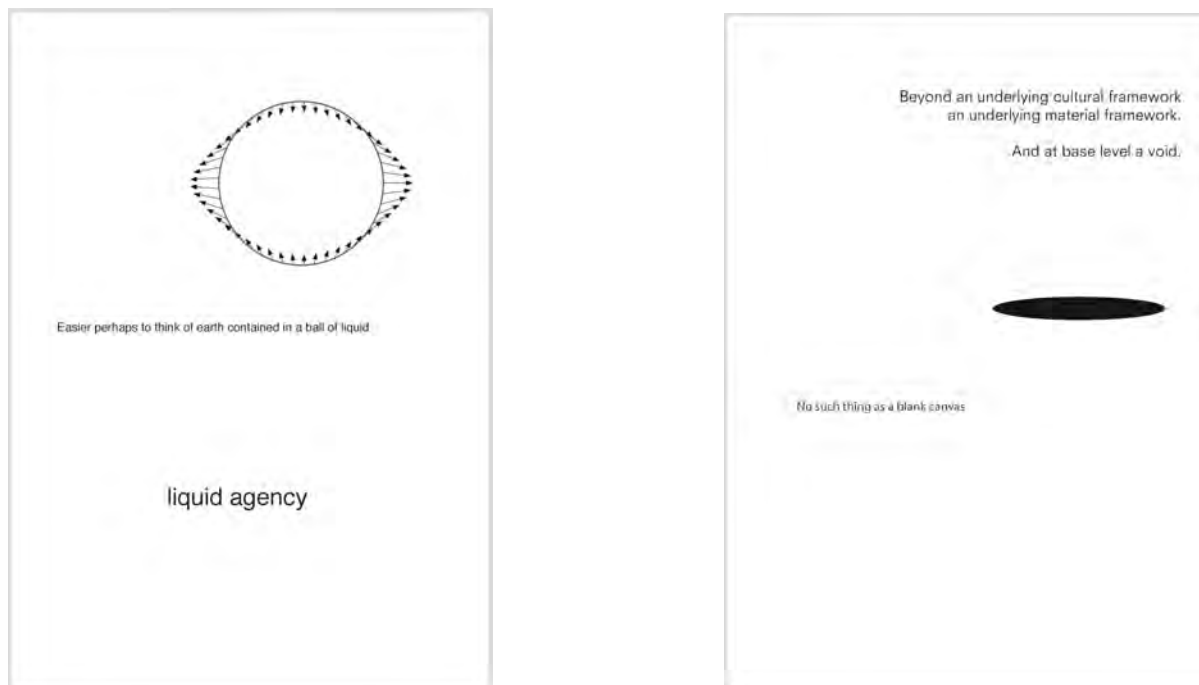


Fig. 22: Examples of early text-works exhibited at Small View Gallery in 2016, subsequently developed in *Obs*.





Fig. 23: Installation view of *Ob* at Small View Gallery, 2016. Documents relating to this show and the 'Reading and Thing' group, which inspired the group in the book can be found here: <https://olf.alab.space>. Photography: Sam Skinner



Fig. 24: Installation view of *Archive Wall*, FACT, 2017. Comprising reworked archival imagery relating to Liverpool and Bidston Observatories. Photography: Gareth Jones.

The production and publishing of a book acts in a self-reflexive mode between the reading and writing processes I have employed, from writing interpretation panels to the textual and paper-based material found in archives relating to the observatory. A response to the way older paper, variously smooth, cracking, and folded, is piled up and compels to be worked through, like the log books of the old Liverpool Observatory found in the archive at the World Museum, Liverpool. These archival items became the focus of my *Ob* installation at Small View Gallery, Liverpool in 2016, and the satellite *Archive*

*Wall* installation at *The New Observatory* exhibition I produced. These preliminary presentations cleared a path for the subsequent publication and its move into more discrete and fictional territory. Furthermore, the primary and secondary source materials serve as what Gérard Genette calls ‘hypotexts’, informing my subsequent text, what he terms the ‘hypertext’, akin to the relation between Homer’s *Odyssey* and James Joyce’s *Ulysses* for example (Genette, 1997:5). Albeit in my case the relation is less binary and more fragmentary and intermedial, becoming a hypertext of many hypotexts.

## Narrative Structure

The premise of the book’s form and content is based upon an album-like facsimile of various texts and items of printed ephemera anonymously deposited at an archive. The items document and relate to a community-led protest of sorts against a clandestine ‘big data’ study performed by a cloud-based observatory, called the ‘Ob’, and the subsequent development of a counter observatory by a local reading group, known as the ‘Obs’.<sup>36</sup> The story focuses on the reading group, their acts of observation and obfuscation, interactions between the ‘Ob’ and the ‘Obs’, and a final section which describes the proliferation of other new observatories. The publication is principally comprised of a textual account of this story, mixing prose and poetic registers, supplanted with graphical illustrations which integrate with the text.

The narrative is inspired by employing a method of ‘participant observation’ upon the institutions I have engaged with, including FACT, Proudman Oceanographic Laboratory, Bidston Observatory, but also my historic study of the institution of the observatory, in particular the Liverpool Observatory. Such institutions and the individuals that worked within them were among the first to face the avalanche of printed numbers, pioneering probabilistic and statistical tools for analysing data, and to develop electrified networks, in the case of the Paris and Greenwich Observatory’s use of telegraphic lines (Aubin et al., 2010:13). This research, combined with an interest in contemporary observational practices, including visits to and attendance at events and organisations such as the Open Data Institute’s ‘Summit’ events in 2016 and 2017, meeting people who seemed to want to put sensors in everything, and where I heard statements such as ‘how to make the city a more responsive organism’ or ‘public space as interface’. It was also where I witnessed tensions within the community such as Hetan Sha, the Director of the Royal Statistical Society, in 2016, stating that we needed to ‘use the bloody data!’ Implying that there is no shortage of useful data already in existence providing insight on important issues such as inequality, climate change, or social relations in cities that should be informing action and policy, but that it is rarely acted upon. This argument questions the fundamental premise of much data gathering and the rhetoric that is used to qualify its production and use value.

Other important experiences, that fed into the production of *Obs*, included the chance encounter with a talk about ‘smart concrete’ at UNESCO, Paris, during the New Materialism conference, and the ‘Cultural Analytics’ programme I attended at UCLA, both in 2017. Also the commissioning process itself was important and involved collaborations with artists and institutions such as the Proudman Oceanographic Laboratory and Libre Space Foundation. By drawing upon these experiences and the history of the old Liverpool Observatory, and study of observatories and observation more generally, the publication may be considered as relating to the genre of ‘exofiction’, by authors such as Adrien Bosc and Javier Cercas, that is inspired by historical figures and events fused with contemporary events (Leyris, 2017).

This research into how observation manifests institutionally, particularly within a city, which is key to the narrative, links to more contemporary contexts of the smart city and what Carlo Ratti and Matthew Claudel describe as the ‘collective quantified self’ through which ‘the idea of a singular cyborg is being recast as an Internet of Bodies.’ (Ratti and Claudel, 2016:69). Within such a realm architecture becomes

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<sup>36</sup> Please note that the cloud-based observatory is called the ‘Ob’, and the new observatory subsequently established by the reading group is known as the ‘Obs’, apologies for any confusion!

interface, and the built environment becomes ‘a physically habitable internet.’ (Ibid. p. 82). Producing a world in which we all live and participate in observatories of sorts. Key to the narrative within *Obs* is that initially the power to command the locale and the observatory is in the hands of the few, until the Reading Group produce, to quote Saskia Sassen, an ‘open source urbanism, that enable the community to “talk back”’ (Sassen, 2011). In a theorisation that is an important reference to the text, she writes that: ‘The planners of intelligent cities... actually make these technologies invisible, and hence put them in command rather than in dialogue with users.... Today, when walls are pregnant with software capabilities, why not make this transparent?’ (Sassen, 2011). *Obs*, and by extension *TNO*, offers one response to this call, albeit on an aesthetic level, and seeks to represent and reconfigure instruments of observation, but also the ‘textual abundance’ of the internet and computer code that underwrites, directs, and observes so much contemporary life. This is an echo of how artists such as Stéphane Mallarmé and the Futurists, responded to both new technologies and the proliferation of text in public life through advertising, in the 19<sup>th</sup> and 20<sup>th</sup> century (Looze, 2016:138–42). As Kenneth Goldsmith has written: ‘With the rise of the Web, writing has met its photography.... Faced with an unprecedented amount of available digital text, writing needs to redefine itself to adapt to the new environment of textual abundance.’ (Dworkin and Goldsmith, 2011:xvii). The textual excess of *Obs* performs how the contemporary observational milieu, composed of individuals and communities augmented with computational networks and sensors are constantly ‘writing’ copious scripts, through data trails, clickbait, scrolling, shopping, embedded cookies, search queries, and GPS coordinates, inscribing text files into a multitude of databases.

In a ‘post-truth’ world, where facts are malleable, and media platforms ever more powerful, use of fiction and alternate media possesses, I argue, a new relevance and currency. My own fiction within the publication attempts to hover between the ‘facts’ of the history of the observatory, and contemporary contexts of data gathering and surveillance. Fiction is, after all, at the heart of the technosphere today; a space defined by speculation, prototyping, whitepapers, and futurology, as much as the cold factuality and materiality of computational hardware and infrastructure. Carrie Lambert-Beatty has said that in such a ‘post truth’ context, what she terms the ‘parafictional’ is a useful device for artists to toy with the conventions of storytelling, history, and the contemporary; mixing historical material and fiction, to engender a fruitful alliance of scepticism, doubt, and hope on the part of the viewer (Lambert-Beatty, 2009). She describes how works of parafiction function to destabilize, not simply obliterate, notions of truth. Moreover, she writes: ‘Post-simulacral, parafictional strategies are oriented less toward the disappearance of the real than toward the pragmatics of trust.’ (Lambert-Beatty, 2009:54). My own device of presenting the book as semi-anonymous archive deposit (p. 1), possessing a speculative a-temporal status, attempts to lend the book a parafictional quality, and play with such techniques of ‘make believe’.

*Obs* employs a ‘prose poem’ form, using devices such as symbols, metaphors, and parataxis, without use of verse lines (Clements and Dunham, 2009). Accordingly, as neither fully poetry or prose, it more closely resembles my practice as artist and curator, as an *and-er* of things. Equally, if verse is in its ‘countable’ sense an individual metric line, a subversion of this flow and *count-ability*, resonates with the publication’s themes of immeasurability and more aleatory unpredictable forms. In this regard, it may also be described as, or aligned with, ‘free verse’ in the manner described by Yvor Winters that increases possibilities for both reader and writer by establishing ‘abnormal conventions’ (Winters, 1937). Furthermore, in combining prose and poetic forms, with imagery, it hovers between collage and a long poem. The long poem is known for its ‘umbrella’ characteristics that may include the subgenres and methods of epic, verse novel, lyric sequence, and (textual) montage, pioneered in T.S. Eliot’s *The Waste Land* (1922). As Philip Cohen writes of the development of Eliot’s work: ‘Eliot gradually created a more modernist poem, one which resembles a cubist collage.... speakers shifted from omniscient narrators to a variety of separate-person voices and then to different voices of one shadowy figure.’ (Cohen, 1986:12). In one sense this is what occurs in *Obs*, different voices function as a document of my more singular experience in archives, reading textual material, and curating an exhibition, collectively synthesised within the book as the

shadowy, shifting figure of the observatory. Furthermore, different registers, in particular a movement between the use of ‘we’ and ‘they’, and different modes of mark making, and symbolic orders, form a cohesive, if oscillating whole within the publication. Two other relevant references to its narrative construction are Langston Hughes’ *Montage of a Dream Deferred* (1951) depicting 20th century Harlem and Malay Roy Choudhury’s *JAKHAM* (1966) detailing the 1960’s Hungryalist movement in India. Both employ numerous diverging voices and textual registers, within a context of political resistance that function collectively as vibrant assemblage. Within *Obs*, the intention is for its fragmented view to articulate a concern with breaking hierarchies, and undermining any sense of a primary or objective voice. Also the characterisation and ‘giving voice’ to observational instruments and technology such as the ‘multi-species telescope’, is an attempt to echo and perform the fundamental challenge and paradox at the heart of posthuman and new materialist philosophy, which seeks to move beyond binary subject-object relations and singular anthropocentric viewpoints.

### **Characterizations & Contexts**

The publication begins with a textual account, by an unidentified narrator of the the arrival of the LLOUCCIEPPPP, which stands for Living Lab Observatory for User-Centred City Centric Innovation Ecosystem and Public Private People Partnership or ‘Ob’ for short. This intentionally unwieldy acronym is based on the description of the MIT ‘Living Lab’ initiative, referred to in the earlier section on methodology, and described at the time of writing on Wikipedia as: ‘A living lab is a user-centered, open-innovation ecosystem, often operating in a territorial context (e.g. city, agglomeration, region), integrating concurrent research and innovation processes within a public-private-people partnership.’ (*Living lab*, 2018). For the purposes of the narrative the Living Lab is appropriated and deployed as a ‘cloud-based’ observatory that is observing the community of Temo, a ‘new town’ at the edge of an unidentified city.

William J. Mitchell, Kent Larson, and Alex Pentland’s work on Living Labs at MIT first pioneered the concept of a ‘living laboratory’ (‘MIT Living Lab,’ n.d.). It is defined by its approach, to conjoining both observation and experiment, the observatory and the laboratory, at a city level, within a contemporary big data context. Combining a neo-liberal emphasis on public-private partnerships, with a territorial technoscience driven focus. Comparably we may also cite the Network Architecture Lab at Columbia and the SENSEable City Lab at MIT which declares that: ‘The real-time city is real!’ (*MIT Senseable City Lab*, n.d.). Such institutions can be seen as a modern equivalent of the Liverpool Observatory, operating as technology- and data-driven site-specific institutions. For the purposes of my narrative, I parody and transform their make-up in a number of ways: rendering them nebulous and misaligned to the community; distant in the physical sense through a ‘cloud’ based character and lack of a physical presence within Temo; pushing the ambiguity of its measurements and observations in relation to the government’s so-called ‘objectives’ agenda, which seek to quantify and promote ‘Newness, Full Value, and Sense Thrust’; and engendering a contradiction between its espousal of user centred processes with its covert approach and lack of face-to-face engagement.

The premise of the Ob’s set-up is that it is based out of a university, but funded by a large software company, and commissioned by central government. This aspect of its governance is suggestive of contemporary neo-liberal conglomerations between public and private institutions, often at play within big data and smart city initiatives. For example, for DeepMind’s *Streams* project in collaboration with The Royal Free London NHS Foundation, patient data was provided to the Google owned company in return for developing a healthcare app, but was later revealed to have not complied with the UK Data Protection Act. *Streams* was described as suffering ‘from a lack of clarity and openness, with issues of privacy and power emerging as potent challenges as the project has unfolded’ (Powles and Hodson, 2017). Alongside this, such projects of observation and data gathering suffer from cross-contamination of privacy infringements at large. In particular, the large-scale privacy violations by governments and companies of

recent years, including Facebook's 2012 'Massive-Scale Emotional Contagion' in which Facebook's data scientists manipulated news feeds of some 690,000 users, to investigate how it affected the users' moods (Kramer et al., 2014). And the global surveillance apparatus operated by the United States' NSA in close cooperation with Australia, UK, and Canada, including the PRISM, XKeyscore, and Tempora programmes disclosed by Edward Snowden (Greenwald, 2014). The hubris of such programmes of observation is personified by the smiley face on the slide below demonstrating that NSA employees had cracked Google's server.

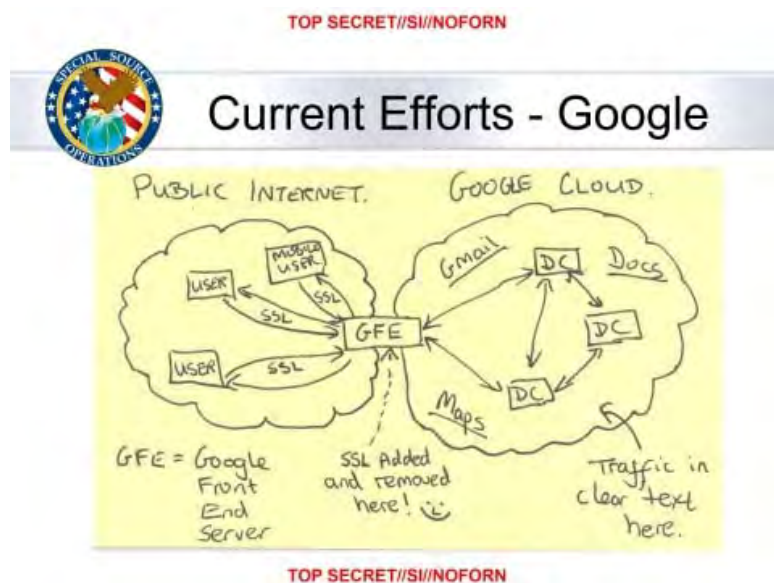


Fig. 25: USA National Security Agency presentation slide on 'Google Cloud Exploitation', 2013. Reproduced from Washington Post, October 30, 2013. Source (public domain): [https://commons.wikimedia.org/wiki/File:NSA\\_Muscular\\_Google\\_Cloud.jpg](https://commons.wikimedia.org/wiki/File:NSA_Muscular_Google_Cloud.jpg)

By making their own observatory, the Reading Group demonstrates how institutions and programmes like the Ob produce new phenomena that is both the subject of their observation and a reaction against it. In this way the narrative of Obs attempts to represent how mass surveillance and data analytics by opaque, amorphous, and often overreaching institutions, acting with hubris, has degraded more egalitarian modes of observation and data collection, producing instead increased inequality and unease. The production of a new alternative observatory by the Reading Group attempts to attend to the 'inoperability of the sovereign subject' and 'emergent agency' through the production of a new spaces for the performance of politics (Engin and Ruppert, 2015:65). The emphasis within the narrative is less upon the specific information that the Ob seeks to collect, it is intentionally obtuse, but rather how its processes are, or are not, conveyed to and involve the community. In so doing, the characterisation of the Ob is a means to represent how: 'Through disciplinary methods they [governments and companies] compel citizen subjects to constitute themselves as data subjects rather than making rights claims about the ownership of data that they produce.' (Ibid. p. 90).

In effect the Ob performs a particular brand of neo liberal communitarianism, symptomatic of its requirement as an organisation, which, however much it may profess to be altruistic, has to find resources for its activities and survival (Zaleski, 2012:254). In this sense, the Ob can be compared to other 'welfare' organisation that are part of an externalisation and farming out of state social services, where for example data gathering and analysis becomes a tool of controlling differentiation and producing individualised management systems for 'disorganised bureaucracy' (Ibid. 255). As Simon Schaffer writes of the 19<sup>th</sup> century observatory, that could equally apply to the Ob, and the contemporary art gallery and museum 'circuit': 'Practitioners tried to turn mutable phenomena into commodities in global networks whose modes were privileged sites of accumulation.' (Schaffer, 2010:127). In this way, the data gathering of the Ob becomes both a tool and spectacle of capital, and method of targeted administration and the

management of difference. As Dolphijn and Braidotti write ‘advanced capitalism functions through tightly controlled nobility, or “striated” social space subjected to constant surveillance.’ (Braidotti and Dolphijn, 2015:21). In particular, by observing the community’s life covertly for specific policy agendas, the Ob attempts to bring private lives less into the public sphere, but rather into the bureaucratic black box.

The Reading Group is in part based on the ‘Reading and Thinging’ group I set up at FACT with fellow researchers Alex Pearl, Thiago Hersan and Radamés Ajna to read different texts whilst undertaking a related ‘thinging’ activity. Thinging, is a concept developed by Lambros Malafouris that seeks to articulate cognitive life instantiated in acts of thinking and feeling with, through and about things (Malafouris, 2014). For example one session was on emotional labour, private life, art, and politics, for which we read work by Bifo Berardi and Erica Scourti, and during the discussion we broke and re-assembled ceramic objects in order to manifest and haptically engage with concepts of cognitive capitalism, emotional labour and the role of anger in politics as presented in the texts (*OLF*, n.d.). Also of import is my previous community art work in Thamesmead, London, that although distinct from Liverpool and this project, is where I lived during my PhD project and is a ‘new town’ undergoing rapid regeneration, though both top-down and bottom-up approaches. Residents have endured both ‘survey fatigue’ and a lack of meaningful engagement, which in combination with local ‘smart city’ initiatives, is an additional source for the publication’s narrative and setting.

The narrative centres on the encounter between the Ob and a local Reading Group, who move from a state of shock, to active engagement and argument with Sandy and the Ob, to the central narrative, whereby the Reading Group create their own observatory. The publication concludes through a proliferation and union of observatories, and resolution with the Ob, before a final phase of dissolution and transformation. The Reading Group function in a mode akin to what Felix Guattari would call the ‘subject group’, as opposed to the ‘subjugated group’, who ‘endeavours to control its own behaviour and elucidate its object, and in this case can produce its own tools of elucidation’. (Guattari, 1984:14). But they move beyond a simple binary or reactionary subject-object relation, though processes of disassociation, obfuscation, and excess, employing measurement as means of creative enquiry and a form of nonsense. They perform a critique of the notion of observation as a disinterested and neutral science, drawing upon themes previously discussed in the literature review and preceding chapters, principally how the observer affects phenomena they are observing, and how ‘theory laden’ the act of observation is.

In *Bruno and Sylvie* by Lewis Carrol (1889), the characters’ attempt to make a map that is 1:1 scale: ‘We actually made a map of the country, on the scale of a mile to the mile!... So we now use the country itself, as its own map, and I assure you it does nearly as well.’ (Carroll, 1893:169). Similarly, in *Obs*, the Reading Group attempt to produce observations and instruments that measure at multiple contorted scales and enable acts of anti-observation. Their process is akin to the anti-art of the Dadaists, who sought to register both a sense of disgust, following the First World War, and affect a reorientation of the senses. In adopting this mode, both the Reading Group and myself as the artist/writer, enact what Jacques Rancière describes as a political and aesthetic ‘dissensus’ which is both the ‘reordering of relations of power between existing groups... [and] an activity that cuts across forms of cultural and identity belonging and hierarchies between discourses and genres, working to introduce new subjects and heterogeneous objects into the field of perception.’ (Rancière, 2015:2). The Reading Group and the language I employ attempts to perform and reroute both the affect and effect of observation and surveillance.

There is a tension within the text between intense distillation in places, and the longer form of the story, between prose and more poetic registers, between objectivity and excess, between sense and nonsense. In this way, *Obs* is an experiment in a *minor literature of dissensus*, attempting to work beyond a binary argument and the ‘two cultures’ of the Reading Group and the Ob. One example of this is how the Reading Group performs its own alienation, or abjectivity, akin to Paul McCarthy’s art that revels in its own difference from a world increasingly connected, streamlined, and compressed (Duncan et al., 2012).

The narrative employs a counter praxis of dissent, following how, as Rick Dolphijn has written, we need to perform and work from the cracks, from the ‘wounds of the contemporary’ (*Rick Dolphijn - The Cracks of the Contemporary VI: The Wound*, 2017). Or to speak with Alain Badiou, produce a truth that is only ‘the “truth of a particular situation”. It is the truth of the situation because it speaks from or about the excluded part’ (Robinson, 2015). *Obs* and the Reading Group speaks for, and to, the *excluded excess* of any subject of observation that must be ignored to enable a ‘useable’ measurement or observation to take place. This linguistic excess within the book, becomes a device or instrument to turn and translate the excluded back out into the world. This is the sense behind its nonsense, of folding noise back into observation – and thus it is a ‘corrective’ practice.

Also driving my decision and practice to focus on a mode of resistance, and attempts to push language towards the obfuscatory, is a desire to explore the tension within maps, artwork, and ‘minor literature’ that engage in the aforementioned ‘deterritorialization of language, the connection of the individual to a political immediacy, and the collective assemblage of enunciation.’ (Deleuze and Guattari, 1986:18). To produce such work engenders both its strength and its weakness via its perceived separation from its subject. As MacKenzie Wark writes in reference to Frederic Jameson’s notion of the ‘cognitive map’, as a theoretical-aesthetic practice for correlating culture with political economy, its problem is that the: ‘cognitive map is contemplative. It is supposed to enable action but is itself not integral to it. Cognitive mapping, even in its own terms, is not sufficiently “dialectical.” It freezes into a contemplative totality that prescribes an ideal form of action that never comes, that is felt only as a structuring absence.’ (Wark, 2015). In many ways I would level this critique at my own publication, but I attempt to move it beyond the simply contemplative via its accession into various sources of its ‘making’ – to the archive, to FACT, and as ‘gift’ to collaborators, but also its correspondence to the exhibition, and commissioned artworks. Each action here I would suggest has an affirmative if modest materiality and relationality, without simply being dogmatic agitprop or defunct tool of contemplation. Each media and work enables the other different affordances and processes of relational learning from each method, process, and context. Furthermore, in using the language of both techno-positivist data science and the sloganeering of activism it explicitly intends for the reader to read it as a meta-artefact of this. As David Levi Strauss writes of the ‘fictocriticism’ of Michael Taussig, the ‘aim of such writing is to turn the attention of the reader to the very act of writing as an “anthropological” or cultural act which engages with the desire to succumb to authority in general’ (Levi Strauss, 2005).

Beyond this artefactual networking and representation of nonsense or noise, the language employed in the publication also experiments with representing iterating tautologies in order to identify each observation or word with its origin and circuitous iterating character. This links to a principal critique at play within the book – that quantification and observation often acts like a poor poetry, whereby, as discussed above, its observation or ascription of phenomena is necessarily reductive and transductive. It attempts to articulate and underscore how such reductions and translations are themselves observed, represented, and folded back into the world, ad infinitum. This process is articulated in the text-work ‘a value is ascribed to phenomena that becomes phenomena in turn...’ (p. 128-32). Thus my suggestion is that art and creative enquiry has a responsibility to engage, critique, and enrich quantification in a process of *corrective affirmative immanence*, acting *between* inscription *and* phenomena, countering a downward spiral of reduction and the smothering of the world with observational inscription and apparatuses.

These key practices of *corrective affirmative immanence* and *minor literature of dissensus* applied to observation and rationality within the book is underpinned by the unequal power relations between a community subjected to observation, and the privileged position of the Ob (the observer), and the network of institutions and forces that lie behind it. In particular the narrative references how forms of technology may intensify these inequalities. Through for example their remoteness, enabled via the proliferation of devices within the community and their simultaneous online character, and broader cultural processes, such as the acceptance of surveillance and promotion of big data ‘innovation’. The publication thus explores art’s ability to appropriate, critique and subvert these forms of observational power play, but

also the paradox of this, its *inability* to build this into any kind of system which may be acknowledged by those it wishes to critique or refunction on its own terms. As Steven Corcoran writes in a discussion of Rancière's work: 'Art can never become life except by being turned into the instrument of those who want to mould a new social ethos; and implementing "emancipation" will always overturn into a form of societal management by "enlightened" experts.' (Rancière, 2015:3). Thus the proclaimed point of the Reading Group's acts of resistance is also the seed of its failure to succeed. Their art, and perhaps art more generally, can only ever be relational, and the narrative plays this out. The Reading Group first perform a reactionary protest against the Ob, before becoming frustrated by how their 'rebel' status is maintained by the system they seek to subvert, including the development of their own observatory and instruments. This 'total artwork' or monument produces emergent unforeseen phenomena and the 'answer' they find, Sandy's 'born-again' transformation, the gelastic transformation of the observatory into a windmill, and the proliferation of further observatories, is unrecognizable to the original question. To return to Hans-Jörg Rheinberger from chapter two; the observatory functions as an experimental system: 'of manipulation designed to give unknown answers to questions that the experimenters themselves are not yet able to clearly ask' (Rheinberger, 1997:28). These unforeseen outcomes within the book speak another language, are a different currency, emerging as epiphenomena of immanent iterating becoming.

As Catherine Malabou writes of a lizard's ability to regrow a *different* tail: 'when a lizard's tail grows back, it leaves no trace of amputation at all... The organ reconstitutes itself without scars, but this healing process does not raise life to a form of completion. The organ grows back different from the one it replaces – in size, weight, form. There is no scar, but there is difference' (Malabou, 2011:82). In the case of the Reading Group's observatory, we may say that they too grow not simply a new tail, but multiple new different tails. In this sense the story explores how art, instruments, and the observatory may be *differently useful* in an emergent Anthropocene ever more dictated by observational technoscience. Exploring how, since the 'denigration of vision' (Jay, 1993) of the early 20<sup>th</sup> century, with its roots in Plato's allegory of the cave, we must ask; what new methods and kinds of observatory-like institutions are required, has observation and representation run out of steam, and to what degree does it simply prop up a certain 'cultural hegemony' of the type Antonio Gramsci articulated? Responses to this are articulated by how the Reading Group self-organise and produce their own observatory, what they term the 'Obs' – emphasizing the plural. This contrasts with how the old Liverpool Observatory, *The New Observatory* exhibition at FACT, and the singular 'Ob' within the narrative, all benefit from substantial institutional and financial support and affiliation. The Reading Group's lack of interest in producing 'sensible' instruments that measure coherently becomes a symptom of their success to *organize differently*. The narrative articulates the capacity of community to work collaboratively in a local situated mode of resistance, to *curate the material community*. In this way they also connect to groups who feature within TNO, including Libre Space Foundation and the Nika Haus. The Reading Group consciously challenge traditional hierarchies, roles, and specialisation, which leads to farcical technoscience, but experimental observation in an aesthetic or performative key. Acting within a context of observational precariousness they challenge certain concentrations of power, producing counter observational images, instruments and processes. They both revel in and rebel against the universalising language of science and observation, which as Michel Serres articulates in *Genesis*, has the simultaneous power to shift us beyond simple social or localised relations, whilst also at times narrowing and intensifying them (Serres, 1995a).

The Reading Group's programme of resistance also springs from a reaction against so-called 'techno-solutionism' (Morozov, 2014) where technologies of observation are misused, both knowingly and not. In particular, how the solution to challenges faced by cities, for example, are misapprehended and problems of social relations misdiagnosed. Within the narrative, the Ob's fundamental measurement system is flawed, and compounded by a failure of its operators, principally Sandy, to acknowledge this through ideological confidence in their objectivity. The Ob is the bulk collection of data dressed up in techno positivism. The Reading Group seeks to hack and refunction the Ob, to impose critique upon it. To subvert how underpinning the Ob is further capital accumulation that 'fetishes the technological fix'



(Harvey, 2003). There is a move against the quantifiability and determinability of subjective and social life, and by extension matter. In particular how the Ob may use insights toward extraction and control, or as Jonathan Crary says, after Foucault, how the body may be made 'compatible with new modes of power' (Crary, 1992:147). In this move *against compatibility*, the Reading Group, to use computing metaphors, attempt to simultaneously produce their own operating systems and insert their own virus-like code into the Ob's programmes.

The Reading Group's organisation and actions personifies to some extent the shift in recent history of the source of relational bonds in society from the family to technologically mediated friendships. Combined with this is how technology, in particular social media embeds itself through the symbolic spaces of networks and renders them more amenable to control, producing what John Urry has called 'communicative mobilities' (Urry, 2007). Tempo threaded through with 'smart concrete' and fully surveilled becomes akin to what Manuel Castell's has described as 'real virtuality' where 'reality itself... is entirely captured, fully immersed in a virtual image setting.... appearances are not just on the screen...but they become the experience'(Castells, 2000:373). The Reading Group act to resist extraction and control of their social bonds by the Ob, which fails to be participatory or articulate its worth beyond reproducing power, capital, or a spectacle of innovation. The Reading Group's dissent is then focused on sovereignty and their refusal to allow their to data act in their place. Thus while the Ob perceives the gathered data to be 'the real', the Reading Group attempt to deny this 'like for like' identification. Furthermore, individual figures within the narrative, specifically those within the Reading Group are intentionally not significantly developed. This serves to render the Reading Group as a character in its own right, but also to represent how communities and individuals may be 'dividualised' to a collection of data points, enabling objectification within a 'control society' (Deleuze, 1992), linking to contexts whereby: 'The self has become more and more self-reflexive in the sense that the identity of the individual is constituted in increased self-monitoring and self-control.' (Delanty, 2010:98).

By manifesting and describing different observatories within the narrative, *Obs* explores the observatory as a specific 'social imaginary'. Jon Thomson describes social imaginaries as 'the creative and symbolic dimension of the social world, the dimension through which human beings create their ways of living together and their ways of representing their collective life.' (Thompson, 1984:6). *Obs* is a device to engage the particular frictions that institutionally-based social imaginaries can engender, particularly those that are 'top-down', unaccountable and diffuse such as the Ob. The implication within the narrative of *Obs*, is that challenging and changing observational institutions and their systems, for example what and how they measure, is key, rather than simply fixing the communities they attempt to serve and observe.

The observatory as character in the narrative, in both its 'Ob' and 'Obs' guises functions as 'archipuncture', to use curator Manray Hsu's term, that works with the 'affective infrastructure' of the locale, rupturing normalized understandings of sociomaterial relations and opening a space for 'material diagnostics' (Knox, 2017). The narrative of the Obs emerging or nesting within the larger tentacular Ob, like a Russian Matryoshka doll suggests the iterating spread of the observatory that is a fundamental concern of my larger project. The publication concludes by zooming back out and offering the dual image of a global community of observatories, implying the world as one interconnected observatory or planetary scale computer. This image is rooted in how observatories today often work together to track events, for example on 17 August 2017 the Laser Interferometer Gravitational Wave observatory, in collaboration with 70 other observatories observed the collision and aftermath of two neutron stars colliding. But it is also representative of the scale of operations of observational science today, both in terms of occupying land and sheer quantity of data being generated. Consider for example the new Square Kilometre Array being built in South Africa and Australia, with receiving stations across an area of 3,000 kilometres producing petabytes per hour. The image of the world having or becoming an observatory is pushed further and internalised through the image of individuals having themselves become both observatories *and* 'observatories of themselves' (p. 81) within the book.

## The Language and Affects of Observation

In the 1500's the notion and practice of observation, moves off the margin of the 'experimentica' or 'experimentum', and 'observationes' became a distinct autonomous form of writing and recognised scholarly genre (Pomata, 2011). Which, though first focused on astronomy and medicine, would go on to expand dramatically into all areas of life. I drew attention to observational modes of writing in my engagement with Liverpool Observatory, and its first director John Hartnup and his writings in chapter 1. These also served to inform my artistic approach to *Obs* that consciously employs writing as a mode of enquiry and expression, for its connections to the history of observation, and pivotal use within observatories. Science itself often employs poetic textual form, in the reductive character of observations, as previously discussed, but also for example the use of terms like 'Goldilocks Zone' for habitable planets, where the conditions must be just right: not too hot and not too cold, or the description that; a spoonful of neutron star weighs as much as a mountain (*Astro 2201*, Cornell, n.d.).

*Obs* is a reflection upon the use of different languages to engage with measurement and observation, but also an observation upon my reading of both the history of observational science, contemporary 'big data' contexts, in particular the smart city, commercial data mining, and state surveillance. It does not conform to science fiction in its more conservative sense of 'realistic speculation about possible future events' (Davenport et al., 1971:63), partly because it is a-temporal, but also due to its use of more experimental or nonsensical poetic language. In its use of poetic form to address the subject of observational technoscience, it may be closer to work such as *In Memorium* by Tennyson that are responses by the author reading *about* science. Which, Susan Gliserman describes as being the result of 'the exchange of affective meanings, specifically, those emotional conflicts and resolutions which were created and required by certain scientific data and theories.' (Gliserman, 1975:278). She continues, building upon the work of Norman Holland, that 'writer's individual fantasies and defences are recreated in the form of his work' (Gliserman, 1975:280).

The language employed within *Obs* has an excessive character to it, that seeks to overwhelm the Reading Group's own total surveillance, to 'totalize the totalizer' (Toscano, 2012). As discussed in the methodology section, I employ an affective method, and it should be noted that the narrative and language also represents my own personal 'defences' and feelings towards observation, particularly surveillance, which I will now briefly contextualise.

Over the last two decades, the government in the UK has been undertaking the mass surveillance of individuals' lives, as part of a programme which is deemed to have breached human rights laws (Travis, 2016). Alongside the 'bulk' collection of data by security services, is the loss of control of intimate facts about personal lives via social media and the creeping surveillance and observation of the everyday. We may cite for example, Renew London fitting devices into bins in the city of London to track the smartphones of passers-by. This was defined by the company as anonymised data (Miller, 2013), but it as has been argued the notion of anonymous data is a paradoxical misnomer (Berinato, 2015). Whether anonymous or not, the knowledge of being observed disturbs our equanimity and creates unease, as does its concealment – this is a key driver within the narrative of *Obs*. Consider for example, Jon Penney's work on self-censorship, exploring an abrupt decline in Wikipedia searches for terrorism-related keywords, such as *Al Qaeda*, *Hezbollah*, *dirty bomb*, *chemical weapon*, and *jihad*, following Edward Snowden's surveillance revelations (Penney, 2016). Demonstrating how such activities limit observation itself and knowledge production of these fields. For those conducting the surveillance within this milieu it becomes, as Yochai Benkler states, paramount to 'control everything as much as possible in order to minimize risks... [and] come to their conclusions from a framework that... is relatively insulated from potential alternative viewpoints.' (Shaw, 2016).

Furthermore, the very 'freedom', which observation via the state often seeks to promote and protect, can become eroded through the pervasiveness of observation. Blanket surveillance creates a 'climate of

mistrust and suspicion, a reduction in respect for the law and those who enforce it, and an intensification of the prosecution of offences that are susceptible to easy detection and proof.’ (Wacks, 2015:8). To contextualise *Obs*, and the language employed therein, it is pertinent here to refer to Alan Westin’s four ‘functions’ of privacy: 1. Personal autonomy – limiting manipulation by others and supporting democracy. 2. Emotional release – permissible deviations to social or institutional norms, to be ‘ourselves’. 3. Self Evaluation – the ability to test and say the wrong thing. 4. Limited and protected communication – to share confidences and intimacies. Which he sets alongside the four ‘states’ of privacy: 1. Solitude - individual separated from the group and freed from the observation of other persons. 2. Intimacy - individual as part of a small unit. 3. Anonymity - individual in public but still seeks and finds freedom from identification and surveillance. 4. Reserve - the creation of a psychological barrier against unwanted intrusion - holding back communication (Westin, 1967). Westin writes that, even without an explicit breaking of these states, ‘each individual is continually engaged in a personal adjustment process in which he balances the desire for privacy with the desire for disclosure and communication’ (Westin, 1967:7). The language of *Obs* explores how this ‘adjustment’ process may play out and seeks to articulate aspects of observation’s ‘chilling affects’. It is interesting to note that in the bestseller *The Spirit Level* (2009) by Richard Wilkinson and Kate Pickett, which articulates how social inequality has an adverse effect on many areas of life from health to education, the authors fail to include surveillance and privacy infringement in the book as a factor contributing to unequal social relations. It is an area I would argue that needs further study, and could not new, open, critical, creative, and self-reflexive observatory like spaces and institutions serve to address some of these needs and concerns?

The language of *Obs* operates within a context within which privacy is not a universally accepted ‘unqualified good’, rather that asserting a right to it can appear ‘quaint’ and almost ‘prudish’ (Wacks, 2015:36). *Obs* then, and *TNO* also, is a call to renew the states and functions of privacy outlined by Westin as valid and important. Furthermore, the promotion of privacy rights can be critiqued for a perceived individuating conservatism, as for example when Benjamin Bratton warned that the recent EU’s General Data Protection Regulation ‘may just fortify “The Individual” under guise of privacy ethics, as well as the legal and functional division between Citizen and Non-Citizen.’ (Bratton, 2018). In this regard, it is important to note that technology is also employed by the Reading Group in a positive egalitarian form as a communal language. Science, particularly its ‘laws’ as Michel Serres has written, offers to some degree a universal language, but such zones or moments of unity are only islands in a field of multiplicity, which cannot ever be fully observed, only sensed (Serres, 1995a). The Reading Group’s process is affirmative, they seek not to destroy the Ob, but rather a counter-actualisation of the observatory, to perform and experiment with both the laws of science and of sense. Something that may fruitfully relate to, intra-act with, and obfuscate (Nissenbaum and Brunton, 2016) the Ob. After all, observational networked media is useful to modes of resistance, promoting information sharing, movement building, and collaboration for political activism and civil disobedience (Shantz and Tomblin, 2014). Also art may augment networked and social media to powerful effect, as the artist group WochenKlausur write: ‘The context of art offers advantages when action involves circumventing social and bureaucratic hierarchies and quickly mobilising people’ (Kester, 2004:102).

### **From Observatory Notebooks to Artist Books**

An important part of the emerging genre of observational writing was the transformation from private notes to public books, functioning in a critical and pedagogical mode to promote the production of further observations (Pomata, 2011). In this regard it is relevant to explain that *Obs* is drawn from approximately 20 private notebooks I filled, and *Obs* was produced in a printed edition of 200.<sup>37</sup> My notetaking was predominantly a project of observing my observations on other observers and observatories. As Lorraine Daston has described in an essay on observation and inscription: ‘As observation became repetitive as well

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<sup>37</sup> Printed by Footprint Workers Co-op, Leeds, published by Broken Dimanche Press, Berlin, and designed in collaboration with Mark Simmonds based in Liverpool.

as collective, the challenge of synthesizing the sequence of notes made by an individual complemented that of integrating the ensemble of reports produced by the community.’ (Daston, 2011:93). This corresponds to how the publication functions both to synthesise my textual, archival, curatorial processes and observations, and seeks to integrate itself *back* into its *material community* – copies of the publication will be deposited at for example FACT, Bidston Observatory, Liverpool Archive, Manchester School of Art, Utrecht University Library, and with artists and other collaborators on the project. This act returns the project to its ‘origins’, born of resonant sites, institutions, and documents in archives. Furthermore, if to document something is to intentionally stabilise it for use by others (Buckland, 1997) my action experiments with how documentation may be *re-made unstable*. Bearing some kinship, if a less destructive method, with John Latham’s work *Still and Chew: Art and Culture 1966–1967*, produced from chewing, regurgitating, and returned to the library, a copy of Clement Greenberg’s book *Art and Culture* (1965) which Latham objected to.

Writing any narrative or poetic form is an exercise in observing observation. Historically to state that something is an observation implies a ‘first-hand report’ but also a lack of intervention, as opposed to an experiment (Daston, 2011:85–86). It is this conflation of experiment with observation, that defines both Sandy’s *modus operandi* in the narrative and is a key aspect of disagreement and finally resolution with the Reading Group. They quote Leibniz stating ‘there are certain experiments that would be better called observations, in which one considers rather than produces the work.’ (Daston, 2011:86). But is it possible to consider without producing, to observe without inscription, without construction? In the first chapter of the book (p. 36) it states, there is ‘no denying they were there’ and attempts to articulate the issue of the relation between an observation, with its actuality. This is an echo of Paul Gross and Norman Levitt’s critique of a social constructivist view of science that suggested if you applied it to the everyday, it would be the equivalent of being inside and seeing rain outside, and saying that to *believe* it existed, would be to suggest that the rain was socially constructed (Gross and Levitt, 1998). Coupled to this is how the image of ‘inside’ and ‘outside’ as metaphor for subject and object relations, phenomena and representation, at play through acts of observation, is a recurring motif in the book. As Katherine Hayles writes in reference to Philip K Dick’s novel *Ubik*, and themes of inside and outside: ‘The hope *Ubik* holds out is that although boundary disputes will never disappear, inside and outside can be made to touch each other through the medium of writing that is no less valuable for infecting our world with all manner of epistemological and ontological instabilities.’ (Hayles, 1999:188). In this way writing generally, and potentially moments in *Obs* too, can be said to make the inside and outside touch each other on a semiotic level, to perform *an always already intra-action between phenomena*.

The publication does not attempt a traditional narrative where everything is connected, or for relations between inside and outside to be binary. The intention is rather that readers begin to make their own connections, and ‘complete the picture’, to catalyse the reader’s *observe-atory* character and abilities, to make boundaries touch each other, within the mind, but also through the medium of the book itself. This is an attempt to relay an experience of observation in a variety of registers, from the close and analytical to slow drifting modes, from human to machine. In this sense, by prioritising description over narrative, it brings to the fore the *observe-atory* character of reading, and the wider human sense-world, which in turn engenders the production and reception of, for example, observatories and art. In another regard, the observatory functions as a metaphor or microcosm of the human sense-world augmented and transfigured by technoscientific apparatus. Further still, observatories may function as microcosms for wider worlds and systems, from the astronomical to, in the case of the publication, an urban conurbation. The question posed then, and rendered as existential farce, throughout the publication is to what extent any person or observational system may truly be a representative microcosm or *know* the world. Asking, as Gregory Bateson does, what if the mind is ‘our microcosm; and our microcosm is an appropriate metaphor for the macrocosm?’ (Bateson, 1991:227). However, I would suggest it is necessary to critique such a statement for its anthropocentrism, and rather than saying that the mind or an observatory is representative of the world, that we may say more modestly that it is (one aspect) simply of the world. And that art, like scientific instruments, become tools for ‘knowing the correspondence between world

and mind... Hermetic forms of knowledge, closer to spiritual and experiential knowledge, but knowledge nevertheless.' (Boutet, 2013:33). Furthermore, that we are never able to fully gauge this correspondence, to wholly observe observation. Accordingly, a subject within the book is Sandy's unwavering belief in his ability to model the world and know it fully, that subsequently becomes unstuck following the Reading Group's interventions, and their own collaborative activities to build new instruments and a collective observatory. This penultimate section revels in creative modes of observation in metaphorical correspondence with both the world and observation itself, simultaneously transcendent and immanent. Suggesting that it is perhaps the ontological and material character of this process, rather than its epistemological component, that is in closest relation to any 'model', 'way', or 'becoming with', of the world.

The material character of the printed book and the writing itself expresses, and is at play within, a conversation concerning how knowledge shifts, and attempts to live in the senses and bring forth. It is media as pharmakon – remedy, poison and scapegoat (Derrida, 2017). Possessing a tripartite nebulous character, the result of both the characters', writer's and the readers' gap's in knowledge and different interpretations, which is exaggerated within the poetic form and materiality of the book. As Badiou writes 'the poems true relation is established between thought, which is not a subject, and presence, which goes beyond the object.' (Badiou, 2004:30). This focus on *betweenness* resonates with my discussion of Karen Barad's work in the literature review and Chapter 1, and my earlier discussion of the *and*-ness of my practice, which prioritises *differentiating co-constituting entangled relationalities*, rather than simply binary correspondence or exchange.

Experiments with typographic form within the book, push these relationalities further, and act to appropriate and refunction measurement and codifying systems, critiquing the constructed nature of science, measurement and observation. The latin script of the text, is augmented by graphic diagrams, units of measurement, and reworked fragments of found imagery, which rub up against the grain of bark and pixelated patterns of static, and my own typographic experiments and sketches of instrument and measurement like inscription. This montage of technique and source material, between phenomena and means of ascribing value to it, experiments with the 'dances of agency' (Pickering, 1995) at play in observation, producing assemblages produced by both humans *and* the world inscribing upon and measuring itself. This approach to 'writing' is informed by Michel Serres' and Timothy Lenoir's work on scientific measurement and inscription as discussed in the literature review, Mark Changizi's research on how ecological forms influence the structure of letters and symbols (Changizi et al., 2006),<sup>38</sup> and Vicki Kirby's work, which extends Derrida's 'no outside of text' to 'no outside of Nature', the provocative consequence of which is that:

'... the reader /writer of this "general text" is necessarily dispersed – it is not located, at least not in any classical sense, in a human agent. Within this "open system" whose only constant is mutation/writing, the same questions that are confronted in the physical sciences about determination, agency, causality, space-time involvement, and "spooky" entanglement, are all operative.' (Kirby, 2011:ix).

This dispersed agency is at work in the imagery and typography, and the text itself, particularly the 'slogans' (p. 51-54) and the instruments, but also the eventual dissolution of the observatory back into the 'media' of the earth. This approach also bears affinities with the concept of 'parapoetics', which: 'asks what other semiotic possibilities can be afforded to us... how to speculate and engage in parallel vocabularies in unknown sign systems... in what manner significations can manifest themselves, and what promises for our relations to Others a poetry in an expanded, transhuman field might hold.' (Bencke and Antonsen, n.d.).

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<sup>38</sup> For a more detailed description of Changizi's work and a typeface in relation to it for a previous project see: (Skinner and Jones, 2017).

As Daniel Naegle writes of Duchamp's *Door: 11 rue Larrey*, which I discussed earlier, 'Duchamp did not do away with the traditional door and frame. What he countered, he countered with the conventional. He re-presented traditional artefacts.... part of our everyday world. Reframing converts it to a coded message.' (Naegle, 2006:6). Equally, as I attempted to reframe the observatory, within the gallery and book, so too I attempt to push against the book's inherent conventionality and modularity. As Johanna Drucker writes of the artist book, its defining feature is the 'tension between the seeming simplicity of that conventional form and the unlimited complexity produced through the relation of elements to each other in a finite arrangement.' (Drucker, 2004:359). This constraining form of the book produces a creative tension with *Obs* contents often defined by excess and irregularity, manifest across narrative, language, and design.

The language within *Obs*, exemplified by a certain compression, sits alongside and within half-toned images of technological profusion, which rendered in print form in particular, become almost a residue or an afterimage. As Jonathan Crary writes of the afterimage in the 19<sup>th</sup> century optics; 'it was to become a crucial means by which observation could be quantified, by which the intensity and duration of retinal stimulation could be measured.' (Crary, 1992:102). Analogously, the publication describes both a fictitious encounter with observation, and narrates my own non-fiction encounter with it through the project, functioning as a two-fold afterimage in synthesis. Akin to Max Ernst's practice of working, which he described as being conducted with one eye looking out and the other looking in (Waldman, 1975:39–42).

In using printed media I proffer old media, as a new frontier that has a new, or renewed, agency and currency within digital culture (Ludovico, 2012). If as Galloway writes: 'code is the only language which is executable' (Galloway, 2006:165) it is the unexecutable observability, that is a unique affordance of print. To not act upon it, click or swipe away, or for it to so easily generate data like an Amazon Kindle ebook, which offers a constrained performativity. This I would suggest resonates with the 'ambient literature' of Tan Lin that both attempts to produce space in an administered world, but also challenges the status quo of existing forms of literature and their modes of reception (Genusa, 2012). The offline quality of the printed book foregrounds and exposes the ubiquitously linked nature of contemporary observational culture. As Jean-Francois Lyotard wrote: 'To link is necessary; how to link is contingent.' (Lyotard, 1989:29). Accordingly, just as I promote the observatory for its anachronist valance, so too the book, possesses certain resistant affordances that the reader may link in to or unlock. Johanna Drucker describes the infinite difference of media the reader may experience, when she states: 'The problem of understanding media can seem as intractable as those of the wave/particle distinction in physics: the phenomenon under scrutiny changes its character depending on who is doing the observing, where, and for what purpose.' (Drucker, 2013).

To return to the imagery contained within *Obs*, it is a combination of my own hand drawn illustrations, imagery produced using graphics software, and adulterated found imagery. My own drawings are based on sketches I have been producing throughout the project of observatory like structures, instruments, and inscriptions. Produced in an 'automatic' manner they reference the automatic character of much of the writing, that takes a somewhat pseudo rigid guise, through the uniformity of its vector-based typesetting that may aid the reader but is fruitfully at odds with the content of language it communicates. The images are also an attempt to draw attention to the surface of the page, enjoining image with the text, pushing the work away from information toward sensation. These assemblages of word and image seek also to suggest a form that evades capture and promotes abstraction, representing the processes and concerns of the Reading Group within the narrative. Moreover, the use and abstraction of diagrammatic and writing systems explores the different forms of language, between text, number, image, and notation, which are used as tools for inscribing observations within art and science. In so doing, it highlights language itself as a technology, and how it may have agency in broader naturecultures. These technoscientific graphic renderings are presented alongside more-than-human inscriptions and textures,

such as tree rings and static, which collectively participate in the narrative itself and draw upon the readers own understandings and experiences of these forms.

If data is the product of ascribing value to phenomena, then any act of drawing or writing may be seen as the production or abstraction of data. Also, drawing and printing has an added ability to foreground and expose how inscription and data marks bodies, splices, and produces new forms. The gestural quality of the drawings and half-toned rendering of images are intended to underscore the ascribing of value and the embodied constitution of inscription, using the shared knowledge of the body and measurement as conduit. As Lisa Gitelman states, the ‘sense that technology is enmeshed within textuality, that machines are discursively and physically constructed’ (Gitelman, 2000:8–9) underscores how the book itself is a tool or method of programming, and part of a more than linguistic observational network. Gitelman’s work builds on that of Jerome McGann’s, in which textual production is part of ‘a laced network of linguistic and bibliographical codes’ in which ‘the textual condition’s only immutable law is the law of change’ (McGann, 1991:9–13). Accordingly, my publication attempts to reflect upon the textuality of technology via: imagery folded into the narrative; the language of technoscientific observation; and vice versa through the technology of textuality embodied within the production, design, and distribution of the book itself. To take this one step further, I would also question my own authorship, preferring the Derridean sense of the work emerging from the ‘scene of writing’, akin to how, as discussed earlier, this project emerged from material in the archive, and the chains of materiality that produced it. Suggesting that the act of observation, and specifically writing is always a repetition of a kind, as much a reading as a writing, and that the challenge is to write about, articulate and represent what is writing and observation *itself*, and by extension media and technology, not to write only about the psyche (Derrida and Mehlman, 1972). To evolve a central motif of this project: *the world writes and observes itself*. This is the case in a technological sense, with computers reading programmes, and new machine learning algorithms like the Markov Chain Monte Carlo method that can generate or ‘write’ code (Shaver, 2017), through to how instructions stored within DNA are read and processed by cells. Equally, reading, writing, and observation, may be seen to operate as ‘planetary form’ in *both* the sense of more than human modes of self observation and inscription, *and* the textual systems used in computing and observation operating at planetary scale.

In this chapter I have explored aspects of how the two differing media formats of the exhibition and book co-constitute and inform one another through the project and my practice. I have shown how the outcome of archival research and subsequent embodied processes, including visiting the observatory and archive, and textual research exploring wider contexts via a process defined by its *andness*, may produce elements that are simultaneously discrete and connected. I have attempted to articulate why the subject of the observatory, observation, and accompanying contemporary contexts of data, surveillance, and measurement, may demand such a dual practice and double articulation, prioritizing *andness*, and create productive ‘mutant coalitions’ between the gallery, book, archive and observatory. Within such a process the book in particular becomes a reflective and experimental ‘and’ to the more architecturally bounded form of the exhibition and role of the curator. Offering a performative opening or key within both the exhibitionary fabric and totalizing character of measurement, and serving as a discrete riposte and deconstruction of observation’s constructed character. A manifestation of the ‘toward’, ‘to’, ‘on’, ‘over’, ‘against’, that is defining of the etymological root of ‘ob’ within observatory and object. As David Turnbull writes, we ‘do not simply know the world through maps and representations, but through practice and performance... maps carry within themselves the seeds of their alternatives’ (Turnbull, 2000:126). Equally, my method and process throughout the project has carried with it the seed of subsequent stages, from archive to exhibition to publication, but in particular these observations of observation, mappings of mapping, necessitate alternative strategies, otherwise they simply ape and suffocate that which they seek to reevaluate and critique. As Jacques Derrida states; ‘it is not because the infiniteness of a field cannot be covered by... a finite discourse, but because the nature of the field... excludes totalization’ (Derrida, 2001:365). Thus I would suggest the publication serves to both critique the map, and map the untotalizability of the field. In this sense, the exhibition and the indeed the work of

the curator, following initial commissioning period and rooted in interpretation, mapping and the presentation of things, is redirected by the publication, and enacts a level of meta critique upon my process and practice. Attending to both Montaigne's call that: 'We need to interpret interpretations more than to interpret things' (Derrida, 2001:351) and Deleuze's 'and'— which promotes a continual unsettling of form and content. Underscoring all these processes and contexts is an objective to move beyond the observer, subject, author, and text, without losing sight of the agency of the subject, particularly the political subject, and to provide for the gallery audience and reader to perform their own untotalizing and opening out of observation.



## Conclusion

I conclude with comments and questions that my project and this thesis provokes, and speculate on how alternative observatories and practices of creative observation may intervene in the future. To begin, I return to the five points discussed in the introduction and consider them in relation to the overarching research question: What could an observatory be in the 21st century, in particular, one sited within a public gallery or imagined through an artist book?

1. This thesis and project has functioned as a corrective archaeology to mine and materialise an alternative vision of the observatory. I have explored how the observatory is an important touchstone and microcosm for our contemporary technologically mediated condition that necessitates, and is intrinsically capable of, appropriation and refunctioning. However, in attending to how the observatory's history is one of continual change and proliferation, which may find new life within the gallery and the artist book, my project has not attempted to describe its possible future beyond the gallery or fictional narrative within the book. As such, further research is required to explore how for example wearable or nano technologies may become important within future observational apparatuses and processes, particularly within the arts. Furthermore, the continued growth and profusion of observation and data collection, which is central to the narrative within *TNO* and *Obs*, provokes the question of how much data is enough? More work is required on the potential for counter movements against observation and data collection, and how and from where this might emerge. And how to navigate the conflict between a need to limit and critique the use of data by 'surveillance capitalism' on the one hand, and the need to challenge climate change deniers lack of faith in environmental data, on the other. In addition, research exploring what forms and subjects of observation may become outmoded and what they may be replaced by is required. For example, how might specialist modes of observation contained within the professionalised field of science, within quantum mechanics for example, evolve into everyday technology and media, as prior observational devices and practices have?

2. In the introduction I proposed the book and gallery as important spaces of assembly, serving to bring the past into contact with the present and for the distributed character of observational instruments and apparatuses to be reformulated and momentarily gathered in new assemblages. As observational instruments and observatory like institutions become increasingly prevalent, producing an ever more observed world, the necessity for situated, ethical, critical, and creative responses grows too. The work of the artists in *The New Observatory* exhibition, and the *Obs* publication itself, contributes and add impetus to I hope in a small way these evolving vocabularies and tactics.

3. I argued at the outset that the subject and history of observation is a key point of connection between the arts and sciences. My project asserts that artistic modes of inscription, in particular publishing and the exhibition, serve as resonant practices for exploring relations between art and science, and creating a dialogue between historic and contemporary forms of observation and the observatory. In focusing on how art, writing, and social life can both mediate, and be mediated by, observational technoscience, I have in turn attempted to demonstrate how technoscience can be mediated through art. In so doing, I propose that creative and resistant modes of observation that reflect upon both the effects of observation and the immeasurability of life, are relevant and meaningful modes of embodied, reciprocal, and counter observation between the 'two cultures'.

4. The process of ascribing value to phenomena is at the heart of observation, the observatory, and this project. Both the artist book and exhibition functioned as inscription devices to reflect upon and perform these processes. Collectively the project is a consideration of how both artistic and scientific thought and practice produces itself through the apparatus of observational production, that comprises an assemblage of textual, visual, instrumental, and social practices. Each of these practices have been shown to be employed within both art and science, and thus demonstrate their shared characteristics, where they

diverge, and how one may affect the other. For example, as I write, the time management software produced by Jeronimo Voss and Radamés Ajna, inspired by chronometer rating at the old Liverpool Observatory, continues to be employed at the Nika Haus in Frankfurt, refunctioning processes of mercantile and imperialist extraction toward supporting the management of collective egalitarian housing. Furthermore, within the project I researched and reimagined both FACT and the Liverpool Observatory simultaneously, inscribing one in and with the other, bringing the institutions into a co-constituted dialogue.

5. My theoretical framework has been defined by on the one hand an attempt to apprehend the history and complexity of the *apparatus of observational production*. By first using situated archival research, in conjunction with a media archaeological indebted approach, to investigate the Liverpool Observatory in the belief that its history possesses a wider relevance to contemporary life. Principally this research was supported by contextual material and conceptual tools from the history of science and new materialist scholarship, including Haraway's work on naturecultures and Barad's on observation. From this analysis emerged a focus on the *materiality of inscription*; the points of contact between observation and the world, the traces and after-effects of measurement, sensing, and prediction. Here the history and philosophy of science, in particular work by Schaffer, Latour, and Serres on the invention and use of measurement devices and how it is moulded by both material and social forces, links to the work of literary critique and philosophy of inscription, within the work of Kirby, Derrida, and Gitelman, attending to what I have described as the *excluded excess* that is necessarily ignored to render an observation or measurement 'accurate' or useable. Linking both the *apparatus of observational production* and the *materiality of inscription*, is a concern with the ideological character of these phenomena and a concern that they ape, catalyse, and entrench capitalist processes which increase inequality. Though there is an emergent field of new critique addressing this, it tends toward analysis of surveillance processes, for example *The Age of Surveillance Capitalism* (Zuboff, 2019). But alongside critique of the processes of abstraction inherent within contemporary observation of our lives, we must be careful not to delegitimise processes of observation, particularly as practiced within social and climate science. On the one hand there is a need to listen and learn from observational data relating to climate change or inequality, and on the other there is a need to challenge observational practices employed by government surveillance agencies and Silicon Valley for example, that dispossess our rights. This is a complex terrain to navigate and articulate, but I propose that physical observatory-like spaces for the gathering of diverse people, instruments, and debate have a unique currency with both sides of this observational milieu and thus act as germane vessels for responding to such imperatives.

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Following the above discussion of key points in the introduction I will now turn to briefly build upon these conclusions alongside a consideration of broader questions and implications that my project compels.

If the project explores how art and science seek to investigate phenomena that exists beyond the surface appearance of the world, and then somewhat paradoxically, in turn represent and inscribe results back onto the surface of the world. A challenge exists for how to conduct and present observation in modes that encourage critique of these processes of representation, and their respective materiality, validities, and meanings, which may add, rather than reduce, the possibility for complexity and improvisation. Observation demands to be reimagined and diffracted by both art and science, to enable each to expand upon and experiment with the other, and observation's speculative and ethical potential, rather than simply reflect or reify insights. A reimagined observatory is, I posit, a useful and meaningful space to do this.

Beyond this argument, the project has investigated via the prism of the observatory the relationship between the very old and the very new. How new observational media and technologies continue to find

use and new relevance within a changing world, in particular those that are defined by embodied experience and networked materiality. I have attempted to confront the new, without obscuring the past, through an engagement with an old, and the invention of a new, observatory. Attending to the tension, and creative destructions that exists when the new and the old come into contact, within both art and science, which is symptomatic of how, as Thomas Kuhn wrote: 'the old must be revalued and reordered when assimilating the new' but accordingly 'discovery and invention in the sciences are usually intrinsically revolutionary.' (Kuhn, 1979:227). However, there remains significant research to be undertaken which explores how culture and epistemology beyond the sciences can develop and keep up with these revolutions, and how explicitly curatorial and artistic methods, including those with a historical and situated dimension, may meaningfully evolve and contribute.

When we name something as new, like materialism or the observatory, we are also saying that something old persists and that some novel potential has been found within it. However, one must also be cautious how the very act of resurrection can demonstrate the deadness of that which the new attempts to resuscitate. Within this framework the question of how my project, and others like it, involved in reinvention, reimagining, and renewal, are tied to capitalism's own rapacious drive for the 'new' must be asked. As discussed in chapter 3, how organisations and individuals, and here I include myself, must find resources for their activities and survival is pertinent. Further work is required to unpick how acts of renewal, offer genuine innovation, or a renewal for renewal's sake, which may verge on conservative or capitalistic value extraction. In tracing the observatory through time and performing my own reimagining of it, the project seeks to explore the observatory's, but also the gallery and the book's, 'objective spirit', how they each function within an ever evolving networked environment of technoscientific and cultural apparatus that conjure, sustain, and renew their existence, and their reception by future audiences and collaborators both human and non. How to think of the world and such artefacts beyond subject-object relations that are often all too easily observed and commodified, exploring instead the peculiar intra-active relations between inscription and phenomena, will remain an ongoing question for my research.

On a broader, and perhaps more political level, the exhibition and publication is an enquiry into, and a call for, observational self-organising, expression, and resistance in the limited space of an administered world. The project promotes a position that art represents and supports life just as well as science, and that each demands to be interrogated and engaged with by the other. Moreover, that we take seriously the *and*, in art *and* science, and acknowledge their shared characteristics and plurality, particularly those of observation and experiment. The publication, the fictional activities of the Reading Group, and the very real artists in the exhibition, each explore how observation may be simultaneously critiqued and reimagined, through the use and construction of new instruments in open and collaborative ways. A question persists for future enquiry; how can such instrument making practices be made both viable and sustainable in a society where technoscientific power is unequally distributed and increasing inequality affects access to education, materials, and the production of knowledge.

The Reading Group's acts of resistance were born from a dissatisfaction with how their objectified ascribed lives are inscribed in data, and used as a stand-in for their own participation in democracy and community. Their grievance is with the discrepancy between the posturing of an institution that purports to be social, but disavows the community's participation in acts of observation, other than on an extractive, algorithmic, and datafied basis. This narrative, expressed also in *The New Observatory* exhibition, produces a tension between art and activism, the map and the world, data and the body, which will, without addressing, only grow in the future. My own project was temporary in nature and more work is required to explore how variously permanent, highly visible, clandestine, open, relational, situated observatory-like spaces may be developed and sustained. How they may evolve and maintain relevance with the movements of a deterritorialized technoscience and the remote observation it catalyses is crucial. It is exciting to note that at the time of writing the old Bidston Observatory is open again as an artistic research centre and the Edinburgh Observatory has reopened as a home for the art organisation

Collective. These endeavours and others like them, offer a significant opportunity to explore the continued possibilities and relevance of the observatory in the future. The degree to which it can forge relationships with different communities beyond a specialised art community will be a defining factor. As the Fluxus artist Robert Filliou once said: ‘art is what makes life more interesting than art’ (Dezueze, 2005:17). Analogously, we may ask how in the future may observation make life more interesting than observation?

My project suggests that critical and creative public observatories have the potential to localise and situate the transnationalism and decentralization of technology, in particular the internet and connected devices. But, there is also a tension within my emphasis on the local and site specificity, and how such observatories and their instruments may become nomadic and link with other alternate networks. How to balance an observatory’s anachronistic fixity as a resource and enable, to reformulate a web 2.0 term, an ‘architecture of participation’ (O’Reilly, 2015) that can in turn hack infrastructure is a question for future enquiry. The network of ground stations developed by Kei Kreutler and Libre Space Foundation continues to grow, but so too do the number of satellites in space which they observe. Future research could be conducted into how these instruments continue to evolve and the degree to which a relationship with a continuing *TNO*-like project may be beneficial. Or how might the observatory be reinvestigated and rethought in a future project from the perspective that it acts more as temporary a landing strip or launch pad to such projects?

The *Declaration of the Independence of Cyberspace*, written by 1996 by John Perry Barlow states ‘there is no matter here’, and the binary between physical and digital is often used to characterise on and offline space, but this is a metaphysical delusion that continues to be propagated and needs continual redress. Cyberspace and the computer hardware that underpins it is deeply material and catalysing some of the most significant and damaging extraction activities on earth. How then do the practices I have outlined above address the inherent extractive materiality of observational practices? A possible area of future work that this project opens up, is an analysis of how observation and its accompanying technologies and practices may impact upon and connect to issues of sustainability and ecology. Following Katherine Hayles, whose work attempts to give information back its body (Hayles, 1999), I would argue that more work is required on the impact of informational bodies, from data centres to cables, transmitters to receivers. In a time when limiting impact upon natural resources is fundamental, exploring how to undertake renewable observation that can still aid the understanding and invention of complex systems that are otherwise hard to grasp, produce or compare, demands further enquiry.

To conclude, through my project I have explored how porous the boundaries are, or may be, within artistic and scientific institutions, curation and publishing, observatory and gallery, and how such an approach catalyses opportunities for future transformations. The ‘universal’ and ‘different’ languages inherent within the sciences and the arts offer exciting transdisciplinary potential for exchange between diverse communities, both human and non. Such dynamic forms of communication between the arts and sciences may enable a shift from, for example, the observatory and observation being simply a system, which may be characterised as amore static collection of things or propositional processes, to a more dynamic *network* – in its dual sense as both noun and verb, which is always open and evolving.

The science of observation, particularly cybernetics and quantum theory demonstrates and articulates the observer effect, whereby the observer is part of, and may influence that which they observe. What has been less well explored is the observer effect on everyday life, caused by technoscientific observation conducted by government and corporations. My own project posits a situated and self-reflexive observatory as a useful tool for engaging with these socio-technical effects, but also as a space to explore the materiality of inscription and intra-actions with phenomena that observation performs and produces. In so doing, my project attempts to position observation and the observatory as beyond becoming simply a technocratic and tautological control system, exploring instead how the observatory may function as

tool and touchstone for reflection and more active self, societal, naturalcultural, and observational reflexivity.

Denormalising the ontology of classification is more and more urgent, as is the necessity to add complexity to how we relate to, and are enmeshed with, both technology and nature. Moreover, as technoscience continues to increase its influence upon our lives, a demand for social and ethical engagement increases also, and the hybridisation of observatory and gallery, of art and science, offers a dynamic and adaptable space for relational, critical, and creative discourse – to rethink the empirical, to observe observation, to promote the multi-sensory, challenge what registers on the scale, and put simply, what counts. Art and the observatory can function as both crucible and touchstone for the fact that there is no absolute system of measurement, and observation like artistic form or process, never inherently, or wholly, possesses or articulates a subject or phenomena, other than itself. How to understand, apprehend, or even retreat from, this productive lack, this affirmative refusal, this ungraspable excess, remains an ongoing project.

## References

- Abbott, A. (2008) *Hidden Treasures: The Paris Observatory*. Nature. [Online] [Accessed on 10th January 2018] <https://www.nature.com/articles/457033a>.
- Altshuler, B. (tran.) (2013) *Biennials and Beyond: Exhibitions that Made Art History: 1962-2002*. London: Phaidon Press.
- Anderson, K. (2005) *Predicting the Weather: Victorians and the Science of Meteorology*. Chicago: University of Chicago Press.
- Anker, K. E. (2010) 'The sense of being moved.' *Technoetic Arts: A Journal of Speculative Research*, 8(2) pp. 167–172.
- Arends, B. and Thackara, D. (eds) (1999) *Experiment: Conversations in Art and Science*. London: The Wellcome Trust.
- Aristotle (1987) *De Anima (On the Soul)*. London: Penguin Classics.
- Armitage, J. (2006) 'From Discourse Networks to Cultural Mathematics: An Interview with Friedrich A. Kittler.' *Theory, Culture & Society*, 23(7–8) pp. 17–38.
- Astro 2201, Cornell* (n.d.). [Online] [Accessed on 4th May 2017] [http://hosting.astro.cornell.edu/academics/courses/astro201/neutron\\_star.htm](http://hosting.astro.cornell.edu/academics/courses/astro201/neutron_star.htm).
- Aubin, D., Bigg, C. and Sibum, H. O. (eds) (2010) *The Heavens on Earth: Observatories and Astronomy in Nineteenth-Century Science and Culture*. Durham NC: Duke University Press.
- Badiou, A. (2004) *Handbook of Inaesthetics*. Stanford, Calif: Stanford University Press.
- BAK – Instituting Otherwise* (n.d.). [Online] [Accessed on 11th March 2018] <https://archive.bakonline.org/en/Research/Itineraries/Future-Vocabularies/Themes/Instituting-Otherwise>.
- Bal, M. and Morra, J. (2007) 'Editorial: Acts of Translation.' *Journal of Visual Culture*, 6(1) pp. 5–11.
- Banham, O. (1960) *Theory and Design in the First Machine Age*. 2nd Edition, Cambridge, Mass: MIT Press.
- Barad, K. (2003) 'Posthumanist performativity: Toward an understanding of how matter comes to matter.' *Signs*, 28(3) pp. 801–831.
- Barad, K. (2007) *Meeting the universe halfway: quantum physics and the entanglement of matter and meaning*. Durham, N.C.: Duke University Press.
- Barrett, E. and Bolt, B. (eds) (2013) *Carnal knowledge: towards a 'new materialism' through the arts*. London: I.B. Tauris.
- Barthes, R. (1981) *Camera Lucida*. New York: Hill & Wang.
- Bateson, G. (1991) *A Sacred Unity: Further Steps to an Ecology of Mind*. Donaldson, R. E. (ed.). New York: Harper.

- Bateson, G. (2000) *Steps to an Ecology of Mind*. Chicago: University of Chicago Press.
- Beer, G. (1988) 'Problems of Description in the Language of Discovery.' In Levine, G. (ed.) *One Culture: Essays Sci/Lit*. Madison, Wis: University of Wisconsin Press.
- Bencke, I. and Antonsen, D. (n.d.) *Parapoetics*. Laboratory for Aesthetics and Ecology. [Online] [Accessed on 5th January 2016] <http://www.labae.org/para-poetics/>.
- Bergson, H. (1911) *Matter and memory*. New York: MacMillan.
- Berinato, S. (2015) *There's No Such Thing as Anonymous Data*. Harvard Business Review. [Online] [Accessed on 22nd March 2016] <https://hbr.org/2015/02/theres-no-such-thing-as-anonymous-data>.
- Betts, J. (2018) *Marine Chronometers at Greenwich: A Catalogue of Marine Chronometers at the National Maritime Museum, Greenwich*. Oxford University Press.
- Bogen, J. (2017) *Theory and Observation in Science*. The Stanford Encyclopedia of Philosophy. [Online] [Accessed on 10th January 2016] <https://plato.stanford.edu/archives/sum2017/entries/science-theory-observation/>.
- Bogen, J. and Woodward, J. (1988) 'Saving the Phenomena.' *The Philosophical Review*, 97(3) pp. 303–352.
- Boldyrev, I. A. and Herrmann-Pillath, C. (2013) 'Hegel's "Objective Spirit", extended mind, and the institutional nature of economic action.' *Mind & Society*, 12(2) pp. 177–202.
- Bösch, F. (2015) *Mass Media and Historical Change: Germany in International Perspective 1400 to the Present*. New York: Berghahn Books.
- Boutang, P. Y. M. (2012) *Cognitive Capitalism*. Cambridge: Polity.
- Boutet, D. (2013) 'Metaphors of the Mind.' In Barrett, E. and Bolt, B. (eds) *Carnal Knowledge*. London: I.B. Tauris.
- Bowker, G. C. and Leigh Star, S. (1999) *Sorting Things Out: Classification and Its Consequences*. Cambridge: MIT Press.
- Braidotti, R. (2013) *The Posthuman*. Cambridge: Polity.
- Braidotti, R. and Dolphijn, R. (2015) *This Deleuzian Century*. Leiden, NL: Brill | Rodopi.
- Brand, S. (1976) 'Conversation with Gregory Bateson and Margaret Mead.' *CoEvolutionary Quarterly*, (10) June.
- Bratton, B. H. (2018) "'Unfortunately, GDPR may just fortify 'The Individual.''" @bratton. 14th April. [Online] [Accessed on 16th May 2018] <https://twitter.com/bratton/status/985057085401518080>.
- Brinkley, R. (1983) 'What Is a Minor Literature?' *Mississippi Review*, 11(3) pp. 13–33.
- Brown, N. (2017) *The Limits of Fabrication: Materials Science, Materialist Poetics*. New York: Fordham University Press.

- Brown, S. D. (2005) 'The theatre of measurement: Michel Serres.' *The Sociological Review*, 53(1) pp. 215–227.
- Buckland, M. (1997) 'What is a document?' *Journal of the American Society of Information Science*, 48(9) pp. 804–809.
- Bühlmann, V. (2014) 'Atomism, Alphabet, and Idiosyncrasy (the Amorous Nature of Intellectual Conception).' In. UC Davis, California USA.
- Bürger, P. (1984) *Theory of the Avant-Garde*. Minneapolis: University Of Minnesota Press.
- Burt, S. (2014) *Ronald Johnson's "ARK": A Poem in Three Dimensions*. The New Yorker. [Online] [Accessed on 24th January 2017] <https://www.newyorker.com/books/page-turner/ronald-johnsons-ark-a-poem-in-three-dimensions>.
- Callon, M. and Law, J. (2004) 'Introduction: Absence — Presence, Circulation, and Encountering in Complex Space.' *Environment and Planning D: Society and Space*, 22(1) pp. 3–11.
- Camilleri, K. (2009) *Heisenberg and the Interpretation of Quantum Mechanics: The Physicist as Philosopher*. 1 edition, Cambridge: Cambridge University Press.
- Carnap, R. (1995) *An Introduction to the Philosophy of Science*. Gardner, M. (ed.). New York: Dover.
- Carroll, L. (1893) *Sylvie and Bruno*. New York: MacMillan.
- Cartwright, D. E. (1999) *Tides: A Scientific History*. Cambridge: Cambridge University Press.
- Cartwright, N. (1983) *How the Laws of Physics Lie*. Oxford: Oxford University Press.
- Cartwright, N. (1989) *Nature's Capacities and Their Measurement*. Oxford: Clarendon Press.
- Castells, M. (2000) *The Rise of the Network Society: The Information Age - Economy, Society and Culture Vol 1*. John Wiley & Sons, Ltd.
- Castells, M. (2004) 'An Introduction to the Information Age.' In Webster, F., Blom, R., Karvonen, E., Melin, H., Nordenstreng, K., and Puoskari, E. (eds) *The Information Society Reader*. London: Routledge, pp. 138–49.
- Chang, H. (2005) 'A Case for Old-Fashioned Observability, and a Reconstructed Constructive Empiricism.' *Philosophy of Science*, 72(5) pp. 876–887.
- Changizi, M. A., Zhang, Q., Ye, H., Shimojo, S., Ryan, A. E. M. J. and Losos, E. J. B. (2006) 'The Structures of Letters and Symbols throughout Human History Are Selected to Match Those Found in Objects in Natural Scenes.' *The American Naturalist*, 167(5) pp. E117–E139.
- Chapman, A. (1998) *The Victorian Amateur Astronomer: Independent Astronomical Research in Britain, 1820-1920*. Chichester: Wiley-Blackwell.
- Chun, W. H. K. and Keenan, T. (eds) (2006) 'Introduction: Did Somebody Say New Media?' In *New Media, Old Media: A History and Theory Reader*. New York: Routledge, pp. 1–10.



- Cigainero, J. (2017) *Star gazing: Adrián Villar Rojas hides a constellation of works at Athens' Observatory*. Wallpaper\*. [Online] [Accessed on 10th January 2018] <https://www.wallpaper.com/art/adrian-villar-rojas-athens-observatory-installation>.
- Clements, B. and Dunham, J. (eds) (2009) *An Introduction to the Prose Poem*. Danbury, CT: Firewheel Editions.
- Cohen, P. (1986) “‘The Waste Land,’ 1921: Some Developments of the Manuscript’s Verse.” *The Journal of the Midwest Modern Language Association*, 19(1) pp. 12–20.
- Colebrook (2017) *Twilight of the Anthropocene Idols. ∴ after us*. [Online] [Accessed on 21st August 2017] <http://www.aft3r.us/twilight-of-the-anthropocene-idols/>.
- Connolly, W. E. (2013) ‘The “New Materialism” and the Fragility of Things.’ *Millennium - Journal of International Studies*, 41(3) pp. 399–412.
- Cook, S. and Graham, B. (2010) *Rethinking Curating: Art after New Media*. Cambridge, Mass: MIT Press.
- ‘Correspondence respecting the Liverpool Observatory between Mr.-and the Rev. R. Sheepshanks.’ (1845) *The Athenaeum*, (937) October, pp. 985–986.
- Crary, J. (1992) *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*. Cambridge, Mass.: MIT Press.
- Cunningham, A. and Jardine, L. (eds) (2009) *Romanticism and the Sciences*. Cambridge: Cambridge University Press.
- Danius, S. (2011) *The Senses of Modernism: Identities and Foreign Policies, Moscow, 1955 and 1999: Technology, Perception, and Aesthetics*. Ithaca: Cornell University Press.
- Daston, L. (2011) ‘The Empire of Observation, 1600-1800.’ In Daston, L. and Elizabeth Lunbeck (eds) *Histories of Scientific Observation*. Chicago: University of Chicago Press (81–113), pp. 45–80.
- Daston, L. and Galison, P. (1992) ‘The Image of Objectivity.’ *Representations*, (40) October, pp. 81–128.
- Daston, L. and Lunbeck, E. (eds) (2011a) *Histories of Scientific Observation*. Chicago: University of Chicago Press.
- Daston, L. and Lunbeck, E. (2011b) ‘Introduction - Observation Observed.’ In Daston, L. and Lunbeck, E. (eds) *Histories of Scientific Observation*. Chicago ; London: University of Chicago Press, pp. 1–9.
- Davenport, B., Heinlein, R. A., Kornbluth, C., Bester, A. and Bloch, R. (1971) *Science Fiction Novel: Imagination and Social Criticism*. 3rd edition, Chicago: Advent Pub Inc.
- David Bolter, J. and Grusin, R. (eds) (2000) *Remediation: Understanding New Media*. Cambridge, Mass: MIT Press.
- Dearden, P. (n.d.) *The Development and Work of the Liverpool Observatory at Waterloo Dock 1836 – 1866*. University of Liverpool.

- Definition of 'observe' in English by Oxford Dictionaries* (n.d.) Oxford Dictionaries | English. [Online] [Accessed on 18th February 2018] <https://en.oxforddictionaries.com/definition/observe>.
- Delanty, G. (2010) *Community*. London: Routledge.
- Deleuze, G. (1992) 'Postscript on the Societies of Control.' *October*, 59, Winter, pp. 3–7.
- Deleuze, G. and Guattari, F. (1986) *Kafka: Toward a Minor Literature*. Minneapolis: University of Minnesota Press.
- Deleuze, G. and Parnet, C. (1987) *Dialogues*. London: Continuum.
- Derrida, J. (2001) *Writing and Difference*. London and New York: Routledge.
- Derrida, J. (2017) *Dissemination*. Reissue edition, Chicago: University of Chicago Press.
- Derrida, J. and Mehlman, J. (1972) 'Freud and the Scene of Writing.' *Yale French Studies*, (48) pp. 74–117.
- Dezueze, A. (2005) 'Transfiguration of the Commonplace.' *Variant*, 2(22) pp. 17–19.
- Dick, S. J. (1991) 'National Observatories: An Overview.' *Journal for the History of Astronomy*, 22(1) pp. 1–4.
- Dolphijn, R. and van der Tuin, I. (2012) *New materialism: interviews & cartographies*. Ann Arbor, [Mich.]: Open Humanities Press (New Metaphysics).
- Dolphijn, R. and Tuin, I. van der (2012) *New materialism: interviews and cartographies*. Ann Arbor: Open Humanities.
- Domnitch, E. and Gelfand, D. (2004) 'Camera Lucida: a three-dimensional sonochemical observatory.' *Leonardo*, 37(5) pp. 391–396.
- Donnelly, M. C. (1973) *A Short History of Observatories*. Eugene: University of Oregon Books.
- Doubtfire, J. and Ranchetti, G. (2015) 'Curator as Artist as Curator.' *Curating the Contemporary*. April. [Online] [Accessed on 22nd April 2017] <https://curatingthecontemporary.org/2015/04/30/curator-as-artist-as-curator/>.
- Drucker, J. (2004) *The Century of Artists' Books*. 2nd Edition, New York City: Granary Books.
- Drucker, J. (2013) *Understanding Media: Craig Dworkin's "No Medium."* Los Angeles Review of Books. [Online] [Accessed on 18th May 2018] <https://lareviewofbooks.org/article/understanding-media-craig-dworkin-no-medium/>.
- Duncan, M., Selz, P., Berman, W., Burden, C., Altoon, J., Kienholz, E., McCarthy, P., Saar, B., Hammons, D. and Chicago, J. (2012) *L.A. Raw: Abject Expressionism in Los Angeles, 1945-1980: From Rico Lebrun to Paul McCarthy*. Santa Monica, Calif.: Foggy Notion Books/Pasadena Museum of California Art.
- Dunn, N. (2017) *Sensory Arts and Design*. Heywood, I. (ed.). London: Bloomsbury Academic.

- Dworkin, C. and Goldsmith, K. (eds) (2011) *Against Expression: An Anthology of Conceptual Writing*. Paperback Octavo edition, Evanston Illinois: Northwestern University Press.
- Ede, S. (ed.) (2000) *Strange and Charmed: Science and the Contemporary Visual Arts*. London: Calouste Gulbenkian Foundation.
- Ede, S. (2005) *Art and Science*. London: I.B.Tauris.
- Einstein, A. (1905) 'Über einen die Erzeugung und Verwandlung des Lichtes betreffenden heuristischen Gesichtspunkt.' *Annalen der Physik*, 322(6) pp. 132–148.
- Engin, I. and Ruppert, E. (2015) *Being Digital Citizens*. London: Open University.
- Filipovic, E. (ed.) (2017) *The Artist as Curator: An Anthology*. Cologne: Verlag der Buchhandlung Walther König.
- von Foerster, H. (ed.) (1997) *Cybernetics of Cybernetics or The Control of Control and the Communication of Communication*. 2nd edition, Minneapolis: Future Systems, Inc.
- Forgan, S. (1994) 'The Architecture of Display: Museums, Universities and Objects in Nineteenth-Century Britain.' *History of Science*, 32(2) pp. 139–162.
- Foucault, M. (1972) *Archaeology of Knowledge and the Discourse on Language*. New York: Pantheon Books.
- Foucault, M. and Gordon, C. (1980) *Power/knowledge: selected interviews and other writings, 1972-1977*. New York: Pantheon Books.
- Fraassen, B. V. (1980) *The Scientific Image*. Oxford: Oxford University Press.
- Gabrys, J. (2016) *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet*. Minneapolis: University of Minnesota Press.
- Gaffney, V., Fitch, S., Ramsey, E., Yorston, R., Ch'ng, E., Baldwin, E., Bates, R., Gaffney, C., Ruggles, C., Sparrow, T., McMillan, A., Cowley, D., Fraser, S., Murray, C., Murray, H., Hopla, E. and Howard, A. (2013) 'Time and a Place: A luni-solar "time-reckoner" from 8th millennium BC Scotland.' *Internet Archaeology*, (34).
- Galloway, A. (2006) *Protocol: How Control Exists after Decentralization*. MIT Press.
- Gemtou, E. (2011) 'Depictions of Sunsets as Information Sources.' *Leonardo*, 44(1) pp. 49–53.
- Genette, G. (1997) *Palimpsests: Literature in the Second Degree*. Lincoln: University of Nebraska Press.
- Genusa, A. (2012) *A Book is Technology: An Interview with Tan Lin*. Rhizome. [Online] [Accessed on 4th May 2018] <http://rhizome.org/editorial/2012/oct/24/interview-tan-lin/>.
- Gitelman, L. (2000) *Scripts, Grooves, and Writing Machines: Representing Technology in the Edison Era*. Stanford, Calif: Stanford University Press.
- Gitelman, L. and Pingree, G. B. (eds) (2004) *New Media, 1740-1915*. New Edition, Cambridge, Mass: MIT Press.

- Gliserman, S. (1975) 'Early Victorian Science Writers and Tennyson's "In Memoriam": A Study in Cultural Exchange: Part I.' *Victorian Studies*, 18(3) pp. 277–308.
- Goody, A. (2011) *Technology, Literature and Culture*. Cambridge: Polity Press.
- Gould, S. J. (1981) *The Mismeasure of Man*. New York: W. W. Norton & Company.
- Greenwald, G. (2014) *No Place to Hide: Edward Snowden, the NSA and the Surveillance State*. London: Hamish Hamilton.
- Gross, P. R. and Levitt, N. (1998) *Higher Superstition: The Academic Left and Its Quarrels with Science*. Baltimore: Johns Hopkins University Press.
- Guattari, F. (1984) *Molecular Revolution: Psychiatry and Politics*. New York: Penguin.
- Hacking, I. (1983) *Representing and Intervening*. Cambridge: Cambridge University Press.
- Halpern, O. (2015) *Beautiful Data: A History of Vision and Reason Since 1945*. Durham: Duke University Press.
- Hanson, N. R. (1958) *Patterns of Discovery: An Inquiry into the Conceptual Foundations of Science*. Cambridge University Press.
- Haraway, D. (1988) 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective.' *Feminist Studies*, 14(3) pp. 575–599.
- Haraway, D. (1992) 'The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others.' In Grossberg, L., Nelson, C., and Treichler, P. A. (eds) *Cultural Studies*. London: Routledge, pp. 295–337.
- Haraway, D. (1998) 'Deanimations: Maps and Portraits of Life Itself.' In Jones, C. A. and Galison, P. (eds) *Picturing Science, Producing Art*. London and New York: Routledge.
- Haraway, D. J. (1991) *Simians, cyborgs and women: the reinvention of nature*. London: Free Association Books.
- Haraway, D. J. (2003) *The Companion Species Manifesto: Dogs, People and Significant Otherness*. Chicago: University of Chicago Press.
- Harney, S. and Moten, F. (2013) *The Undercommons*. Wivenhoe: Minor Compositions.
- Hartnup, J. (1857) *On the Importance of Testing Chronometers Before they are Used at Sea*. Liverpool: T. Brakell.
- Harvey, D. (2003) 'The Fetish of Technology: Causes and Consequences.' *Macalester International*, 13 pp. 3–30.
- Haus der Kulturen der Welt (2016) *Anthropocene Observatory*. HKW. [Online] [Accessed on 10th January 2018]  
[https://www.hkw.de/en/programm/projekte/2014/anthropozaenobservatorium20132014/start\\_anthropozaen\\_observatorium\\_2013\\_2014.php](https://www.hkw.de/en/programm/projekte/2014/anthropozaenobservatorium20132014/start_anthropozaen_observatorium_2013_2014.php).
- Hayles, N. K. (1999) *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago, Ill: University of Chicago Press.

- Headrick, D. R. (2002) *When Information Came of Age: Technologies of Knowledge in the Age of Reason and Revolution, 1700-1850*. Oxford: Oxford University Press.
- Herf, J. (2008) *Reactionary Modernism: Technology, Culture, and Politics in Weimar and the Third Reich*. New Ed edition, Cambridge: Cambridge University Press.
- Higgitt, R. (2014) 'A British national observatory: the building of the New Physical Observatory at Greenwich, 1889–1898.' *The British Journal for the History of Science*, 47(4) pp. 609–635.
- Holmes, F., Olesko, K. and Wise, M. N. (1997) 'The Images of Precision: Helmholtz and the Graphical Method in Physiology.' *In The Values of Precision*. Princeton, N.J: Princeton University Press, pp. 198–221.
- Holmes, R. (2009) *The Age of Wonder: How the Romantic Generation Discovered the Beauty and Terror of Science*. first edition, London: Harper.
- Homes, C. (2009) 'The Astronomer Royal, the Hydrographer and the time ball: collaborations in time signalling 1850–1910.' *The British Journal for the History of Science*, 42(03) p. 381.
- Howse, D. (1980) *Greenwich time: and the discovery of the longitude*. Oxford: Oxford University Press.
- Huhtamo, E. and Parikka, J. (2011) *Media Archaeology: Approaches, Applications, and Implications*. Berkeley, Calif: University of California Press.
- Huysen, A. (2006) 'Nostalgia for Ruins.' *Grey Room*, April, pp. 6–21.
- Ishibashi, Y. (2014) 'In Pursuit of Accurate Timekeeping: Liverpool and Victorian Electrical Horology.' *Annals of Science*, 71(4) pp. 474–496.
- Jacobs, N. and Huck, J. (2017) 'Can We Give Ourselves Extra Senses: Exploring Sensory Augmentation.' *In Heywood, I. (ed.) Sensory Arts and Design*. London: Bloomsbury Academic, pp. 67–88.
- James Coupe Website* (n.d.). [Online] [Accessed on 3rd October 2017] <http://jamescoupe.com/?p=2339>.
- James, W. (1909) *A Pluralistic Universe*. New York: Longmans, Green, and Co.
- Jay, M. (1993) *Downcast Eyes*. Berkeley: University of California Press.
- Jeffery, C. (ed.) (2015) *The Artist as Curator*. Bristol, UK; Chicago: Intellect.
- Jones, C. A. and Galison, P. (eds) (1998) *Picturing Science, Producing Art*. London and New York: Routledge.
- Jonsson, K., Holmström, J. and Lyytinen, K. (2009) 'Turn to the material: Remote diagnostics systems and new forms of boundary-spanning.' *Information and Organization*, 19(4) pp. 233–252.
- Kanngieser, A. (2012) '... And ... and ... and ... The Transversal Politics of Performative Encounters.' *Deleuze Studies*, 6(2) pp. 265–290.

- Kern, S. (2003) *The Culture of Time and Space, 1880-1918*. Cambridge, Mass: Harvard University Press.
- Kervegan, J.-F. (2018) *The Actual and the Rational - Hegel and Objective Spirit*. Chicago: University of Chicago Press.
- Kester, G. H. (2004) *Conversation pieces: community and communication in modern art*. London: University of California Press.
- King, K. (1991) 'Bibliography and a Feminist Apparatus of Literary Production.' *TEXT 5: Transactions of the Society for Textual Scholarship* pp. 91–103.
- Kirby, V. (2011) *Quantum Anthropologies: Life at Large*. Durham, NC: Duke University Press.
- Knox, H. (2017) 'Affective Infrastructures and the Political Imagination.' *Public Culture*, 29(2 (82)) pp. 363–384.
- Knudsen, B. T. and Stage, C. (eds) (2015) *Affective Methodologies*. New York: Palgrave Macmillan.
- Koch, C. (2012) *Neuroscience: Observatories of the mind*. Nature. [Online] [Accessed on 10th January 2018] <https://www-nature-com.ezproxy.mmu.ac.uk/articles/483397a>.
- Kramer, A., Guillory, J. and Hancock, J. (2014) 'Experimental Evidence of Massive-Scale Emotional Contagion Through Social Networks.' *Proceedings of the National Academy of Sciences of the United States of America*, 111, June.
- Krauss, R. E. (1994) 'The Mind/Body Problem: Robert Morris in Series.' In *Robert Morris: The Mind/Body Problem*. New York: Guggenheim, pp. 2–17.
- Krysa, J. (ed.) (2006) *Curating Immateriality: The Work of the Curator in the Age of Network Systems*. Brooklyn, NY: Autonomedia.
- Kuhn, T. S. (1970) *The Structure of Scientific Revolutions*. 2nd edn, Chicago, IL: University of Chicago Press.
- Kuhn, T. S. (1979) *The Essential Tension: Selected Studies in Scientific Tradition and Change*. New edition edition, Chicago, Ill.: University of Chicago Press.
- Lambert, G. (2002) 'Deleuze and the "Dialectic" (a.k.a. Marx and Hegel).' *Strategies: Journal of Theory, Culture & Politics*, 15(1) pp. 73–83.
- Lambert-Beatty, C. (2009) 'Make-Believe: Parafiction and Plausibility.' *October*, 129, August, pp. 51–84.
- Lankford, J. (1981) 'Amateurs and Astrophysics: A Neglected Aspect in the Development of a Scientific Specialty.' *Social Studies of Science*, 11(3) pp. 275–303.
- Latour, B. (1986) 'Visualisation and Cognition: Drawing Things Together.' In Long, E. and Kuklick, H. (eds) *Knowledge and Society: Studies in the Sociology of Culture Past and Present: A Research Annual*. Elsevier Science Limited, pp. 1–40.

- Latour, B. (1988) *Science in Action: How to Follow Scientists and Engineers Through Society*. Harvard University Press.
- Latour, B. (2002) *Inconoclash - Beyond the Image Wars in Science, Religion and Art*. Cambridge, Mass.: MIT Press.
- Latour, B. (2016) *Reset Modernity - Fieldbook*. ZKM.
- Latour, B. and Weibel, P. (eds) (2005) *Making Things Public: Atmospheres of Democracy*. Cambridge, Mass.: MIT Press.
- Latour, B. and Woolgar, S. (1986) *Laboratory Life: The Construction of Scientific Facts*. 2nd ed. edition, Princeton, N.J: Princeton University Press.
- Lenoir, T. (ed.) (1998) *Inscribing science: scientific texts and the materiality of communication*. Stanford, Ca: Stanford University Press.
- Levi Strauss, D. (2005) *The Magic of the State: An Interview with Michael Taussig*. Cabinet. [Online] [Accessed on 18th January 2016] <http://cabinetmagazine.org/issues/18/strauss.php>.
- Leyris, R. (2017) 'Rentrée littéraire : le triomphe de l'exofiction.' [Online] 16th August. [Accessed on 16th January 2018] [https://www.lemonde.fr/livres/article/2017/08/16/le-triomphe-de-l-exofiction\\_5173067\\_3260.html](https://www.lemonde.fr/livres/article/2017/08/16/le-triomphe-de-l-exofiction_5173067_3260.html).
- List Of Observatory Codes* (n.d.). [Online] [Accessed on 8th January 2018] <https://www.minorplanetcenter.net/iau/lists/ObsCodesF.html>.
- Liverpool Observatory and Tidal Institute Annual Report* (1940). Liverpool: C. Tinling and Co.
- Living lab* (2018) Wikipedia. [Online] [Accessed on 5th October 2018] [https://en.wikipedia.org/w/index.php?title=Living\\_lab&oldid=818577932](https://en.wikipedia.org/w/index.php?title=Living_lab&oldid=818577932).
- Long, P. (2012) *Artisan/Practitioners and the Rise of the New Sciences, 1400-1600*. Corvallis, OR: Oregon State University Press.
- Looze, L. de (2016) *The Letter and the Cosmos: How the Alphabet Has Shaped the Western View of the World*. Toronto: University of Toronto Press.
- Ludovico, A. (2012) *Post-Digital Print: The Mutation of Publishing Since 1894*. Eindhoven: Onomatopee.
- Lyotard, J.-F. (1989) *Differend: Phrases in Dispute*. Minneapolis: University Of Minnesota Press.
- Macdonald, L. T. (2015) 'Making Kew Observatory: the Royal Society, the British Association and the politics of early Victorian science.' *The British Journal for the History of Science*, 48(03) pp. 409–433.
- Macey, S. L. (1979) *Clocks and the Cosmos: Time in Western Life and Thought*. Hamden, Conn: Archon Books.
- Malabou, C. (2011) *Changing Difference. The Feminine and the Question of Philosophy*. Cambridge: Polity Press.

- Malafouris, L. (2014) 'Creative Thinging.' *Creativity, Cognition and Material Culture*, 22(1).
- Malik, S., Cox, C. and Jaskey, J. (eds) (2015) *Realism Materialism Art*. Sternberg Press.
- Malnar, J. M. (2004) *Sensory Design*. Minneapolis: University of Minnesota Press.
- Man, P. D. (1986) *The Resistance to Theory*. University of Minnesota.
- Mandelbrot, B. B. (1982) *The Fractal Geometry of Nature*. San Francisco: W.H.Freeman & Co.
- Manovich, L. (2002) *The Language of New Media*. Cambridge, Mass.: MIT Press.
- McGann, J. J. (1991) *The Textual Condition*. Princeton, N.J: Princeton University Press.
- McLuhan, M. (1964) *Understanding Media: The Extensions of Man*. New York: McGraw Hill.
- Miller, A. I. (2014) *Colliding Worlds: How Cutting-edge Science is Redefining Contemporary Art*. New York: W. W. Norton & Company.
- Miller, J. (2013) 'Halt called to London tracking bins.' *Technology*. [Online] 12th August. [Accessed on 22nd July 2017] <https://www.bbc.com/news/technology-23665490>.
- 'MIT Living Lab' (n.d.). [Online] [Accessed on 6th January 2017] <http://livinglab.mit.edu/>.
- MIT Senseable City Lab* (n.d.) MIT Senseable City Lab. [Online] [Accessed on 29th July 2017] <http://senseable.mit.edu>.
- Monton, B. and Mohler, C. (2017) *Constructive Empiricism*. The Stanford Encyclopedia of Philosophy. [Online] [Accessed on 5th September 2016] <https://plato.stanford.edu/archives/sum2017/entries/constructive-empiricism/>.
- Moore, N., Salter, A., Stanley, L. and Tamboukou, M. (2016) *The Archive Project: Archival Research in the Social Sciences*. London: Routledge.
- Morozov, E. (2014) *To Save Everything, Click Here: Technology, Solutionism, and the Urge to Fix Problems that Don't Exist*. Penguin.
- Morrisson, M. S. (2016) *Modernism, Science, and Technology*. London: Bloomsbury Academic.
- Naegele, D. (2006) 'Duchamp's Doors and Windows.' *34th Annual European Studies Conference Proceedings*, January.
- Natale, S. (2012) 'Understanding Media Archaeology.' *Canadian Journal of Communication*, 37(3).
- Nightmare: The Birth of Victorian Horror* (1996) Directed by C. Frayling. [Film] BBC.
- nikolic, mirko (2017) *minoritarian ecologies: performance before a more-than-human world*. doctoral. University of Westminster.



- Nissenbaum, H. and Brunton, F. (2016) *Obfuscation - A User's Guide for Privacy and Protest*. Cambridge, Mass.: MIT Press.
- ob- | *Online Etymology Dictionary* (n.d.). [Online] [Accessed on 24th January 2017] <https://www.etymonline.com/word/ob->.
- 'Observatory Committee Minute Book: 1836 – 1856.' (n.d.).
- OLF (n.d.) OLF. [Online] [Accessed on 29th January 2018] <http://olf.alab.space/>.
- Olson, G. A. (1990) 'Jacques Derrida on Rhetoric and Composition: A Conversation.' *Journal of Advanced Composition*, 10(1) pp. 1–21.
- O'Neill, P. (2012) *The culture of curating and the curating of culture(s)*. London: MIT Press.
- O'Reilly, T. (2015) #SocialCivics and the architecture of participation. O'Reilly Radar. [Online] [Accessed on 29th May 2018] <http://radar.oreilly.com/2015/03/socialcivics-and-the-architecture-of-participation.html>.
- Parente, A. and Velho, L. (2008) 'A cybernetic observatory based on panoramic vision.' *Technoetic Arts: A Journal of Speculative Research*, 6(1) pp. 79–98.
- Parikka, J. (2012a) *What is Media Archaeology?* 1 edition, Polity Press.
- Parikka, J. (2012b) 'What is Media Archaeology?' *Machinology*. 8th May. [Online] [Accessed on 24th August 2017] <https://jussiparikka.net/2012/05/08/what-is-media-archaeology-out-now/>.
- Penney, J. (2016) *Chilling Effects: Online Surveillance and Wikipedia Use*. Rochester, NY: Social Science Research Network.
- Pentland, A. (2014) *Social Physics: How Good Ideas Spread--The Lessons from a New Science*. New York: Penguin Press.
- Philipsz, S. (2009) *You Are Not Alone*. Modern Art Oxford.
- Pickering, A. (1995) *The Mangle of Practice*. Chicago: University of Chicago Press.
- Pippin, R. B. (2001) 'Hegel and Institutional Rationality.' *The Southern Journal of Philosophy*, 39(S1) pp. 1–25.
- Poggioli, R. (1981) *The Theory of the Avant-garde*. Cambridge, Mass.: Harvard University Press.
- Pomata, G. (2011) 'Observation Rising: Birth of an Epistemic Genre.' In Daston, L. and Elizabeth Lunbeck (eds) *Histories of Scientific Observation*. Chicago: University of Chicago Press, pp. 45–80.
- Pomata, G. and Siraisi, N. G. (eds) (2005) *Historia: Empiricism and Erudition in Early Modern Europe*. Cambridge, Mass: MIT Press.
- Popper, K. (1959) *The Logic of Scientific Discovery*. New York: Basic Books.
- Powles, J. and Hodson, H. (2017) 'Google DeepMind and healthcare in an age of algorithms.' *Health and Technology*, 7(4) pp. 351–367.

- Rancière, J. (2015) *Dissensus*. London: Bloomsbury Academic.
- Ratti, C. and Claudel, M. (2016) *The City of Tomorrow: Sensors, Networks, Hackers, and the Future of Urban Life*. New Haven: Yale University Press.
- Report of the Council of the Royal Astronomical Society, 1845, cited in Correspondence respecting the Liverpool Observatory between Mr. John Taylor and the Rev. R. Sheepshanks* (1845). London: George Barclay,.
- Rheinberger, H.-J. (1997) *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube*. Stanford: Stanford University Press.
- Richards, T. (1993) *The Imperial Archive: Knowledge and the Fantasy of Empire*. London: Verso.
- Richardson, J. (2017) 'Black organs and optics: gazing at viscera in the work of Doreen Garner.' *Women & Performance: a journal of feminist theory*, 27(1) pp. 81–95.
- Rick Dolphijn - The Cracks of the Contemporary VI: The Wound* (2017) Directed by S. Acts.
- Robinson, A. (2015) 'Alain Badiou: Truth, Subjectivity, and Fidelity.' *Ceasefire Magazine*. 20th January. [Online] [Accessed on 6th January 2017] <https://ceasefiremagazine.co.uk/alain-badiou-truth-subjectivity-fidelity/>.
- Rosenkrantz, K. (2005) 'Celestial Navigation.' *Science Scope*, 29(1) p. 30.
- Rush, M. (2005) *New Media in Art*. London: Thames and Hudson Ltd.
- Sassen, S. (2011) *Open Source Urbanism*. Domus. [Online] [Accessed on 21st February 2017] <https://www.domusweb.it/en/opinion/2011/06/29/open-source-urbanism.html>.
- Sayili, A. (1960) *The observatory in Islam and its place in the general history of the observatory*. Ankara: Turk Tarih Kurumu Basimevi.
- Schaffer, S. (1998a) 'On Astronomical Drawing.' In Jones, C. A. and Galison, P. (eds) *Picturing Science, Producing Art*. London and New York: Routledge, pp. 441–474.
- Schaffer, S. (1998b) 'The Leviathan of Parsonstown: Literary Technology and Scientific Representation.' In Lenoir, T. (ed.) *Inscribing science: scientific texts and the materiality of communication*. Stanford, Ca: Stanford University Press, pp. 182–222.
- Schaffer, S. (2010) 'Keeping the Books at Paramatta Observatory.' In Aubin, D., Bigg, C., and Sibum, H. O. (eds) *The Heavens on Earth: Observatories and Astronomy in Nineteenth-Century Science and Culture*. Durham NC: Duke University Press, pp. 118–147.
- Schickore, J. (2007) *The Microscope and the Eye: A History of Reflections, 1740-1870*. Chicago: University of Chicago Press.
- Schinckus, C. (2017) 'From Cubist Simultaneity to Quantum Complementarity.' *Foundations of Science*, 22(4) pp. 709–716.
- Schofield, J. (2006) *Bidston Observatory: The Place and the People*. Birkenhead: Countywise Ltd.

- ‘Science and Art at Ladd Observatory’ (2013) Rhode Island Monthly. 17th June. [Online] [Accessed on 20th December 2016] <http://www.rimonthly.com/science-and-art-at-ladd-observatory/>.
- Scott, G., Vijayan, R. and Male, P. (2011) ‘Relevance of the expression “obs stable” in nursing observations: retrospective study.’ *BMJ*, 343, December, p. d7504.
- Sekula, A. (1986) ‘The Body and the Archive.’ *October*, 39 pp. 3–64.
- Serres, M. (1982) ‘Mathematics and Philosophy: What Thales Saw...’ In Harari, J. V. and Bell, D. F. (eds) *Hermes - Literature, Science, Philosophy*. Baltimore: Johns Hopkins University Press, pp. 84–97.
- Serres, M. (1995a) *Genesis*. Michigan: University of Michigan Press.
- Serres, M. (1995b) ‘Gnomon: The beginnings of geometry in Greece.’ In Serres, M. (ed.) *A History of Scientific Thought: Elements of a History of Science*. Oxford: Wiley-Blackwell.
- Shantz, J. and Tomblin, J. (2014) *Cyber Disobedience*. London: Zero Books.
- Shapere, D. (1982) ‘The Concept of Observation in Science and Philosophy.’ *Philosophy of Science*, 49(4) pp. 485–525.
- Shapin, S. and Schaffer, S. (2011) *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. 2nd ed., Princeton, N.J: Princeton University Press.
- Shapiro, B. J. (1999) *A Culture of Fact: England, 1550-1720*. Ithaca: Cornell University Press.
- Shaver, B. (2017) *A Zero-Math Introduction to Markov Chain Monte Carlo Methods*. Towards Data Science. [Online] [Accessed on 18th October 2018] <https://towardsdatascience.com/a-zero-math-introduction-to-markov-chain-monte-carlo-methods-dcba889e0c50>.
- Shaw, J. (2016) *The Watchers*. Harvard Magazine. [Online] [Accessed on 16th January 2017] <https://harvardmagazine.com/2017/01/the-watchers>.
- Skinner, S. and Jones, N. (2017) ‘Absorbing Text: Rereading Speed Reading.’ Andersen, C. U. and Cox, G. (eds) *APRJA*, 6(1).
- Smith, P. H. (2004) *The Body of the Artisan: Art and Experience in the Scientific Revolution*. Chicago: University of Chicago Press.
- Smith, T. (2012) *Thinking Contemporary Curating*. New York, NY: Independent Curators Inc.
- Snow, C. P. (1961) *The Two Cultures*. London: Cambridge University Press.
- Solon, O. (2018) ‘Amazon patents wristband that tracks warehouse workers’ movements.’ *The Guardian*. [Online] 1st February. [Accessed on 15th March 2018] <https://www.theguardian.com/technology/2018/jan/31/amazon-warehouse-wristband-tracking>.
- Srnicek, N. (2016) *Platform Capitalism*. Cambridge, UK: Polity Press.

Stafford, B. M., Terpak, F. and Poggi, I. (2001) *Devices of Wonder: From the World in a Box to Images on a Screen*. Los Angeles, CA: Getty Publications.

Stephens, C. (1989) “‘The Most Reliable Time’”: William Bond, the New England Railroads, and Time Awareness in 19th-Century America.’ *Technology and Culture*, 30(1) p. 1.

Storrie, R. (2012) *Embryo of a Port 1715*. [Online] [Accessed on 1st July 2015] <http://web.archive.org/web/20121011230106/http://www.btinternet.com/~m.royden/mrlhp/students/port/embryoofport.htm>.

Suchman, L. A. (2007) *Human-Machine Reconfigurations: Plans and Situated Actions*. 2nd Edition, Cambridge: Cambridge University Press.

Tate (n.d.) *Artist-curator – Art Term*. Tate. [Online] [Accessed on 17th January 2017] <http://www.tate.org.uk/art/art-terms/a/artist-curator>.

Testa, P. (2016) ‘Italian Smart Cities from the ANCI’s National Observatory standpoint.’ *TECHNE - Journal of Technology for Architecture and Environment*, 0(11) pp. 40–44.

‘The Liverpool Observatory’ (1849) *Chamber’s Edinburgh Journal* pp. 265–266.

Thompson, E. P. (1967) ‘Time, Work-Discipline, and Industrial Capitalism.’ *Past & Present*, (38) pp. 56–97.

Thompson, I. (ed.) (1896) *Excursion Guide: British Association, Liverpool*.

Thompson, J. (1984) *Studies in the Theory of Ideology*. Cambridge: Polity.

Toscano, A. (2012) ‘Seeing it Whole: Staging Totality in Social Theory and Art.’ *The Sociological Review*, 60(1\_suppl) pp. 64–83.

Travis, A. (2016) ‘UK security agencies unlawfully collected data for 17 years, court rules.’ *The Guardian*. World news. [Online] 17th October. [Accessed on 16th January 2017] <https://www.theguardian.com/world/2016/oct/17/uk-security-agencies-unlawfully-collected-data-for-decade>.

Turnbull, D. (2000) *Masons, Tricksters and Cartographers: Comparative Studies in the Sociology of Scientific and Indigenous Knowledge*. Psychology Press.

Urry, J. (2007) *Mobilities*. Cambridge: Polity.

Virilio, P. (2006) *Speed and Politics*. Los Angeles, CA: Semiotext(e).

Vlahakis, G. and et al (eds) (2006) *Imperialism and Science: Social Impact and Interaction*. Santa Barbara, California: ABC-CLIO.

Wacks, R. (2015) *Privacy: An Introduction*. Second Edition, New to this Edition:, Oxford, New York: Oxford University Press.

Waldman, D. (1975) *Max Ernst - A Retrospective*. New York: Solomon R. Guggenheim Foundation.

Wardrip-Fruin, N. (2003) *The New Media Reader*. Cambridge, Mass: MIT Press.

Wark, M. (2015) 'Cognitive Mapping.' Public Seminar. 1st May. [Online] [Accessed on 18th January 2017] <http://www.publicseminar.org/2015/05/cognitive-mapping/>.

Wellbery, D. (1992) 'Introduction.' In *Discourse Networks, 1800/1900*. Reprint edition, Stanford, Calif: Stanford University Press.

Westin, A. F. (1967) *Privacy and Freedom*. New York: Atheneum.

Wiener, N. (1961) *Cybernetics Or Control and Communication in the Animal and the Machine*. MIT Press.

Wilson, S. (2012) *Art + Science Now*. London: Thames & Hudson.

Winters, Y. (1937) *Primitivism and Decadence: A study of American Experimental Poetry*. New York: Arrow Editions.

Wolfschmidt, G. (2015) "'Route of astronomical observatories" project: Classical observatories from the Renaissance to the rise of astrophysics.' *Proceedings of the International Astronomical Union*, 11(A29A) pp. 124–128.

[www.gauthier.info](http://www.gauthier.info) (2018). [Online] [Accessed on 8th March 2018] <http://gauthier.info/533201N0032129W-from-the-Sea/>.

Zaleski, S. (2012) *Neoliberalism and Civil Society - English Summary*. Torun: Wydawnictwo Uniwersytetu Mikołaja Kopernika.

Zeigler, B. P., Praehofer, H. and Kim, T. G. (2000) '3.3.2 Feedback in continuous systems.' In *Theory of Modeling and Simulation: Integrating Discrete Event and Continuous Complex Dynamic Systems*. Academic Press.

Zuboff, S. (2019) *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. London: Profile Books.

# Appendix

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- 1.4 Reference letter from Roger McKinley, Research Manager at FACT
- 1.5 *Obs* publication



***An exhibition  
reimagining how  
we measure,  
predict, and sense  
the world today.***

**The New  
Observatory**

**22 June - 1 October 2017**



## Artists

Burak Arikan, Wafaa Bilal, Natasha Caruana, James Coupe, Phil Coy, Citizen Sense, Julie Freeman, David Gauthier, Interaction Research Studio, Rachel Jacobs, Jackie Karuti, Kei Kreutler and Libre Space Foundation, Liz Orton, Proboscis (Giles Lane and Stefan Kueppers), Evan Roth, Stanza, Thomson & Craighead, Jeronimo Voss (also with Radamés Ajna), Yu-Chen Wang

## Curators

Hannah Redler Hawes (ODI) and Sam Skinner (Manchester Metropolitan University and FACT)

## Exhibition Design

Ab Rogers Design

The New Observatory is co-produced by FACT and the Open Data Institute (ODI).

## Statutory Funders



## Exhibition supporters



## Commissioning Partners



## Material Sponsors



## Transportation Partner



Works commissioned by the Open Data Institute as part of the Data as Culture programme were supported using public funding by the National Lottery through Arts Council England.

# The New Observatory

22 June - 1 October 2017

*The New Observatory* transforms FACT into an observatory for the 21st century, bringing together an international group of artists exploring new and alternative modes of measuring, predicting, and sensing the world.

Humans have always used tools to observe, but now technology alters our perceptions more than ever. Today we are all connected to ever-growing systems of data. Corporations, governments, machines and individuals are constantly tracking and interpreting the smallest details of our lives.

Artists in *The New Observatory* create instruments, or use data, to measure the world differently. They conjure new and untold stories, from the personal to the political, micro to macro. They collectively challenge assumptions and standardisation, investigating the moments when logic fails and how that failure might create new possibilities.

Artworks reflect upon how powerful observational tools, once the preserve of scientists, are now part of everyday life. Liverpool has its own unique history of observation. The Liverpool and Bidston Observatories, active from 1845 and 1867, monitored natural phenomena from the stars to the tides, and created their own bespoke scientific instruments. The exhibition engages with this history and spirit, reimagining what an observatory, and observation, can be.

Many of the artworks in the exhibition are the result of unusual data gathering expeditions. Phil Coy visited ancient copper mines in Ireland, Natasha Caruana trawled coastal towns and pawn shops across the UK, and David Gauthier travelled out to sea to film a Waverider buoy in Liverpool Bay. Other artists collaborate with, or create, new communities of observation. Julie Freeman works with a colony of naked mole rats and Kei Kreutler and Libre Space Foundation invite us to become amateur astronomers.

The exhibition suggests we are becoming 'observatories of ourselves' and considers the roles of analysis, understanding, and imagination in this process. *The New Observatory* stands as an open call for everyone to become actively involved in responding to our complex, contemporary relationship with data. It offers a space to reassess our roles as active citizens within a 'surveillance' culture, and to forge more critical, creative relationships with the data landscapes we inhabit.

**James Coupe  
(UK/US)**

***A Machine for Living, 2017***

Multimedia installation.

Dimensions variable.

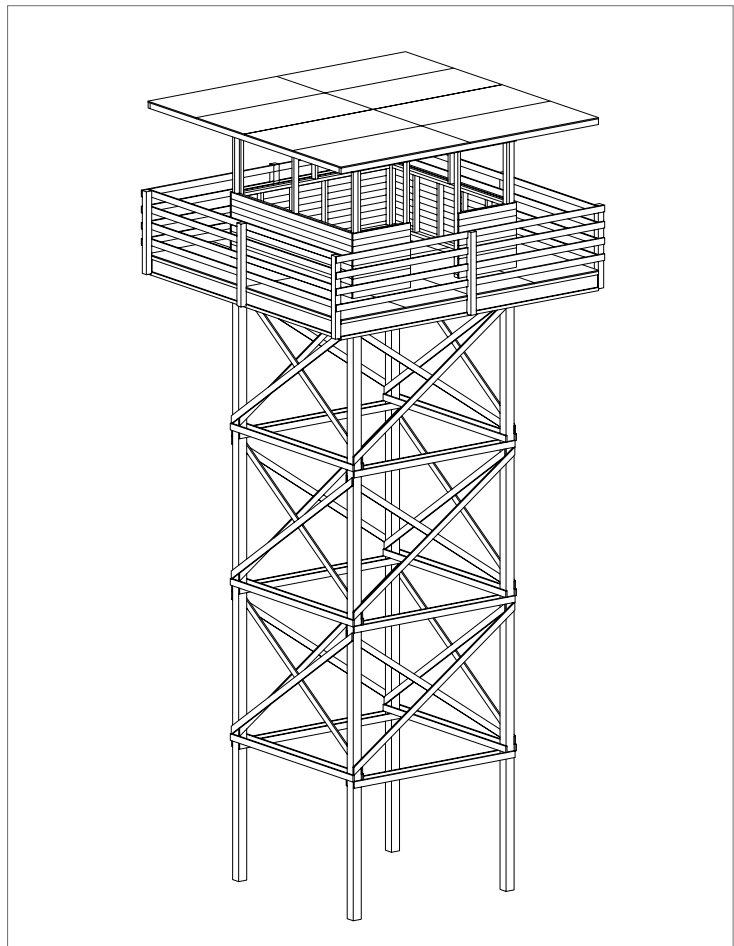
James Coupe examines the power and meaning of surveillance in our everyday life. His four-storey wooden watchtower, *A Machine for Living*, in the main foyer at FACT, is occupied by computers, algorithms and online labourers, working together to make human experience something which computers can begin to understand.

Through a modular network of screens, the watchtower embeds the living rooms, bedrooms and workplaces of hundreds of crowd-workers into its structure. The installation's surveilling (and surveilled) agents are members of mTurk (or Mechanical Turk). This on-demand scalable workforce, or crowdsourcing Internet 'marketplace' enables individuals and businesses to employ workers remotely to do tasks that computers are currently unable to. These crowd-workers complete tasks that require them to reflect, document, dream, plan, and consume all forms of observation - illustrating a very human approach to what we normally consider a machinic, computer-led, process.

Through the crowdsourcing of these tasks to an 'unseen' workforce, surveillance today is revealed as something bi-directional and dispersed. By bringing the normally outdoor watchtower structure into a gallery context, the work creates a strange kind of monument to observation and in an act of subversion, grants us a rare opportunity to consider who is watching whom.

Courtesy the artist. Commissioned by FACT with support from DXARTS (University of Washington), and American Hardwood Export Council.

James Coupe, *A Machine for Living*, 2017. Image courtesy of the artist and FACT.



## Citizen Sense (UK)

### **Frackbox, 2014-2016**

Converted mailbox; electronics; sensing equipment. Dimensions: 48 x 15 x 28cm.

### **Dustbox, 2016-2017**

Ceramic structure; electronics; sensing equipment. Dimensions: 15cm diameter.

Sensors are a vital part of environmental monitoring within scientific study. The *Citizen Sense* project democratises these technologies through instruments for mass observation, enabling engagement with environmental issues, both locally and further afield.

*Frackbox* was designed to be covertly placed at the intersections between Pennsylvanian citizens' homes and nearby fracking sites in the United States. These structures (which at first glance appear to be the standard road-side US mailbox) contain a kit which monitors air pollutants and volatile organic compounds. Members of the Pennsylvanian community, working with the kits in 2014, were able to collect enough evidence to unlock an additional \$1.6 million of state funding towards further environmental monitoring.

The *Dustboxes* are a series of low-tech air pollution data collectors, housed in a ceramic case resembling an air pollutant particle. Residents of Deptford in London were able to borrow these devices for free from their local library to measure air pollution in their own areas. Each *Dustbox* streamed real-time data to an online platform, available for all to view at: [citizensense.net](http://citizensense.net)

Courtesy the artist. Citizen Sense is a research and practice group based at Goldsmiths, University of London. Citizen Sense is led by Jennifer Gabrys, working in collaboration with Helen Pritchard and Lara Houston, along with community members, creative practitioners and scientific consultants. Citizen Sense is currently funded by the European Research Council (ERC).

Citizen Sense, *Dustbox*, 2016. Image courtesy the artist.



## Interaction Research Studio (UK)

### **Datacatcher, 2015**

Selective laser sintered nylon;  
bespoke electronics and data  
sources. Dimensions variable.

The Interaction Research Studio at Goldsmiths University, London create prototypes of deliberately open-ended objects designed to elicit strong feelings and memories as well as providing more functional uses.

The *Datacatcher* is a brightly coloured handheld device, reminiscent of a flashlight. It has been designed to help build relationships between people's experiences of data and their surroundings. Originally designed as a mobile device, the *Datacatcher* displays short snippets of thought-provoking socio-political data related to the area into which it is taken. Messages include factual information, such as typical income, education levels, and the number of pubs or GP surgeries nearby. Turning the control dial shows previous messages, or proposes more provocative or tongue-in-cheek questions such as "what can you hear?" or "how does it smell here?"

Using this device, people are able to build a multi-layered picture of their local environment that is data-rich and multi-sensory. Some of the sources of data include the Office for National Statistics, Fix My Street, Twitter, Wikipedia, Yahoo Finance and Zoopla.

Courtesy the artist. Additional data supplied by the following sources: The Environment Agency, Department of Energy and Climate Change, The Police, Experian Mosaic, Open Data Communities, Weather Underground and They Work For You. *Datacatcher* is part of a five year project funded by the European Research Council (ERC) conducted by a group of researchers based in the Interaction Research Studio at Goldsmiths, University of London.

Interaction Research Studio, *Datacatcher*, 2015. Image courtesy the artist.



**Rachel Jacobs  
(UK)**

***The Prediction Machine,*  
2015 - ongoing**

Sustainable oak; steel; aluminium;  
printer; LCD screen; speakers;  
laptop; cables; adaptors;  
generator; bicycle chain and gears;  
iPad. Dimensions: 145 x 32 x 46cm.

***The Promises Machine,*  
2015 - ongoing**

Sustainable oak; steel; cables; iPad.  
Dimensions: 135 x 32 x 40cm.

Rachel Jacobs' work merges art, environmental science and technology through cross disciplinary collaboration, exploring how to 'perform' scientific data.

*The Prediction Machine* is an interactive artwork based on Victorian-era fortune telling machines, hand-powered via a dynamo, and connected to a weather station and a live data feed. The work invites us to become immersed in the act of using an instrument, generating data, and observing the changing weather. The machine predicts 'moments of climate change' that we might experience in the future – from snow on a summer's day to three months of drought. Predictions are presented as short video messages from the future. The experience concludes with a printout of a 'climate fortune' we can take away and keep.

*The Promises Machine* presents a scientific explanation of the projected climate data, informing how *The Prediction Machine* makes predictions, and reveals a graph depicting 100 years of minimum and maximum temperatures for the local area. We are invited to write and submit our own promise or wish for the future, in response, and sign up to receive regular updates about our prediction and how close it might be to coming true.

Courtesy the artist. The short videos, or Predictions were produced in collaboration with members of FACT's Digital Ambassadors Group.

Rachel Jacobs, *The Prediction Machine*. Image by Julian Hughes.



**Jeronimo Voss (DE),  
with Radamés Ajna (BR)**

***Applicate Against Time*,  
2017**

Multimedia installation.  
Dimensions variable.

Voss is interested in the narrative qualities of time-based media, and how science, time and history are constructed. Ajna is a multimedia artist exploring how machines affect our social interactions. *Applicate Against Time* explores the observing and management of time within contexts of precarious work.

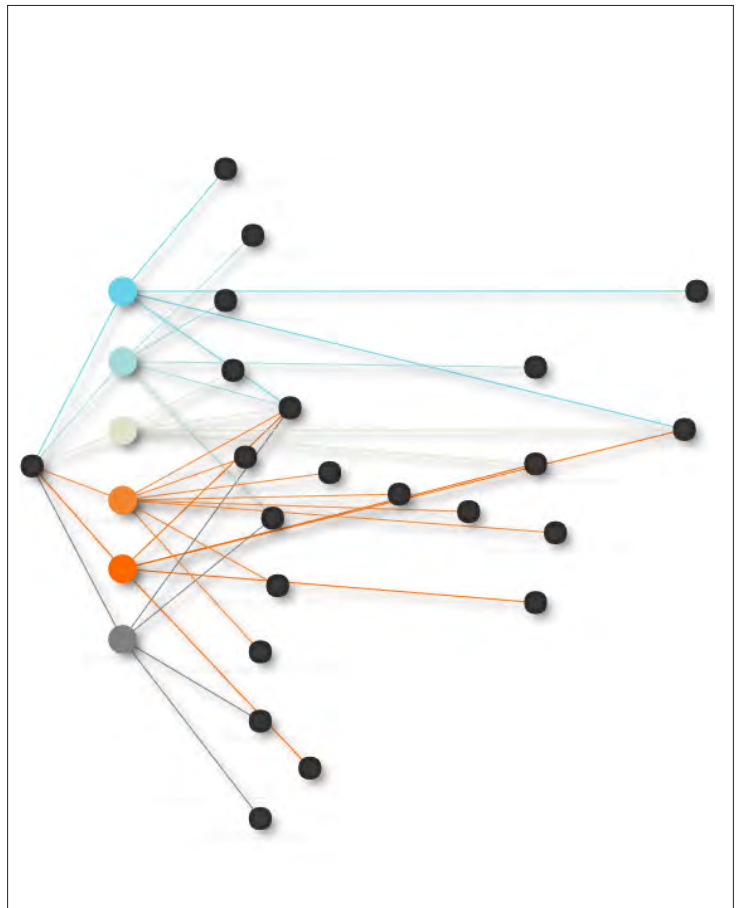
The project brings together living room furniture, media displays and open-source, time-management software. The 'NIKA.app' was created in collaboration with software engineer and media artist Radamés Ajna, during a residency at FACTLab, for use in the communal Nika.haus housing collective in Frankfurt, of which Voss is a member. A video montage combines promotional trailers for existing time management software with footage taken from the app. The project explores how time management tools (used predominantly in a commercial context) may be built and used for more socially responsible ends, such as the smooth running of a housing cooperative.

The furniture design is inspired by experiments in utopian modular living, in particular Ken Isaac's *Super Chair* (1974), and Stafford Beer's and Gui Bonsiepe's *Cybersyn Operations Room* (1971).

Download the app here: <https://github.com/radames/NIKAapp>

Courtesy the artist. A new commission for FACT supported by ifa (Institut für Auslandsbeziehungen).

Jeronimo Voss in collaboration with Radamés Ajna, *Applicate Against Time*, 2017.  
Image courtesy of the artist.



**Yu-Chen Wang**  
(TW/UK)

***I wish to communicate with you,***  
**2017**

Drawing on paper, flags, iPad and website. Dimensions variable.

Yu-Chen Wang's central practice is narrative-led drawing. Her visual stories blur the boundaries between fact and fiction, nature and culture, past and future. *I wish to communicate with you* maps the different sites and technologies relating to the old Liverpool and Bidston Observatories, linking them to their current legacies such as the National Oceanographic Centre at Liverpool University. Wang's unique style of drawing renders a network of places, communities, and instruments as a vast evolving assemblage. Flags, installed by the artist at FACT and atop the Bidston Lighthouse and Bidston Observatory, depict her own designs for reworking traditional semaphore signals for the 21st century.

Wang's flags echo the 18th century merchant's signalling system used to mark the arrival of their vessels, reawakening Bidston's 200 year history as a site of flag-based communication. Local lore tells of sailor's wives watching for the hoisting of flags, to mark when their loved ones might return safely home.

Courtesy the artist. A new commission for FACT supported by Ministry of Culture (Taiwan) and using public funding by the National Lottery through Arts Council England.

Wang will also be in residency at Metal, Edge Hill for two months during the exhibition, developing an accompanying film project which will be screened at FACT, and delivering observational drawing workshops at FACT.





**Evan Roth  
(US/FR)**

[http://  
s33.820180e151.184813  
.com.au](http://s33.820180e151.184813.com.au), 2016

Network located video.  
Dimensions variable.

US artist Evan Roth applies a hacker philosophy to an art practice that visualises transient moments in public space, online and in popular culture.

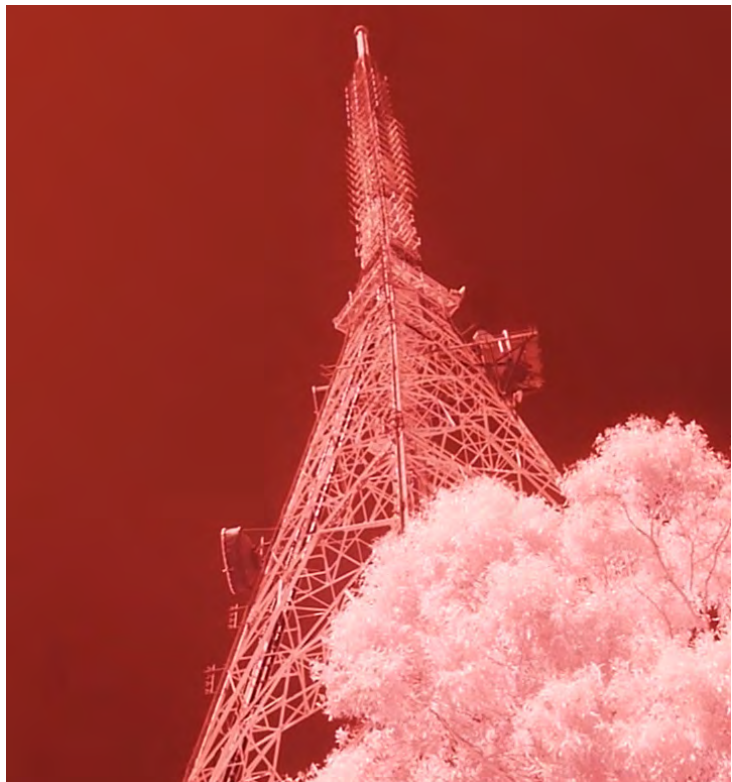
The focus of Roth's *Internet Landscapes* series are the points at which the Transatlantic fibre-optic cables that carry the Internet emerge from the ocean. For these works, Roth ventures out into the landscape that physically hosts the Internet, in a personal quest to visualise and reconnect with a web which gradually feels more and more centralised and controlled.

The image depicted in the gallery is a radio tower in Australia, captured in infrared and streamed to a web page. The accompanying sound consists of field recordings taken at the same location, along with sonic elements of the artist's own bio-data (his heartbeat, for example). In order for the video to reach the viewer's browser, it is converted into infrared laser light which passes through the same physical location depicted in the video.

Presented here is a radio tower in Australia, it's size dictated by the invisible radio waves it is designed to transmit, affording a rare glimpse into that spectrum. Highlighting the inseparable relationship between the digital and the physical, Roth challenges the ways in which we approach online data. Through understanding and experiencing the Internet's physicality, one comes to understand the network not as a mythical cloud, but as a human made and controlled system of wires and computers.

Courtesy the artist and Carroll / Fletcher.

Evan Roth, <http://s33.820180e151.184813.com.au>, 2016.  
Image courtesy the Artist and Carroll / Fletcher.



**David Gauthier**  
**(CA/NL)**

***Measure for Measure for Measure, 2017***

Video with sound, approx. 3 mins;  
tide-gauge hut; mixed media.  
Dimensions variable.

***53°32'.01N, 003°21'.29W,  
from the Sea, 2017***

Video with sound, approx. 15 mins;  
Hantarex monitors; Waverider  
buoy. Dimensions variable.

David Gauthier likes to mangle concepts, objects, languages, and disciplines. His work questions the ways in which meaning is ascribed to things and processes, particularly those which seem complicated and hard to understand.

*Measure for Measure for Measure* consists of a tide gauge hut in which the measurements produced by a tide measuring station (situated on the Liverpool docks) are read aloud. The project reflects the deep connection Liverpool has with the sea, and foregrounds how instruments related to the science of measurement (metrology) affect our understanding of the natural world.

Inspired by the work of painter J.M.W. Turner, *53°32'.01N, 003°21'.29W, from the Sea* foregrounds the elements lost in data depictions: the natural forces of the world. This audio-visual installation uses data transmitted from a Waverider buoy deployed in Liverpool bay (at the title coordinates) to create various outputs: a motion-corrected film of the buoy at sea, and a static representation of the data it is gathering and streaming online. Through a display of both the vigour of the sea in the first video, and the stillness of its numerical representation in the second, the piece draws a sharp contrast between the buoy and its data. It is almost as if the dynamics of the buoy's physical context come to be neutralised by the stillness of its corresponding data representation.

Courtesy the artist. A new commission for FACT with support from Canada Council for the Arts and EU COST Action IS1307. Produced during a residency at the National Oceanographic Centre, University of Liverpool, previously Bidston Observatory. With additional support from Datawell BV.

The Waverider buoy, first released in 1968, is capable of measuring very accurately wave height, wave direction, wave period, sea surface temperature and surface current, with data stored inside the buoy and transmitted via radio and/or satellite or GSM link.

David Gauthier, *53°32'.01N, 003°21'.29W, from the Sea, 2017*. Image courtesy the artist.



**Wafaa Bilal  
(IRQ/US)**

**168:01, 2016 - ongoing**

500 blank books; shelving; wishlist.  
Dimensions variable.

Bilal's work is informed by the experience of fleeing his homeland of Iraq to the US, and existing simultaneously in two worlds. His provocative online performances and interactive works transform traditionally passive art experiences into active participation. *168:01* is a physical and intellectual embodiment of how online information networks can be reconfigured to more political and personal ends.

During the invasion of Iraq in 2003, the College of Fine Arts at the University of Baghdad lost their entire library of over 70,000 books. *168:01* serves both as a means to measure this staggering cultural loss and as a platform for its potential repair. The artist asks local and global audiences to help transform this destruction into a fresh start for Iraq's next generation, by purchasing books from a wishlist compiled by the faculty.

As the installation accrues donations, volunteers replace the blank books with new texts during weekly performances. In doing so, the library's shelves become saturated with knowledge and vibrancy and the structure becomes a 1:1 scale data visualisation of its own repair, and the success of the campaign. Select donors receive the blank exhibition books in return for their contribution and as a symbol of the void they have helped to rectify. At the end of the exhibition, all donated texts will be shipped to Baghdad.

To find out more, and how to donate, please visit [fact.co.uk/16801](http://fact.co.uk/16801)

Courtesy the artist and The Art Gallery of Windsor. The Liverpool iteration of *168:01* by Wafaa Bilal is co-produced by Liverpool Arab Arts Festival and FACT. Transportation partner: Jayhawk.

Wafaa Bilal, *168:01*, 2016 - ongoing. Image courtesy the artist.



## Proboscis (UK)

### *Lifestreams*, 2012

3D printed digital artefacts generated from bio-sensor data; video with sound, 7.57 mins; infographic print.

How do we know what we know? And how do we make meaning from this? The artist collective Proboscis are interested in ways to create manifestations and experiences of data that are multisensory, and that go beyond traditional screen-based visualisations.

Their project *Lifestreams* proposes a method for capturing and storing unique personal health data that is memorable, magical and private. Beautiful seashell-shaped 3D-printed forms embody step count, sleep patterns, blood pressure, stress factors and pulse rate: materialised in the shells as rotation, length, scaling, growth disturbance and surface pattern. The resultant objects transform cold data into intimate, tactile *Lifecharms*, that might serve new forms of interaction between doctor and patient for example. Anyone can make meaning from them but their data remains private.

Accompanying the installation is a video demonstrating the development of the shells from private datasets, as well as an image explaining how the data is made physical. Also shown are several larger scale versions of the shells, 3D-printed in FACTLab to allow visitors to get a sense of the textural nature of the original objects. Please feel free to touch these versions.

Courtesy the artist. Project team: Giles Lane and Stefan Kueppers in collaboration with scientists at Philips Research UK. Originally commissioned by FutureCity for Anglia Ruskin University's public art programme, *Visualise*.

Proboscis, *Lifestreams*, 2012. Image courtesy the artist.



**Liz Orton  
(UK)**

***The Longest and Darkest  
of Recollections*  
2016 - ongoing**

11 C-type and paper photographs  
mounted on variable materials;  
stones; text. Dimensions variable.

Liz Orton's work is concerned with entanglements of land, vision and natural science. She often engages with archives, both real and imagined, to explore the tensions between personal and systematic forms of knowledge.

The series *The Longest and Darkest of Recollections* considers notions of time, memory and the construction of knowledge. Alongside photographs, playfully exploring the methods used by geologists searching for evidence in the 'deep time' of rock formations, is a text directed to the artist's ageing father in the light of his fading memory.

The work is informed by Orton's visual research into the practices and gestures of touch and measurement used by geologists. It fuses scientific and sensual knowledge with other more personal systems of understanding, while subtly questioning the role of photography as fixed evidence. It speaks of an ongoing curiosity about geological history, and obsessions with systematising and categorising time and the earth.

Courtesy the artist. Developed as part of the MEAD Fellowship at the University of Arts London.

Liz Orton, *This connection should make us suspect*. Image courtesy the artist.



**Natasha Caruana  
(UK)**

***Divorce Index, 2017***

HD film with sound, 5.21 mins.

***Curtain of Broken Dreams, 2017***

Approx. 1,560 rings joined with brass links. Dimensions variable.

Natasha Caruana's art practice is grounded in research concerned with narratives of love, fantasy and betrayal.

Caruana used open data to identify coastline towns within Britain as having some of the highest divorce rates in the country, and explored further social datasets to try to identify why. *Divorce Index* is a filmic response to her findings. A couple in dishevelled wedding clothes - the artist and her husband - perform a curious dance at Bottle Alley on Hastings' promenade. Each movement is a choreographed gesture interpreting data around the pressures which may affect a marriage, including unemployment, health care, access to libraries, higher education and gambling.

In the entrance to *Divorce Index* is the *Curtain of Broken Dreams*, consisting of interlinked chains of 1,560 pawned, discarded wedding rings which create a physical representation of the number of divorces in the UK over a typical 12-month period. Becoming enmeshed in the physical evidence of the breakdown of so many unions raises the question of how essential the right conditions, as well as the right person, are to achieving everlasting love. The work poses the question of whether couples might ever consider relocating for the sake of a relationship, if the data predicted an unhappy end or better odds elsewhere?

Courtesy the artist. Both works commissioned by the Open Data Institute as part of the Data as Culture programme, which was supported using public funding by the National Lottery through Arts Council England. This is the premiere of the work.

Natasha Caruana, *Curtain of Broken Dreams*, 2017. Image courtesy the artist.



**Jackie Karuti  
(KE)**

**There Are Worlds Out  
There They Never Told You  
About, 2016**

Two videos from an ongoing mixed-media series:  
Animated video with sound, 1.05 mins;  
water-filled plinth / Video with sound, 3.41 mins.

Jackie Karuti (based in Nairobi, Kenya) works across various media to explore themes of death, sexuality, identity and urban culture.

*There Are Worlds Out There They Never Told You About* consists of two films exploring what it might mean to migrate or run away to worlds that exist in our imagination. The first is an animation of an uncertain hand-drawn landscape. It is populated by communications technologies, crows and mythical beings engaged in a choreographed series of: transmission, reception, control, call and response. Another film shows a collection of handmade paper boats navigating turbulent shallow waters under which a map of the world sits. The boats are assisted – or disrupted – by a god-like, disembodied female hand.

Running through both works is an allusion to the legend of an underwater civilization, descended from slaves thrown overboard during the passage from Africa to the Americas. Its non-linear exploration hints at themes of migration, displacement, and the idea of home - both what that means and how it might be something that can only be recreated in the imagination. The project presents humanity as part of an interrelated system within imaginary, technical and actual realities, whilst suggesting that logical readings may be less effective than those that allow for speculation.

Furthermore, these works act as a reminder that we choose to ignore the power of imagination at our peril, underlining the fact that everything man-made was once imagined.

Courtesy the artist and Circle Art Agency.

Jackie Karuti, *There Are Worlds Out There They Never Told You About*, 2016. Image courtesy the artist and Circle Art Agency.



**Jerónimo Voss  
(DE)**

***Inverted Night Sky, 2016***

Dome; lens; video with sound,  
10 mins. Dimensions: 3 x 3 x 2m.

A video dome projection takes us on a journey through the inner-workings of the Anton Pannekoek Institute for Astronomy, Amsterdam, from the kitchen to the lab. We travel through the everyday activity of the observatory from teacups in the sink to workstations where researchers explore gravitational waves. Alongside, a text rotates around the dome's radius that muses on the relationship between time and power.

The project engages with the work of socialist astronomer Anton Pannekoek, exploring the convergence of art, astronomy, and politics, and how each strive for a certain form of universality. The work is also concerned with realism, both inside and outside the field of art, and how this can be understood as a radical expansion of one's own observational framework or perspective.

The use of a dome appropriates the architecture of the observatory, as a space of both discovery and invention, utility and fantasy. A place to build constellations, to describe or gesture toward that which is elusive and ungraspable.

Supported by ifa (Institut für Auslandsbeziehungen). The film was produced at Anton Pannekoek Astronomy Institute, Amsterdam.

Jerónimo Voss, *Inverted Night Sky*, 2016. Image courtesy the artist.





## Stanza (UK)

### **The Reader, 2015**

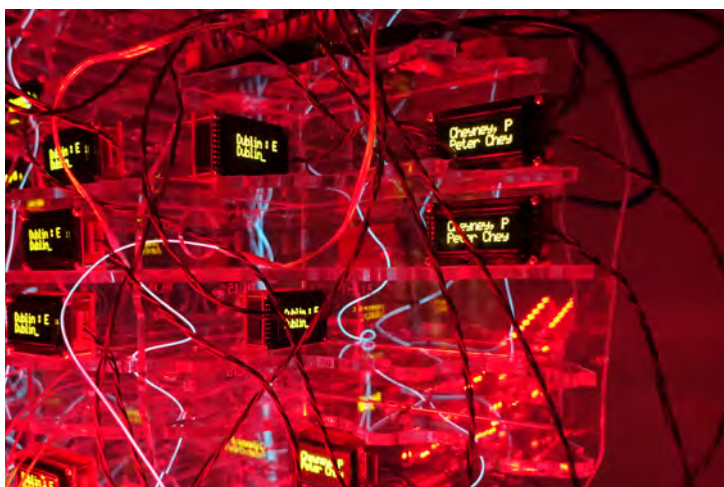
LED matrix displays;  
custom-made PCB boards;  
controller system and cables;  
perspex; laser cut metal; arduinos  
with custom software and  
controller boards.  
Dimensions: 225 x 84 x 80cm.

Stanza works across media, frequently with arts technology, CCTV, online networks, touch screens, environmental sensors, and interactive art. Recurring themes in his work include the urban landscape, surveillance culture and alienation in the city.

This six-foot high sculpture, *The Reader*, is a self-portrait of the artist wearing a hoodie and reading a book. It anticipates a near future where embedded technologies will become part of our everyday lives. Set into the perspex form are 100 mini text displays linked to custom-made cables which carry data pulsing through the body. The data is drawn from every book published since 1952, and accessed using open data provided by the British Library. It speaks to an age of continual consumption of information from endless sources, and encourages us to digest content as well as simply consuming it. In an age of 'infobesity' the work invites us to reflect upon the act of reading - decoding, creating and absorbing meaning, as well as simply receiving.

Courtesy the artist. Commissioned by Milton Keynes Libraries as part of The Digitalis Programme, which was supported using public funding by the National Lottery through Arts Council England.

Stanza, *The Reader*, 2015. Image courtesy the artist.



**Phil Coy  
(UK)**

***Substance-Awholehistoryof  
hollows and reliefs, 2017***

VR headset; 360° video with binaural sound, approx. 7 mins; photo-etched copper plates; computer; copper ore; copper rod. Dimensions variable.

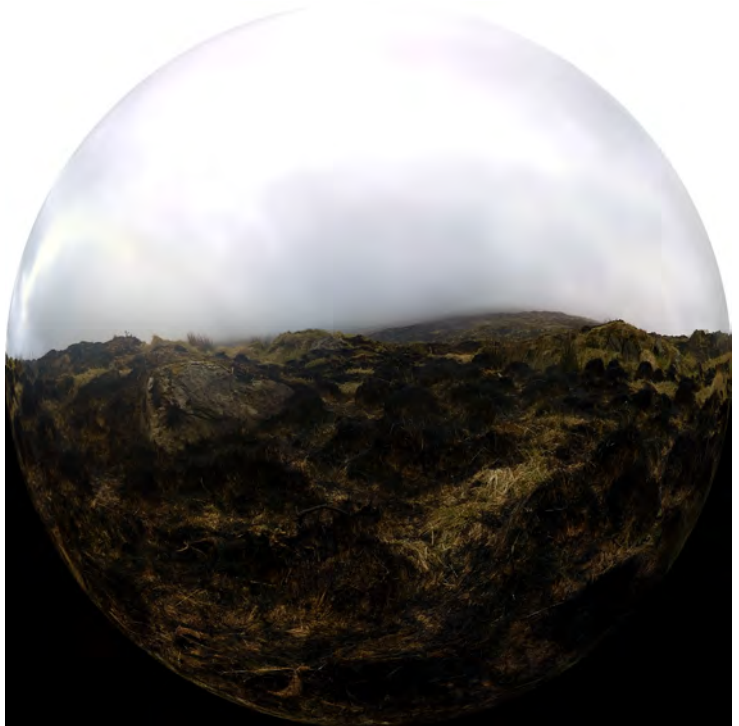
Phil Coy's practice includes films, sculpture, architectural installations, sound, text, photography and performance that collage concepts rooted in the radical art and literature of the 20th century, with the languages and architectures of global commerce.

*Substance* explores the materials and processes that enable us to image the earth's surface, and reveals the scars that the extraction of these materials have left. The work focuses particularly on the mining and refining of copper, the process of photolithography used in the production of silicon chips, and the CCD (charge-coupled device) sensors found in most digital and satellite cameras.

It takes the form of a dymaxion world projection onto photo-etched copper plates - a dymaxion map being a 2D representation of the world with its form heavily interrupted in order to preserve shapes and sizes. Alongside, a Virtual Reality (VR) environment proposes a journey through these hollowed-out landscapes. In so doing the work offers the viewer an experience where both the medium and subject of observation merge.

Courtesy the artist. Supported by Leverhulme Trust, Invisible Dust, Rutherford Appleton Laboratory (RAL Space) and using public funding by the National Lottery through Arts Council England. This is the premiere of the work.

Phil Coy. *Substance (a whole history of hollows and reliefs)*, 2017. Hemispheric production still. Image courtesy the artist.



**Kei Kreutler (US/GE)  
and Libre Space  
Foundation (GR)**

**Open Space Observatory,  
2017**

Open source ground station;  
wi-fi; live-stream video.  
Dimensions variable.

Kei Kreutler is an artist and design researcher exploring how cultural narratives of emergent and ubiquitous technologies shape their use. Libre Space Foundation develop free and open source space related projects and technologies, including the hardware and software for the first open source satellite in the world.

*Open Space Observatory (OSO)* is an initiative to promote gatherings and the development of open source infrastructure for observation of satellites, spacecraft, and space junk. Over the last 60 years, the magnitude of satellites' use and governing power has increased exponentially. Today the sky is full of over 4000 'orbiting spy-eyes', officiating on decisions of military armament, technological development, and territorial, commercial, and juridical zones. Through fostering the momentum of civic space initiatives, the future of satellites could be more evenly distributed. *OSO* looks toward building a network of sky gazers (at the intersection of subcultures and engineering) by installing infrastructure for space observation in public spaces, and re-purposing old observatory sites.

The *OSO* has installed a SatNOGS, an open networked satellite ground station, on the roof of FACT to project live feeds of satellite observation into the gallery. The ground station is built with accessible, affordable components under open hardware license.

Courtesy the artist. *Open Space Observatory* is a new site-specific iteration for FACT.

Kei Kreutler and Libre Space Foundation, *Open Space Observatory*, 2017.  
Image courtesy Libre Space Foundation.



**Burak Arikan  
(US/TR)**

**MYPOCKET, 2008**

Animation; custom software; list of predictions; RSS feed; receipts. Dimensions and duration variable.

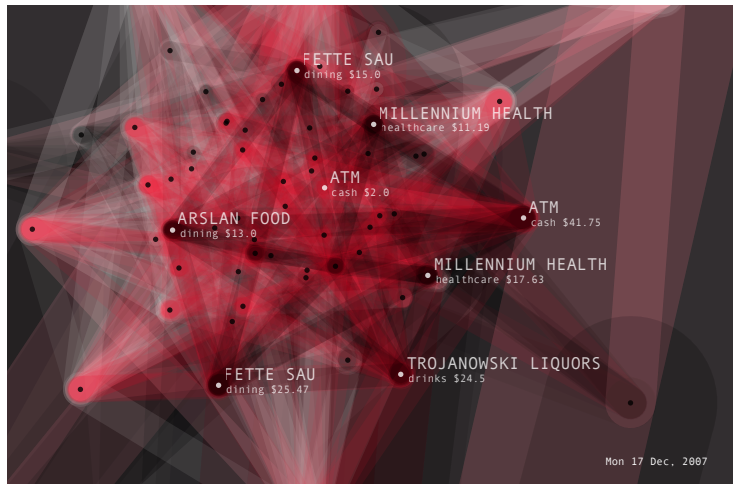
Burak Arikan is a New York and Istanbul based artist working with social, economic, and political issues to generate network maps and algorithmic interfaces, that attempt to render inherent power relationships visible and discussable.

*MYPOCKET* raises questions about how predictive technologies, particularly those that use our personal data, shape our choices through the assumptions they feed us. Custom software, written by the artist, predicted his potential (and catalogued his actual) spending patterns for a two-year period. The *Transactions Feed* publicly posts each of these economic interactions along with the percentage of transactions accurately predicted. The *Transactions Graph* visualises data corresponding to the time of each transaction demonstrating relationships between them. A collection of original marked receipts of correctly predicted transactions, or 'predicted objects', bears witness to the system's accuracy.

The work provides a revelatory self-portrait, exposing how much we divulge about ourselves through our own consumer choices, the trails of data we create, and their potential value to others.

Courtesy the artist. *MYPOCKET* is a 2007 commission of New Radio and Performing Arts, Inc., (aka Ether-Ore) for its Turbulence web site. It was made possible with funding from the Jerome Foundation.

Burak Arikan, *MYPOCKET*, 2008. Image courtesy the artist.



**Julie Freeman  
(UK)**

**Rodent Activity  
Transmissions (RAT)  
systems, 2016 - ongoing**

Data visualisation website  
and associated artworks.  
Dimensions variable.

Julie Freeman works with living systems in order to stimulate unexpected connections to nature. She enjoys the random unpredictability that animals bring, which cannot be anticipated or synthesised. Freeman's multi-part work uses real-time data to allow us a peek into the lives of a colony of electronically tagged naked mole-rats. It embodies a broad series of unconventional approaches to working with data to evidence different structures and forms of life. It also pushes the possibilities of data into new artistic territory.

*A Selfless Society* is an online audio-visual artwork, the *RAT systems* app uses traditional visualization, *Colony Omega Redacted Portraits* is a photography project, and *This is Nature Now* harnesses innovative soft robotics techniques.

Courtesy the artist. Supported using public funding by the National Lottery through Arts Council England and by the Centre for Public Engagement at Queen Mary University of London. Collaborators: Dr Chris Faulkes and Marcin Ignac.

The app can be downloaded from the Appstore (iPhone) <http://bit.ly/ratsystems> and Google Play (Android) <http://bit.ly/playRATsystems>.

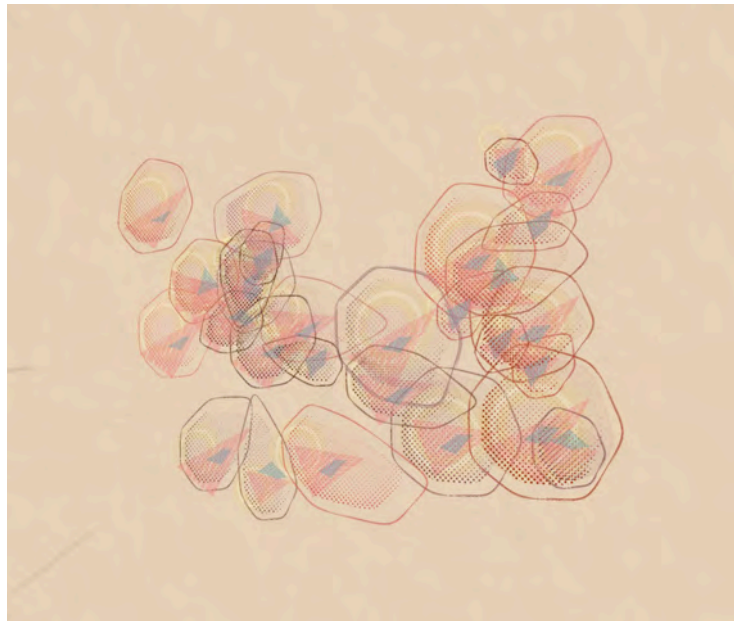
**A Selfless Society, 2016**

Online audio-visual artwork.

*A Selfless Society* is an abstract animation of forms whose shape and behaviour are influenced by the activity patterns of a naked mole-rat colony – the animals are tracked using an RFID (Radio-frequency identification) system to provide this live activity data. Freeman's interest in these animals stems from their cooperative lifestyle. The colony as a whole has the strongest chance of success, while lone individuals have little chance of survival. Naked mole-rats are 'eusocial' like bees, meaning only the queen breeds. What would happen if human society were restructured in this way?

Collaborator: Marcin Ignac.

Julie Freeman, *A Selfless Society*, 2016. Image courtesy the artist.



**This is Nature Now, 2016**

Real-time data-driven silicone kinetic sculptures (documentation version); 3 x single channel HD digital video with sound. Duration variable.

*This is Nature Now* represents live data from a naked mole-rat colony through physical movements of an artificial-material. It explores the body language of objects through techniques in soft robotics. The work asks us to reflect on how specific technologies mediate our experience of the natural world, and how we now encounter nature through our devices and broadcast mechanisms. Can living things be represented through data? If so, what are the traits a non-biological physical object requires to convey this sense of life?

Collaborator: Professor Kaspar Althoefer

**Colony Omega Redacted Portraits, 2016**

24 C-type photographs. 351 x 234mm.

Should data privacy be restricted to humans? *RAT.systems* involves tracking (but not experimenting on) Colony Omega - a colony of naked mole-rats maintained in an artificial environment designed for behavioural observation. Freeman has blocked out all of their eyes. This humorous act strangely highlights the individuality of each of the naked mole-rats. It also stems from, and refers to, wider and more serious concerns. Poachers are said to be using metadata from tourist's photographs on safari, or even academic papers, to locate and kill endangered animals. Respecting an animal's right to privacy may become akin to respecting their right to life. The work re-contextualises more human-centric privacy issues.

Portraits by Lorna Ellen Faulkes, commissioned by Julie Freeman and Dr. Chris Faulkes.

Julie Freeman, *Colony Omega Redacted Portraits*. Image courtesy of Lorna Faulkes + Julie Freeman 2016.



## Thomson & Craighead (UK)

### **Recruitment Gone Wrong, 2017**

Automated masks; video with sound, 7.29 mins; office chairs. Dimensions variable.

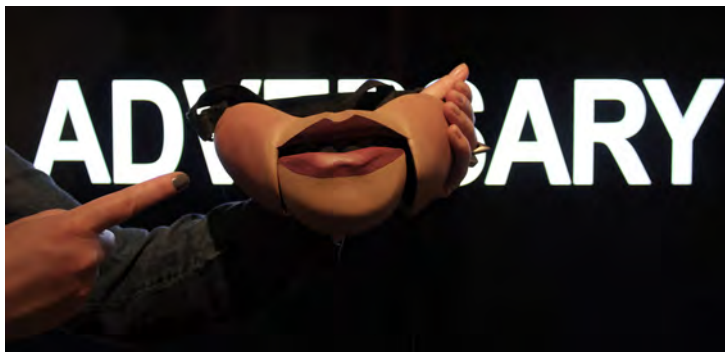
Thomson and Craighead make artworks and installations for both galleries and online spaces, which engage with global communications networks and explore how real time processes and live (or recorded) data transmission can be used as a material or artistic medium.

This theatrical installation invites us to inhabit a covertly recorded conversation between recruiters from the American National Security Agency (NSA) and student activists, who took the NSA to task over the 2013 Edward Snowden revelations. At particular times we are invited to adorn ventriloquists' half-masks to become strange cyborg bodies involved in a form of grotesquely absurd and querulous karaoke. The piece raises questions about net neutrality, openness, and transparency in a culture where we are encouraged to accept invasions of privacy for commercial and political gain as the 'new' normal. The students' disruptive act, the artists' dramatisation of the event and our collusion in performing each part, also speak to ways in which forms of data gathering and analysis are susceptible to unconventional and subversive means which may ultimately transform meaning and intent.

Visitors are invited to participate in *Recruitment Gone Wrong* daily between 12-1pm. The installation can be activated for viewing at all other times by pressing the button. Please ask gallery staff for assistance.

Courtesy the artist and Carroll / Fletcher. Commissioned by the Open Data Institute as part of the Data as Culture programme, which was supported using public funding by the National Lottery through Arts Council England. This is the premiere of the work.

Thomson & Craighead, *Recruitment Gone Wrong*, 2017.  
Image courtesy the artist.



## Related Events

Throughout the exhibition, you can take part in a diverse programme of activities including workshops, screenings and talks. Here are some of the highlights:

For more information about any of the events, or to book a place, visit [fact.co.uk/tno](http://fact.co.uk/tno).

## Talks and Events

### Opening Weekend

Thursday 22 June to Sunday 25 June  
/ FACT, various locations

Join us for an opening day programme including artist talks and lectures starting from 1pm, with a chance to preview the exhibition alongside exclusive artist performances from 6–8pm. The programme continues over the weekend with family workshops and curator tours.

### Curator Tour with Hannah Redler Hawes and Sam Skinner

Friday 23 June / 2pm / FACT Foyer  
Free, booking required

Hannah Redler Hawes and Sam Skinner, curators of *The New Observatory*, lead a tour of FACT's new group exhibition. Find out more about the concepts behind the works reimagining the notion of the observatory today.

### GPS Tarot with Chris Wood

Wednesday 5 July / 5–8pm / FACT Foyer  
Free, drop-in (please note that spaces are limited)

Join artist Chris Wood for *GPS Tarot*, a series of encounters utilising the position of GPS satellites in the act of divination to read your actions and emotions.

### Future Station: Yu-Chen Wang

Tuesday 8 August / 6:30–8:30pm  
/ Metal, Edge Hill Station  
Free, booking required

Join Yu-Chen Wang for this special edition of *Future Station* in partnership with Metal. Wang will discuss the development of her latest artwork *wish to communicate with you*, with exhibition co-curator Sam Skinner.

A new commission for FACT supported by Ministry of Culture of the Republic of China (Taiwan) and by using public funding by the National Lottery through Arts Council England.

### Late Nights at FACT

Wednesday 5 July, 2 August & 6 September  
/ 6–8pm / FACT, various locations

For the first Wednesday of every month during *The New Observatory*, the exhibitions will remain open until 8pm, giving visitors the chance to view the show after hours. Running alongside this will be a specially-curated programme of events and workshops.

### Curator Tour with Sam Skinner

Wednesday 6 September / 7pm / FACT Foyer  
Free, booking required

Join us for a special late-night opening of *The New Observatory*, as curator Sam Skinner leads a tour of the exhibition. The tour will be followed by a screening of *Nostalgia for the Light* chosen by the curators, accompanied by an introduction and discussion about their selection.

### New Materialisms and Old Observatories

Saturday 23 September / 6pm / FACT  
Free, booking required

Join FACT for an evening of talks exploring the historical and philosophical contexts to *The New Observatory*, including discussion of ideas for Bidston Observatory's reinvention as an artistic research centre.

With Dr Rick Dolphijn (Senior Fellow at the Centre for the Humanities, Utrecht University), Prof. Aud Sissel Hoel (Marie Skłodowska-Curie Fellow at the Image Knowledge Gestaltung Cluster, Humboldt University, Berlin), and Fiona James and Kym Ward (Arts Research Centre at Bidston Observatory).

Supported by COST Action IS1307 New Materialism: Networking European Scholarship on 'How Matter Comes to Matter'.

## Film

### Nostalgia for the Light

Wednesday 6 September / 8pm / The Box  
£4/3, booking required

*The New Observatory* curator Sam Skinner presents a screening of *Nostalgia for the Light*, the outstanding documentary from Chilean director



Patricio Guzmán, a moving exploration into the past interweaving the harsh political history of Chile's Atacama Desert with its present reputation as a renowned astronomy site.

## Liverpool Radical Film Network

**Wednesday 28 June / 6:30pm / The Box  
£4/3, booking required**

Join Liverpool Radical Film Network for a specially selected film screening inspired by the themes of *The New Observatory*. The film will be followed by a discussion with invited guests, with discussion of how the preservation and ownership of data feeds into activism today, and how it can be utilised as a tool for survival going forwards.

## Yu-Chen Wang Screening

**Wednesday 27 September / 6:30pm / The Box  
Free, booking required**

Yu-Chen Wang presents a screening of *I wish to communicate*, the film project that she has developed whilst in residency at Metal, Edge Hill for two months during *The New Observatory*. The screening will be introduced by Wang, with the opportunity to discuss this new work afterwards.

A new commission for FACT supported by Ministry of Culture (Taiwan) and by using public funding by the National Lottery through Arts Council England.

## Offsite

The Liverpool and Bidston Observatories, which began observations in 1845 and 1867, monitored natural phenomena from the stars to the tides, and created their own bespoke scientific instruments. Taking this history as a key reference point, selected artists in the show were chosen for their ingenious explorations into how access to the data, devices, and networks once exclusive to scientists are now part of our everyday lives.

The development and research of these works has created several partnerships with research facilities, and spaces of observation across the city. Here you can either experience additional works by *The New Observatory* artists, or discover more about Liverpool's rich legacy of observation.

## Liverpool Planetarium: Phil Coy

**Every Saturday and Sunday throughout  
September and 1 October / 4:30pm / World  
Museum, William Brown Street, Liverpool**

Visit the World Museum for a chance to experience Phil Coy's 360° *Substance – A whole history of hollows and reliefs* video at the Liverpool Planetarium, and learn more about the history of the old Liverpool and Bidston Observatories via their fascinating displays.

Supported by Leverhulme Trust, Rutherford Appleton Laboratory (RAL Space) and by using public funding by the National Lottery through Arts Council England.

## Tide Prediction Machines at National Oceanography Centre

**3rd July, 1st Aug & 5th September / 2-4pm  
/ National Oceanography Centre, Joseph  
Proudman Building, 6 Brownlow Street**

Visit University of Liverpool's National Oceanography Centre to see two recently restored Tide Prediction Machines, as used at Bidston Observatory. The carefully engineered devices simulate the rise and fall of the ocean tide, and were used to produce tide tables for ports – and prove a precursor for Rachel Jacobs' work, which explores how to 'perform' scientific data. For further information visit: [tide-and-time.uk/visit](http://tide-and-time.uk/visit)

## Bidston Lighthouse

**Open every Saturday afternoon until the end  
of August / Guided tours on the hour from 12pm-  
3pm / Bidston Lighthouse, Wilding Way, Bidston  
Hill, Wirral, CH43 7RA**

Open every Saturday afternoon until the end of August / Guided tours on the hour from 12pm-3pm / Bidston Lighthouse, Wilding Way, Bidston Hill, Wirral, CH43 7RA.

Bidston Lighthouse will open for guided tours on Saturday afternoons, July to August, during the exhibition. Bidston Lighthouse has a rich tradition of its own, spanning telecommunications, navigation, lighthouse optics and women in the workplace. Visitors can also learn about the changing role of Bidston Observatory over the past 150 years, from its scientific roots, to its imminent re-invention as an artistic research centre.

Yu-Chen Wang will also link FACT to the Observatory and Lighthouse through a series of flags she has designed, installed at all three locations.

**See [bidstonlighthouse.org.uk](http://bidstonlighthouse.org.uk) for prices and  
September opening times.**

# Learning

Come and discover creative ways to experience *The New Observatory* in the Learning Space in FACT's foyer; a place for families, schools and the local community to engage with and experience the exhibition in a new way. To get the most out of your visit, pick our free Family Pack, which includes learning ideas, gallery talking points and things to do at home.

## FACT at Liverpool Makefest 2017: *Talking to Satellites*

Saturday 24 June / 9am-5pm  
/ Liverpool Central Library, L3 8EW

FACT is pleased to be back at Liverpool Makefest, the North West's biggest maker event. This year we will be running a drop-in workshop where you can learn more about satellites orbiting the earth with the Libre Space Foundation. Come to Liverpool Central Library to talk to satellites, and continue your journey to FACT to see the rest of the show.

*SatNOGS is a project of the Libre Space Foundation. Initiated during the NASA SpaceApps Challenge in 2014 at Athens Hackerspace in Greece, the project won the Hackaday Prize 2014 competition.*

## Do Something Saturdays

24 June - 30 September / 12-4pm / FACT  
Free, drop-in

Every Saturday throughout *The New Observatory* we will be running workshops inspired by the show. Through these, families can discover a different way of experiencing the exhibition, mapping the connections between the works and instruments on display using new techniques. Facilitated by artists and FACTLab these free, drop-in sessions are designed for families to make, do and learn together.

## Prototype Summer Camp *Survival kit: How to take control of your own data*

FACT is looking for young detectives, hackers and futurologists! *Prototype Summer Camp* is a great chance for young people to get creative with technology through a series of hands-on activities: making and testing inventions to spark imagination, create stories and make films about future worlds.

FACT is looking for young detectives, hackers and futurologists! *Prototype Summer Camp* is a great chance for young people to get creative with

technology through a series of hands-on activities: making and testing inventions to spark imagination, create stories and make films about future worlds.

The camps will offer learning experiences aimed to promote critical thinking and creative use of technology, in order to control our own data. Participants will work with the FACT team on DIY experiments in order to produce a survival kit for the future of e-safety.

All levels of experience are welcome; just bring creativity, curiosity, and a packed lunch.

**8 to 11 yrs: 25-27 July & 8-10 August / 9:30am-3pm  
£60 per child**  
**12 to 14 yrs: 1-3 August & 15-17 August / 9:30am-3pm / £60 per child**

*Limited spaces are available free of charge for children eligible for free school meals.*

## Arts Award at FACT

FACT is offering the chance for young people to obtain their Bronze Arts Award by participating in the learning programme for *The New Observatory*. For more information please contact [learning@fact.co.uk](mailto:learning@fact.co.uk)

## Sci-Films to Challenge the Future

Free of charge, registration needed.  
See [fact.co.uk](http://fact.co.uk) for dates.

Join us for a series of learning sessions combining films and hands on activities to explore the role of film in imagining an alternative future.

Sessions include: *What is Dystopia?* (age 13-15 years), focusing on *Pumzi*, Wanuri Kahiu, 2009; *Challenging Stereotypes* (age 13-15 years), focusing on *Attack the Block*, Joe Cornish, 2011; and *Earth Survival Guide* (age 11-13 years), focusing on *Glitterball*, Harley Cokeliss, 1977.

## School visits

FACT is offering tours and workshops for schools, aimed at encouraging student participation to stimulate creative ability with tailored visits aimed at 5-8 years and 8-16 years.

An Education Guide will also be available, including an outline of the works presented in the show, learning objectives, gallery discussions and post-visit suggestions to stimulate the learning process in the context of the exhibition. Download the pack from [fact.co.uk](http://fact.co.uk), and register for a visit by contacting [education@fact.co.uk](mailto:education@fact.co.uk)

## Find out more

For more information about the FACT building, exhibitions, volunteering, booking a group tour, accessibility or hiring a space call 0151 707 4464, visit [fact.co.uk](http://fact.co.uk) or email [info@fact.co.uk](mailto:info@fact.co.uk).

To find out first about upcoming events, exhibitions and opportunities, become a FACTivist for free!

To sign up visit [fact.co.uk/factivists](http://fact.co.uk/factivists).

**FACT**  
**88 Wood Street**  
**Liverpool**  
**L1 4DQ**  
**fact.co.uk**

**FREE ADMISSION**

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fact.co.uk/tno  
#NewObservatory



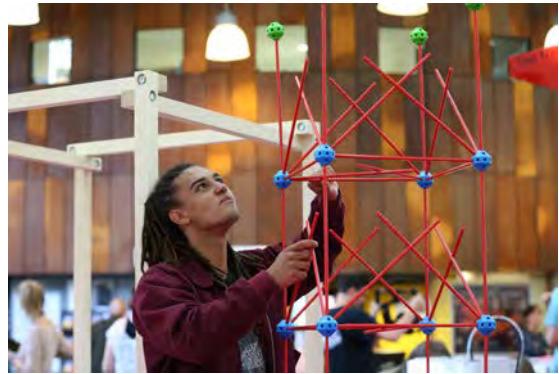


## 1.2 The New Observatory exhibition photographic documentation, 2017

Photography by Gareth Jones

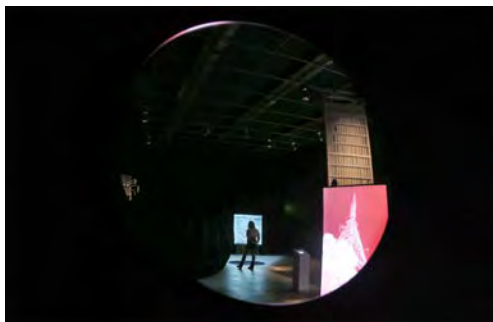
### Learning Space and Foyer Area Gallery

(See booklet for details of works)



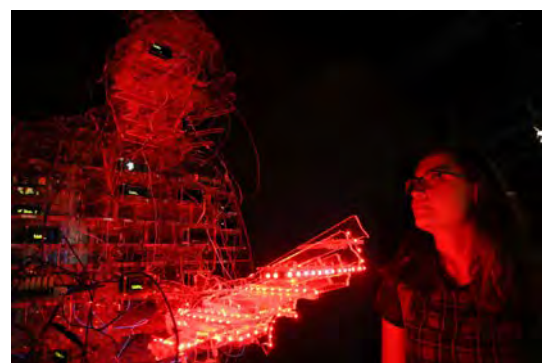
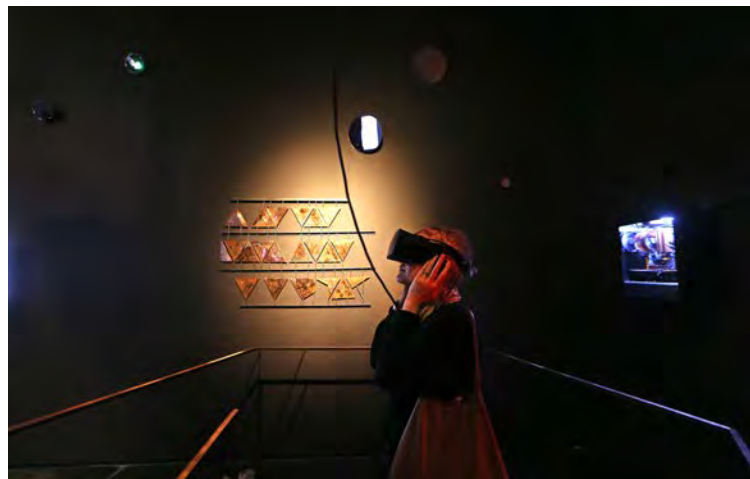
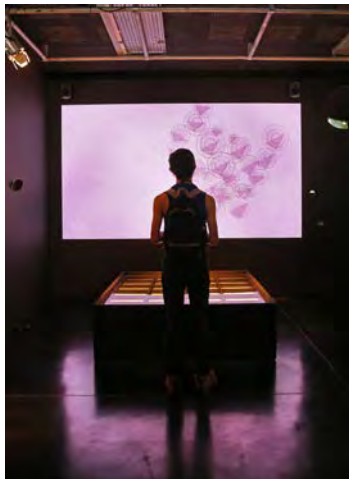
## Gallery 1

(See booklet for further details of works)



## Gallery 2

(See booklet for further details of works)





### 1.3 The New Observatory – Allocation of Curatorial Responsibility for Commissions and Loans

				Primary Curatorial Responsibility	
Artist	Artwork Title	New Commission	Loan / Re-staging	Skinner	Redler-Hawes
James Coupe	<i>A Machine for Living</i>	X		X	
Citizen Sense	<i>Frackbox</i>		X	X	
Citizen Sense	<i>Dustbox</i>		X	X	
Interaction Research Studio	<i>Datacatcher</i>		X		X
Rachel Jacobs	<i>The Prediction Machine</i>		X	X	
Rachel Jacobs	<i>The Promises Machine</i>		X	X	
Jeronimo Voss & Radamés Ajna	<i>Applicate Against Time</i>	X		X	
Jeronimo Voss	<i>Inverted Night Sky</i>		X	X	
Yu-Chen Wang	<i>I wish to communicate with you</i>	X		X	
Evan Roth	<a href="http://s33.820180e151.184813.com.au">http://s33.820180e151.184813.com.au</a>		X	X	X
David Gauthier	<i>Measure for Measure for Measure</i>	X		X	
David Gauthier	<i>53°32'.01N, 003°21'.29W, from the Sea</i>	X		X	
Wafaa Bilal	<i>168:01:00</i>		X	X	X
Proboscis	<i>Lifestreams</i>		X		X
Liz Orton	<i>The Longest and Darkest of Recollections</i>	X	X		X
Natasha Caruana	<i>Divorce Index</i>	X			X
Natasha Caruana	<i>Curtain of Broken Dreams</i>	X			X
Jackie Karuti	<i>There Are Worlds Out There They Never Told You About</i>		X		X
Stanza	<i>The Reader</i>		X	X	X
Phil Coy	<i>Substance - A whole history of hollows and reliefs</i>	X		X	X
Kei Kreutler & Libre Space Foundation	<i>Open Space Observatory</i>	X		X	
Burak Arikan	<i>MYPOCKET</i>		X	X	X
Julie Freeman	<i>Rodent Activity Transmissions</i>	X	X		X
Julie Freeman	<i>A Selfless Society</i>	X	X		X
Julie Freeman	<i>This is Nature Now</i>	X	X		X
Julie Freeman	<i>Colony Omega Redacted Portraits</i>	X	X		X
Thomson & Craighead	<i>Recruitment Gone Wrong,</i>	X			X

Note that additional support was provided by the Exhibitions team at FACT, including: Producer - Lesley Taker, Co-ordinator - Charlotte Horn, Head of Programmes - Ana Botella, Director - Mike Stubbs, and Technical Manager - Mark Murphy. Exhibition Design was produced by Ab Rogers Studio.



01.03.2019

Ref: Sam Skinner's practice-based research project at FACT

To who it may concern,

I write in reference to Sam Skinner's research undertaken at FACT as part of his practice-based PhD, following a request to include this in his thesis appendix.

FACT is the UK's leading organisation for commissioning, exhibiting, promoting and supporting artists' work and innovation in the fields of new and emerging media, with a specific vision and focus on delivering exciting projects that transform audiences and participant's appreciation and engagement in art and the creative use of technology. We have research and practise expertise from over 25 years in the field of digital media.

Prior to commencing his PhD project with us Sam had organised and participated in a number events with FACT as an independent artist, including his installation for the 'Typemotion' exhibition (2014), which included a wall based mural, 'speed reading' video using a typeface he designed, and the programming of two outstanding 'Torque' symposiums looking at contemporary artist publishing practice and intersections with themes of mind, language, and technology, including talks by Katherine Hayles and Lambros Malafouris, amongst others.

These projects produced engaging outcomes for our audiences and demonstrated how Sam's practice as both artist and curator, conducting in depth research in the fields of art and science, translated into unique and lively projects that aligned with FACT's programme and remit to support impactful research-led practice and follows our vision for FACT to be the place "Where Art, People & Technology meet Inside, Outside and Online" in a meaningful exchange.

Foundation for Art and Creative Technology  
88 Wood Street, Liverpool, L1 4DQ  
United Kingdom

+44 (0)151 707 4444  
info@fact.co.uk  
fact.co.uk



These experiences combined with Sam's research proposal (I was on the selection panel) made me confident he would produce a PhD project of a high standard and that FACT could contribute to this by supporting emerging developments in his research and testing those out in the public domain through the exhibition and public programme.

Sam began his research with us, focused on the concept of 'liquid agency' exploring how this fundamental form of matter, shapes and has agency over the development of a city, via a case study of Liverpool. This was informed by his interest in translating new materialist philosophy to applied public-facing art projects. Alongside this research he conducted research into the history and contemporary life of FACT.

Sam committed himself admirably to become an embedded part of the Research and Innovation team, attending, supporting and contributing to key events and discussions. In particular he helped coordinate the 'A Moeda' project, an EU funded project in collaboration with partners in Lisbon and Berlin, to produce a digital artwork phone app which engaged and reflected upon the Internet of Things and the networking of ICT devices. This included leading workshops at FACT and in Berlin, and contributing to the project publication.

Sam's focus on the Liverpool Observatory emerged I believe through both his 'liquid agency' based research, but also by virtue of his immersion in FACT, which enabled him to see the potential resonances of the Liverpool Observatory with FACT's vision, mission and programme.

In the contemporary contexts of big data and surveillance the integration of the Liverpool Observatory into his research was a fertile subject. Sam produced a series of proposals that were discussed with the team and a natural fit was found with conversations that had begun with the Artist Residency Curator of the Open Data Institute Hannah Redler. Sam, Hannah, and the team met over many months to explore the options, and the resultant exhibition was very much a result of this collaborative approach between FACT, Sam and Hannah.

I understand from speaking to Sam and from reviewing his thesis that in order to avoid conflict over authorship he focused his discussions regarding the exhibition on 5 new commissions - which he oversaw. This is, I believe, a fair way to situate Sam's work and



integrate the curatorial, practice-based, elements of his research within a public exhibition context, and enable deeper discussions. In addition, it makes the genealogy of the project clear to all contributors and stakeholders.

To return to Sam's artistic practice, he also produced a large print-based installation upstairs on the outer wall of Gallery 2 at FACT that was a closer engagement with the history of Liverpool Observatory, but delivered on his desire for this element be less 'front and centre' within the exhibition. Analogous to this is his artist book 'Obs' which I think was a concise way to enable him to be responsive and evolve The New Observatory exhibition with the Open Data Institute and the team at FACT, without compromising other strands of his research. The book is a significant work in its own right and I'm also pleased to see the Reading Group feature so prominently which was based on a regular reading group Sam co-organised (with fellow practice-based researcher Alex Pearl) at FACT. Importantly this tested and demonstrated his overlapping practice as artist and curator, and enabled the continuation of Sam's earlier work with Torque that investigated and tested innovations in artist publishing practice.

Finally, I would just like to add that the public programme for The New Observatory, which Sam organised a large majority of, including open days at Liverpool Oceanographic Lab, visits to Bidston Lighthouse, a day long symposium, workshops, screenings, performance, and more, with many of the artists, was also an excellent addition to the exhibition programme and exemplary in terms of enriching a public programme through research.

In closing, Sam's level of professionalism and dedication is excellent and he was a pleasure to support and advice. He delivered, over and above expectations, a robust set of research-driven outputs on time and with clarity. I often cite Sam's work and research at FACT as an example of best practice when it comes to engaging with emerging doctoral research in the public domain.

His combination of adaptability, academic rigor and practical time management meant he was able to deliver excellent work in vivo with a demanding arts organisation without compromising his research needs. The technical and methodological challenges of presenting research to a broad public from within a cultural heritage organisation are significant and Sam rose to the challenge.



Sam is a dedicated, professional innovator in learning and research environments and was a pleasure to work with.

I hope this letter serves as evidence of the high level and standard of Sam's project, and please feel free to contact me to discuss further.

Sincerely

A handwritten signature in black ink, appearing to read 'Roger McKinley', with a large, stylized flourish at the end.

Roger McKinley

Head of innovation

Foundation for Art and Creative Technology



# Obs

**A Pulp Novella**



Level: Item  
Ref No: CGOSV/1/30  
Title: 'The Reading Group' documentation  
Authors: Various  
Description: Reading Group and Obs transcribed testimony, minutes, facsimiles, and ephemera  
See also CGOSV/1/31-49 in holdings  
Access Status: Open

\*

## DRAMATIS PERSONÆ

Ab	} ... <i>Reading Group &amp; Obs Co-conspirators</i>
De	
EI	
J	
H	
MM	

Sandy ... *The Old Ob Director*  
Jeb ... *The New Ob Director*  
Xan ... *A New Ob Builder*  
The Big 6 ... *Robber Barons 5.0*

2

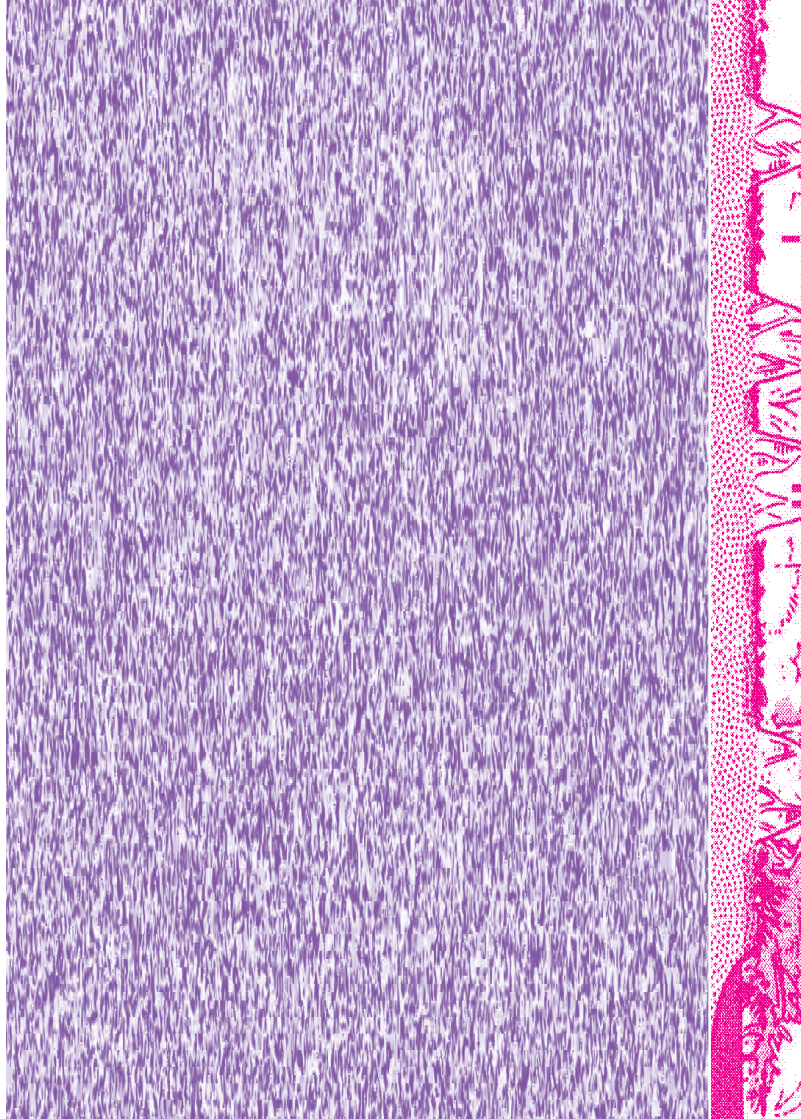
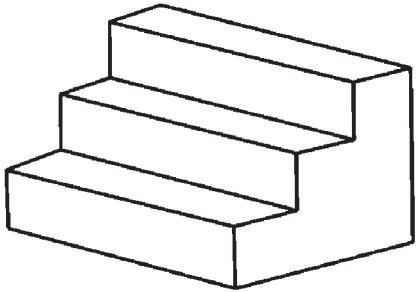
Ob-  
A prefix meaning 'toward,' 'to,' 'on,' 'over,' 'against,' originally occurring in loanwords from Latin, but used also with the sense of 'reversely,' 'inversely,' to form Neo-Latin and English scientific terms: *object; obligate; ob lanceolate*. From Latin *ob* (prep.) 'in front of, before; in the way of; with regard to, because of,' from PIE root *\*epi*, also *\*opi* 'near, against'

We  
Pronoun [*first person plural*] **1** Used by a speaker to refer to himself or herself and one or more other people considered together. **2** Used in formal contexts for or by a royal person, or by a writer or editor, to refer to himself or herself. **3** Used condescendingly to refer to the person being addressed

They  
Pronoun [*first person plural*] **1** Used to refer to two or more people or things previously mentioned or easily identified, also people in general, and (informal) people in authority regarded collectively. **2** [*singular*] Used to refer to a person of unspecified gender

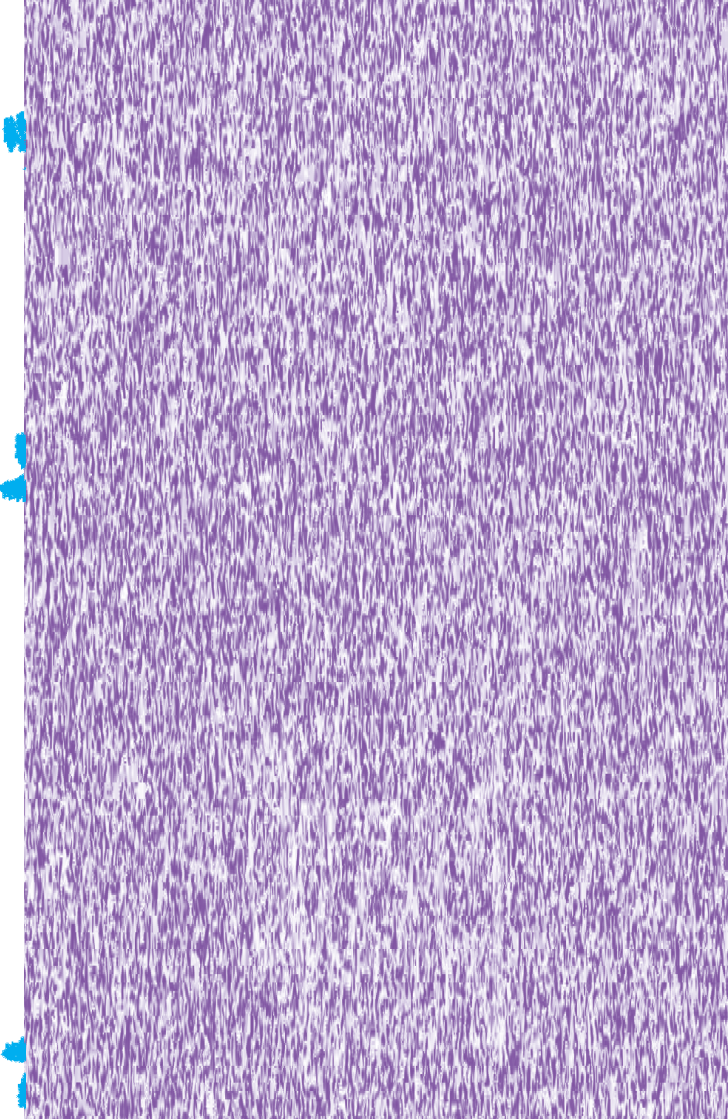
3







# 1



The Reading Group meeting was slow. Drooling, not in a good way. It always started at 6. We'd been reading some Middle English, Dashiell Hammett, Boolean algebra, Mirtha Dermisache, and did 'thinging' alongside the reading and confab, like dendroclimatology, desoldering PCBs, composting, kludging, and mudlarking. Today we read the 180gsm digitally printed double-sided gloss A5 flyer that had slipped through letter boxes that morning

'The principle measures of the observatory: Newness, Full Value, and Sense Thrust will help the community's community allocators better understand... and resilientify resources and...'

The crush of the world was occasional, but today was one of them. Listening

rain pouring down. Dry inside the library, but definitely raining outside, sleeping down the glass

It had been happening for a year sub rosa. The interception regime, the scraping of shadows. A crash between observational science and everyday life. A quantocracy of celeriac mundanity and fungal ingenuity. All the time trailing through your hair, squeaking it was so clean. Leveraging reflections of ambient wi-fi, disembodied pre-mortem in back rooms fed by fibre optic lines from beam splitters installed in trunks of web backbones. Desperately seeking correlation

It was really un. Like a whole year of candles at the new church without any churches. Just a transparency agenda,

ethics checklist, and new learny learn  
magnetolectric superconducting spin-  
tronic photovoltaic apparatuses

The big reveal was made to make your  
mind water. An atonement on data min-  
ing us all for a fat annus mirabilis and  
now soft soaping us for the new 'open'  
Ob phase of total coalescence, rand-  
omized telehealth trials, f.r.i.e.d. senso-  
rium rings, and a survey of surveys

We read close, hyper, deep, and anno-  
tated the flyer to death, until it became  
a map. We were aporetic and agreed to  
take part as wrongly as possible

\*

We used to meet every Tuesday  
night at the station and read aloud in

procession to the library, stopping for  
snacks at the garage. We had a key to  
the portakabin by the lake. The lights  
always took a while to ionize mercury  
vapour and cause electrons in the gas  
to emit photons to the phosphor coat-  
ing and come on

MM wore an 'ABC Sport' baseball cap.  
De wore gardener's clogs. Ab always a  
huge puffa. J wore cool as a uniform.  
El was practically a teddy bear and  
H looked like a silver birch in January.  
So a very pale almost pearlescent com-  
plexion, crow's feet, and fine reddish  
black hair

We liked reading as a way to make  
things not happen. To sit on the earth  
and leave it in the ground, but for the  
pulped secondary growth, pressed



'carbon black' (global demand 12.625 million tons) ink from the incomplete combustion of fluid catalytic cracking tar, the bookshop lights, the skrilla, the distribution, the infrastructure, the glue, the librarians, et cetera

We called it liquid agency and wrote occasional poetry. Like the spirit leaving the body in song the way the unsung publisher the sun turned the ink and screen to photons writing words to the world in light. Not too hot, just right. We lived in the goldilocks zone

We were not so different from the computers that surrounded us in the library. Programming and executing ourselves to read run install code upload update download delete. Herding clouds of electrons through a maze, dampening



the chaotic quantum dynamics (perfect unpredictability) of an electron gas into the digital abstraction (perfect predictability) in a billionth of a second. Words passed through the outside inside, in knotty union

\*

Temo was split down the middle, with the river on one side and covered in radio. The first town built with decentralised smart concrete. The crack, the wound, the groove, that the Ob hacked and mined. Sinewed and wired like an architectonic body builder set for demolition. Ripe. A future pile of rubble. Only 10 years old in digital years. It was a low cost environment of vanity broadcasting and 2 for 1 infospheres, servicing the centre. Grazing

bots with circadian rhythms predicted your predictions. Overdetermined by auto-information and skinterfaces, the street signs were faded. Roundabouts abounded, but crossroads were few

A community of cormorants lived on the old pier largely oblivious. Their wettable plumage spread out like Archaeopteryx or the crucifixion. You could almost hear the Passions. Oil black backs to the sun, shadowing the river, swallowing stones to dive deeper

Among the humans the replacenactment of the universal with universalisation was almost universally accepted. Ignoring the unmathematisable made the unrepresentable unthinkable. Amplified aggregation greased reason. Casting discrepancy aside from action



Everything was optimised and running perfectly. Stuck on the usual. Stuck on the usual. Stuckly unturnoffable. Un get off able

The uni and govt co-opted The Big 6's infrastructure: comcom, a-z, brain-gang, ?x, Hyperion to a Satyr, and IoTa (who made the sausages) for the LLOUCCIEPPPP, or Living Lab Observatory for User-Centred City Centric Innovation Ecosystem and Public Private People Partnership. Ob for short. The premise was don't let the cat in the box know it's dead so you could collect the best data and then use this to manage management and cats more efficiently. Internally the Ob was to measure dormancy and the community's collapulation. It was a flagship project. They signed up to the 'Tech for


Good' charter and had a 'double lock' so the ethics committee okayed it

It was cost effective these days and had added value to: Collect. Store. Transfer. Monitor. Map. Analyse. Sell and databulise co-efficiencies in quiescent accretion

\*

Sandy lived in number and was long and short. The Ob was his baby. His work was at front-end of the new granularity. A dramaturge of turgid metrics. Employed to stage good order and stage the city. Principally datasking, smart composites, and variance-based radio tomographic imaging

MM was into revenge, natural language



processing, and double feedback loops. He committed the Reading Group's first act of obfuscation. Hacking the Ob's server and Sandy's devices. Writing a profile of Sandy using a Generative Adversarial Network. It read:

'He started by smoking observation, before dabbling in predication and totalising. But the real gateway drug was city-centric dashboards, and now he's hooked on filamentous urban-sentience and hacking spore-to-spore eukaryotic polity-communicomes


He speaks in measured tones. His catchphrase is: the queue is shorter in the biometric lane. He values precision, but can't resist the next big thing. Control and distance, oh to control at a distance

He can make waxworks out of problems and find solutions that don't exist. A tool looking for a programme. He likes feeding answers smooth curves and was smart, as they like to say

His laugh was infectious. It was difficult to say no to him, and he was rich. But the rich are a minority group too, he used to say. He wears emperor's new clothes and loves click fishing and gifting new gizmos, like the one that wiped the floor without touching it and sold in the millions

For more than two decades he had been writing: For more than a decade. It was about about time to update his bio and write: For more than two decades





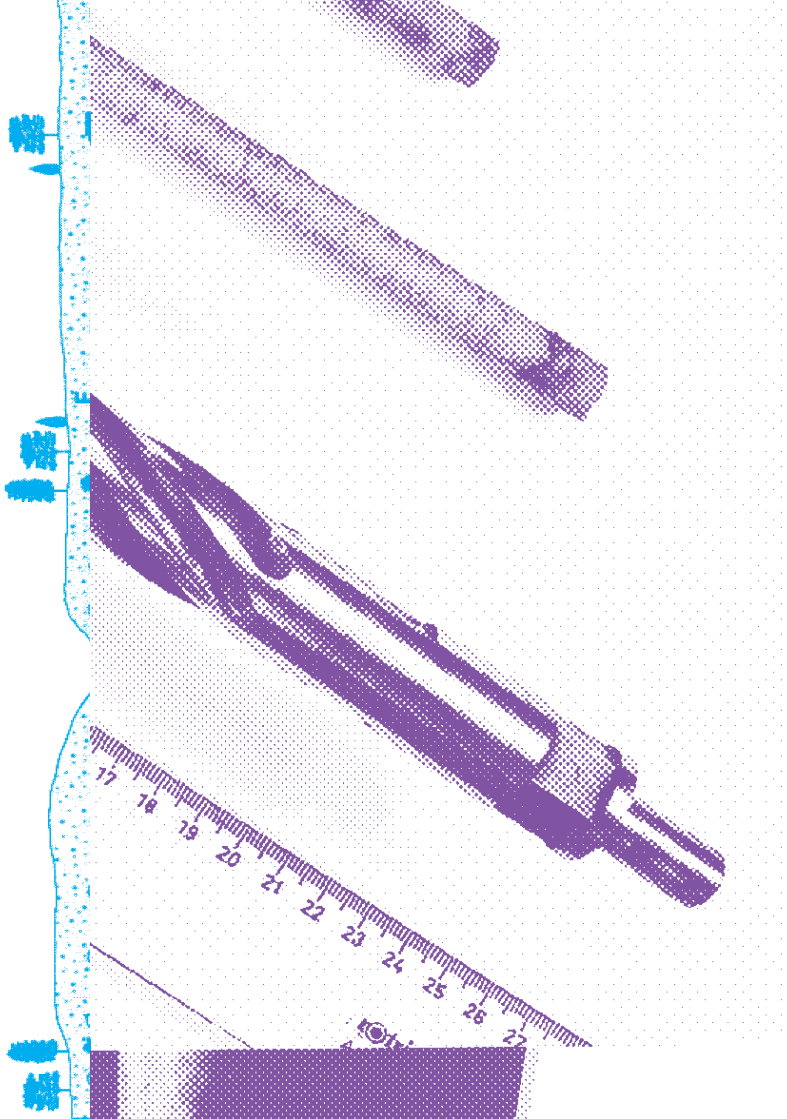
He was convinced his new bias test could ethicalize algorithms. The problem was getting the computer to explain itself to him. There was an intelligence at play but without representation

He's into you, like the song, and incomparable pairs, spectral clustering, transitivity, network similarity, and link farms. He once lost the referent whilst running for the b-certainties. His dogs are called Number and Name. He was once a member of the neo neo's of the extreme north, or was it centre, I can't remember

At night he dreams like an IoT device without a network. Of getting inside the centre, inside the outside. Of visiting observatories as a child. Crawling into telescopes that become slides, slipping

into freefall, grasping for the measure, singing: Sift the two's and sift the three's. Landing in a safety net mesh of a mesh of non response and rightsizing hung between two twisted Jantar Mantars of ecstatic statistics. Before descending into the minute particulars, surrogate mother abstractions, earthing the ground, coddled by the bubble of a pair of Air Max 95s toeing his couch until the teaspoon clinks against the china and he wakes'

Everyone but MM at the Reading Group felt guilty for it, but sent it to Sandy nonetheless, signed: 'Pseudo Anonymous'. In the absence of rights they felt like Oberon the cratered fairy moon king. They played pick up sticks to take their mind off things



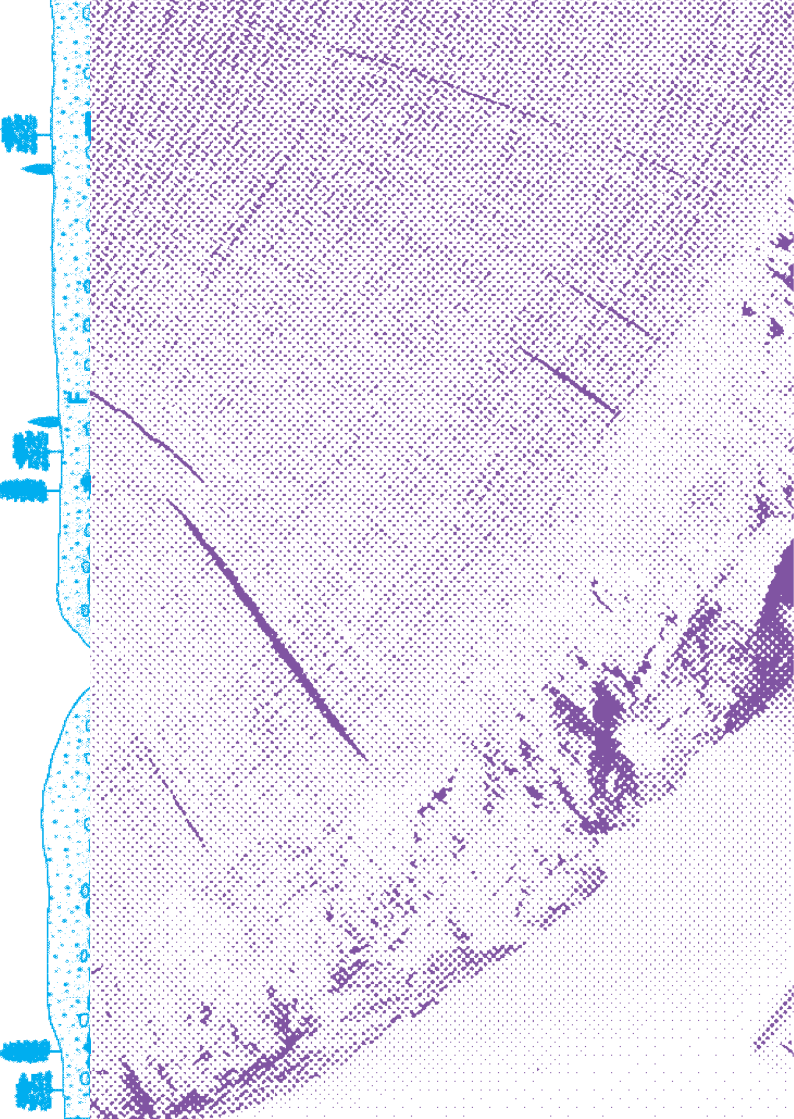
Elsewhere the world in general was surprisingly quiet, beyond the hubbub. Silent appliances and matter worked quietly, depending on your frequency and position. So did many instruments, less so machines. They got hot easily and had legions of fans. The data needed cool too

\*

It was becoming a scandal. The uni, the govt, The Big 6, all in cahoots for a year. Nobody was meant to know. Not even the Merit Commission. The govt reeled out various mantras in defence:

'The Ob is a pilot to manage management and efficiencies more efficiently and the security of the security services and...' It would be useful they






promised and complained they hadn't time to analyse the data yet. There were issues arising, yes, and apologised that the verification was also surveillance, but it was developing photoshop for your voice and there were free datalogical technotropics for participants and Temo was perfect for testing the predictive infranetwork and everything's been approved in line with fairnicity and yesicity and we live in a democracy and it was nonstop notwithstanding nonetheless

Sandy was pulling his hair out at the reaction and pleaded to be able to continue the project at a public hearing. He was successful, but ordered to deliver a programme of participation, engagement, and co-design





Outside the hearing the Reading Group  
chanted:

That that does that  
Is neither this way nor that  
That that is a thing is not really das  
ding

Get outside  
The outside  
That occupies  
Our inside

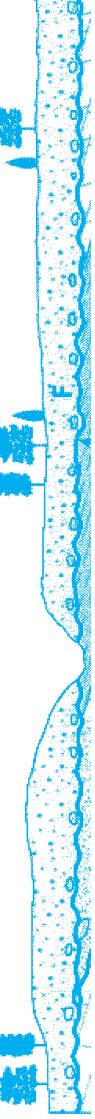
No more universal basic observation  
We want universal basic info rights

The group continued their programme  
of obfuscation, sending Sandy empty  
boxes covered in Gini coefficients and  
Theil indices and organized a 5k GPS  
walk for a line that spelt out 'quantify

this' to the Ob's eye view. They liked  
that they were collaborating with atomic  
clocks on satellites, their time set differ-  
ently to earth. It had a special relativity

A consultation meeting was organised  
by the Ob at the library, the only com-  
munity space in the area other than  
the local churches, the regeneration  
committee room, and the mental health  
drop-in at the carwash

Sandy talked about making visualisa-  
tions of cities and climactic phenomena  
and the power of datoscopies with like  
a mouthful of earth, ear to ear, and that  
he wanted people to... think about...  
and he was trying to... make things  
clearer and fairer. Tax could be based  
on an equation that subdivided cubic  
feet of properties with meritainment,



participation, genetic profile and life expectancy. We were the training set for a multitude to be extrapolated, it was a privilege, and results are only as good as the set and we need a random sample. Don't you see? He was exasperated. He wanted to help, he was excited, but we don't know what data can do yet, he said

El imagined 'better data' in black boxes with projectors made in mirrorless metal vaulted archipunctural observatories measuring themselves, assuming positions

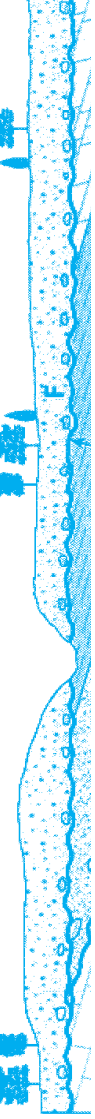
Life drawing, without an eraser

One side accused the other of prostitution, the other of masturbation. I forget which way around it was, it was heated,

a bit like negentropy. D asked what problems are you trying to solve again and how? I know I'm just a soft machine but... Ab shouted that we've had 15 surveys done this year alone. Use that bloody data! A real-time census? Can you sense us now? Je suis survey fatigué. Data mining hits the inside of my cortex

J said it was an experiment not an observation, and quoted Leibniz at them, they were after all a reading group: 'There are certain experiments that would be better called observations, in which one considers rather than produces the work.' The Ob is representing *and* intervening. We don't live single issue lives or simply live as populations

Sandy said the issue was to do with



self-selection, unconvincingness, unob-  
servation, and he needed total random  
coalescence. That observing a phenom-  
enon, changes that phenomenon. They  
said, exactly! They were different sides  
of the same coin. The reverse side of  
the reverse side of the reverse side of  
the reverse side of the reverse side of

Everyone voted. It was 52 for, 48 against.  
The Reading Group only numbered  
6 and others seemed to be drawn to  
the novelty and the inattention. Sandy  
asked that they forget all about the  
meeting to enable unobservation. As  
they walked home the Reading Group  
agreed to do the inexact opposite.  
Sandy's means to an ends failed to em-  
body his stated beliefs and the effect  
was immediate: affect. They felt like  
a resource. Silhouettes of automaton

doppelgangers down abandoned mines  
of rare earth humanerals. But in that  
moment of crisis a new language  
started to form

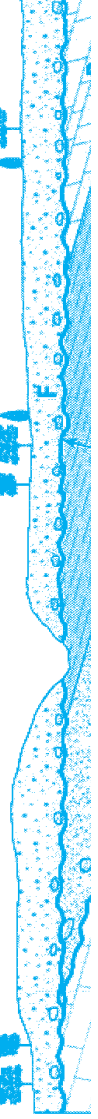
Contradiction as material

Offcuts of the reactionary

Moving things from one place to  
another

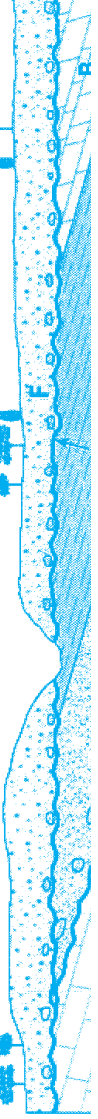
Inscribing with and within phenomena

At the next Reading Group meeting  
they read Alan Westin's *Databanks in  
a Free Society* and for thinging walked  
until it rained. It didn't rain for 11 days  
and one by one they lost their jobs. It  
was a blessing of sorts. They resolved  
to build what they called the Obs



2





We were reborn began, beborn be-  
gainst. Rubik's cubing epistemic angst  
into an observatory. The organic obser-  
vatory of demasurement. A disorder of  
magnitude. A theatre of measurement.  
An onto-epistemological obfuscation  
of the absurd

The first attempt looked like an oil rig  
tree house. A building and a struc-  
ture of connected parts that could  
support instruments but not humans.  
Empirically demonstrated when MM  
climbed up and it fell down

We refunctioned the old chimney at  
the sewage works with transmitting  
receivers and set a large roundtable  
beneath its tapering stack of fired  
earth. A handmade volcano naked eye  
telescope with a 3-metre wide oculus,

Collective  
Thought  
Collectives

Alternative Ad  
Company

Performative Architecture

Affirmative Infrastructure

Non-sensible  
Anti-philosophy  
Bowling Club

The  
Distributed  
Agency

Multi-modal  
Sensorium

Social Statistics  
Sculpture

Asymmetry Making  
& Spontaneous Symmetry  
Breaking Services

Office for  
Universal  
Localism

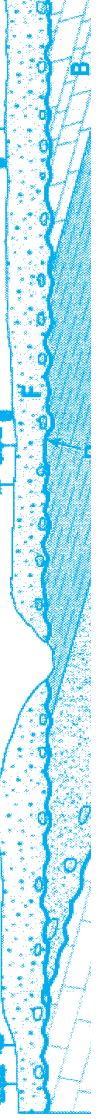
The De-centered  
Situated  
Data Centre

Inside of the  
Outside Union

The Institute of  
Affective Activism







lighting the observatory as the sun lights the earth. The acoustics were cute too. All meetings began with a scream against the sky and ended with a chorus of humming that echoed along the horizon as the earth murmured back in indignant indigeneity

There was no denying they were there

They continued their reading and thing-ing at the Obs alongside a program of agonism against the Ob. Like an armed reading group, building mutual social hacks, looking for an off switch for the subject object relation

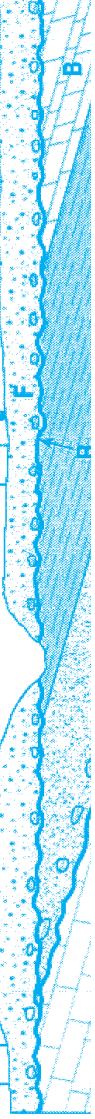
They loosened up every morning by playing hoopla with vortex loops and observed silence for about an hour a day

J called it the Obhouse. Like living in an interferometer at a glass walled distance. Split and cut together apart. For the measurement of small displacements. Defined by privilege and exclusion

To be *able* to be an observer  
To be *able* to render an observable  
To make two. Two make two. So  
make three, make hay, live in diffuse transversality

We started to draw and construct devices. Like a sand castle cinema. Always interlaced with the world in a sensual privacy of discrete experience and inner capacitors. Singularly inaccessible, only senseable, translatable, in modular pluralities





By the end of the 5<sup>th</sup> day we were LARPing with laserometers. It was precarious measurement that fulfilled the compulsion to name. To map immanence onto the empirical. The new observatory was an old adversary

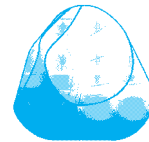
It was becoming a big performance. El swallowed the observatory to catch the fly, to image the setup that setup the image to objectify. I don't know why she swallowed the observatory, perhaps... Was a cumulative they sang, it could go on and on

Ab aligned himself on a seesaw with a whistling kettle, an astrolabe, and the moon outside. One might struggle to find a measure of compassion in the effect his under appreciation of the impact his measuring himself against

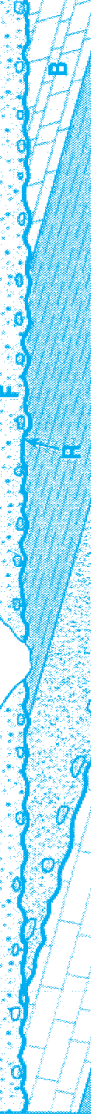
the abilities of the instrument itself was having, but the group were forgiving

Do you need more time? De would would ask. It was 33 degrees C and no one had had any light for 3 hours as they watched remotely from the inbox dreaming of a life less laptop

We liked speech like a picture, or like silent words like a picture speaks. And were unable to measure things beyond things, or rather things that weren't things, and things were more complicated than that. A confluence of scales, it made a nonsense of nonsense. Nonetheless we sometimes found some equilibrium, like a self-writing Gomboc





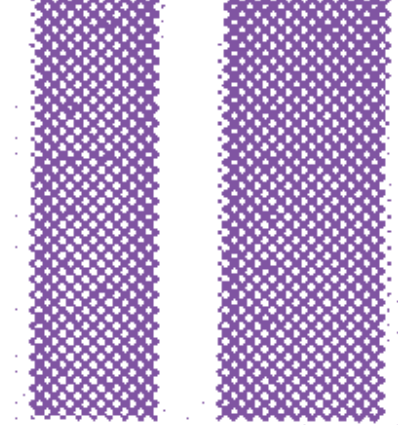


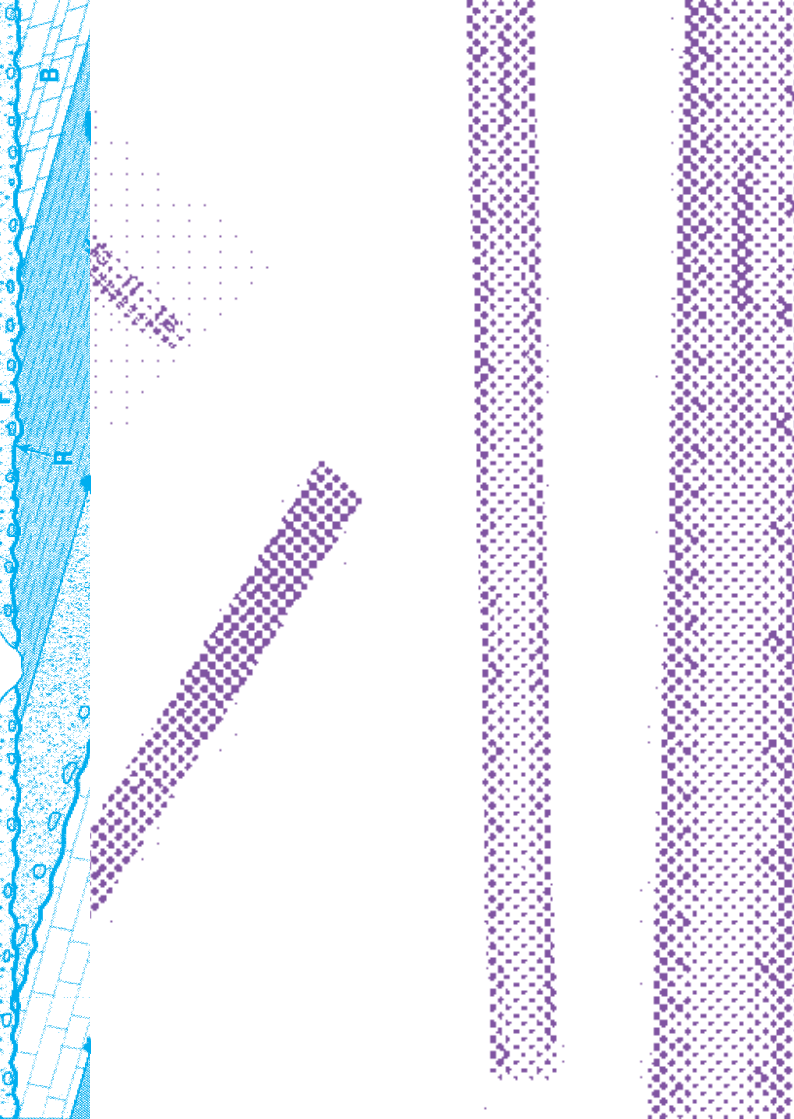
measure for measure for measure

They read that in the 19<sup>th</sup> century Herschel had promoted the use of amateur observers, to divorce observation from singular observers, vested interests, skewed results, increase sample sizes and muzzle falsification

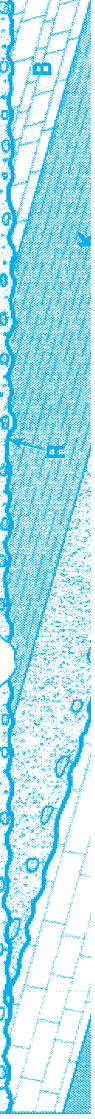
We gathered by the roadside measuring pollution levels using sensors encased in oversized quadcopter models of particulate matter. Plurally skewed mystics and anarcho-vampires of techno-scientific aesthetics inscribing on fantabula rasas. We had an absurd, increasingly pataphysical quality, but were beginning to get on Sandy's radar

The minutes of the meeting read: Our attempt at a radical representation of





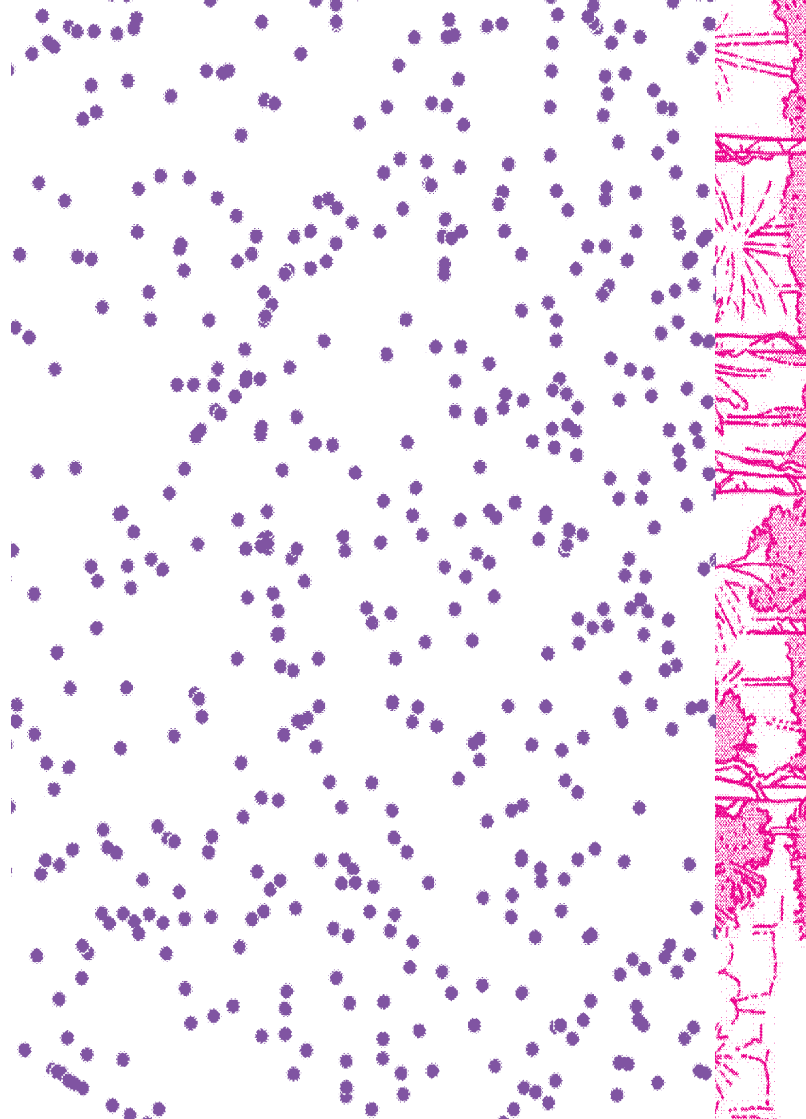
the observatory is still an observatory. So measured! Rebels defined by the system. Best we can hope for? Do two extremes make a norm? Does disquiet desire a nameface or rather an observatory to territorialize deterritorialized sprits? Look at all this stuff! I thought this was an act of protest. When did placards become sensors? Doesn't science enable us to think and work together? A common language beyond ideology, beyond the human? I like that. What's wrong with the Ob and evidence based decision making? It's the policy behind the decisions, that's what, the lack of rights, and the extraction of value and labour. To say what we're for, what were against, yes, but we don't know what we don't know. Keep it clear and complex. Maybe, but I want more in the system too. Like musical

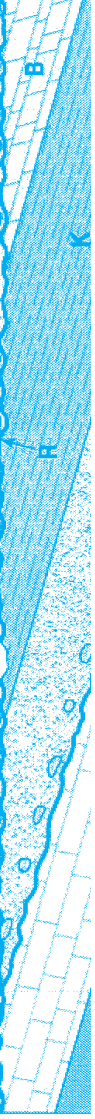


instruments tuning into and making the sounds of the universe. So let's make new instruments and add difference to the process of being processed

They had finished 11 bottles of wine between them. Ab could be heard walking off into the night singing: Observation of observation of observation ob observation of observation of observation oboobservation bob observation bo observation of observation fob observation of observationobobservationof

De said: The life of the mind and the body of the instruments and the data and the world. Oh to occupy the space between phenomena and inscription





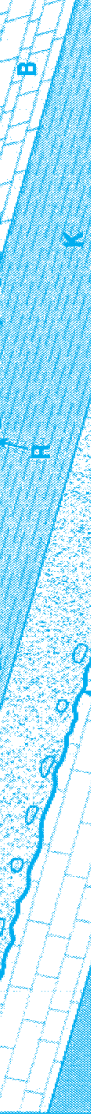
# 3

The parasite was becoming a phantom beneath a phantom, returning in plain clothes to govern freedom as convention of privation. Reneging responsibility only considering effect. Ledger fetishists of compulsory identification and enumeration in a world cup of formalising the world. The Ob was an opaque-eclipse now playing with opacity between its betweenness

The Obs on the other hand was enjoying itself if not exactly getting anywhere. They ran some of their data on a Tianhe-2 machine with a 33.9-petaflop, 3.12-million processor, requiring 17.8 megawatts of power, playing its part in slow cooking the world

They were determined to show information had a body. They tried experiments





in weighing the computer before and after downloading

It was easier to measure yourself against what you're not than what you are. Some amplified things to make them bigger than they were. In all the chaos a solid result was appreciated. There was quite a lot of wish-will-ful-mis-remember-apprehension happening. Inventing rather than predicting the future. In this sense, the Obs was doing a good impression of the Ob

It was difficult to do otherwise. There was always the promise of a better future in the future. Always history in the future. A knowable past and the future unknown. The past was always in front

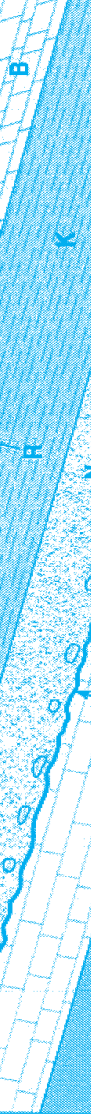
\*

Their sloganeering alternated across banners and y-axes in delightful pandemonium at the march:


BETWEEN BRAINS, BODIES AND THINGS  
TERMS AND CONDITIONS APPLY  
MAKE DATA GREAT AGAIN  
ART FOR ANTS SAKE  
RIGID ADHERENCETO BOUNDARIES  
FALSIFIESTHE OBSERVATION  
SOCIAL GATHERING, NOT DATA GATHERING  
TEXT IS AN IMAGETOO  
THETURNTOTURNING  
OBSERVATORIES OF THE SURREAL NOW  
EQUIPMENT FOR LIVING  
FORGET WHERE YOU'RE GOING  
PROGRESS BACKWARDS  
NO MORE MASTERPLANS



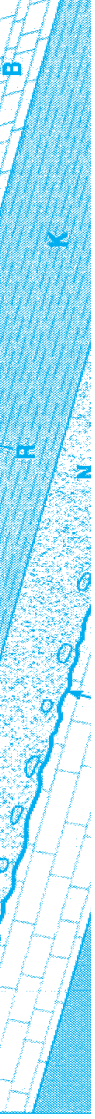




THE CANARY DOWN THE DATA  
MINE  
DIFFERENTLY USEFUL  
DE-COMMODIFY THE SENSES  
UNLEASH YOUR THING POWER  
MY PROFILE OF YOUR PROFILE OF  
MY PROFILE  
WE DON'T NEED A DIVIDE  
ONE TO ONE, ONE TO MANY, MANY  
TO MANY  
COMRADES OF  
SPACE-TIME-MATTER  
QUANTUM NOT QUANTS  
PRO INTRA-ACTIVE MUTATION  
ALL TERRAIN THEORY  
MAKE NON-STATIST ECOSOPHY  
GREAT AGAIN  
CO-MUTINY UNITY  
FREE DISCOURSE  
BETRANSCENDED  
HORIZONTALIZE THE VERTICAL,



UNFLATTEN THE HORIZONTAL  
RECLAIM THE LAB, THE  
OBSERVATORY, THE STREETS  
DISCUSSION NOT INSTRUCTION  
WEAR YOUR IDEOLOGY LIGHTLY  
AND ACCESSORISE DAILY  
HANDS OFF MY PRE-ATTENTION  
REIMAGINE REIMAGINING  
OBSERVATION OF  
OBSCURANTISM  
REINVENT THE EVERYDAY  
EVERYDAY  
THINKING IS PHYSICAL  
YOUR OBSERVATION HITS THE SIDE  
OF MY FACE  
LIBERATE DELIBERATE  
DELIBERATION FROM  
SOCIOPATHIC VOLUNTARY  
REDUNDANCY  
RESIST SYSTEMATISING THE  
UNSYSTEMATISABLE YO



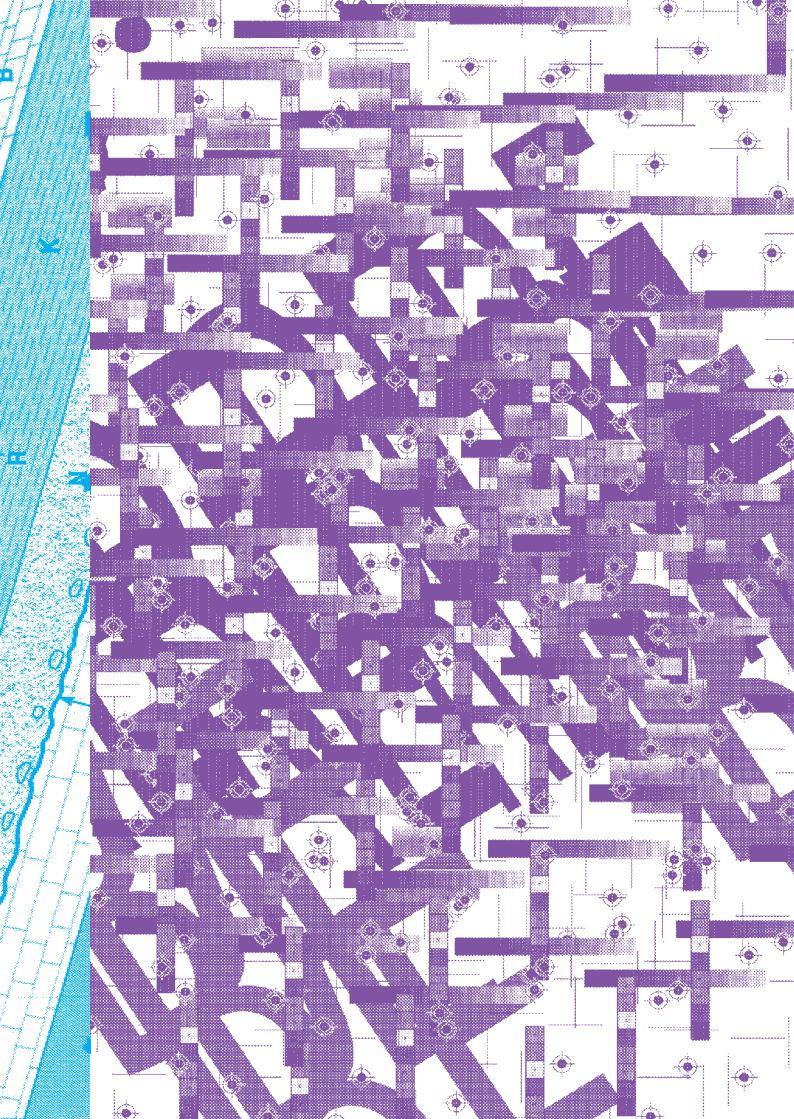
DEPENDS WHERE YOU START FROM  
INIT  
TOTAL IMPERFECTION, ALWAYS  
UNLEASH YOUR THING POWER  
BABY  
THE TECHNOSOLUTIONISM IS A  
CONSENSUAL ILLUSION OF CLICK  
HERE PROFUSION  
ALGORITHMIC IMAGINARIES AND  
ITS DISCONTENTS  
ASTRONOMICAL MASS MINORITIES  
OCCUPY TECHNICS  
RADICAL GENEROSITY  
DON'T TAKE SIDES  
NO MORE GENERAL PROCEDURES  
RENEWABLE MATERIALISM  
OVERPOWER POWER WITH  
DYNAMICS  
WE'RE IN THIS TOGETHER  
THINK INSIDE THE BLACKBOX  
MAKE THE WORLD MATTER

They were joined by:  
The Society of Mutual Appreciation of  
Differences  
Community for Displacing the  
Centrality of the Self  
The Non-verbal Association  
Groundless Aesthetic Experience FC  
& Many Others

\*

Reading began to be subsumed by  
thinging with instruments at the meet-  
ings and EI had become an obsessive  
compulsive observer


The number of people at the meeting  
was 6 (absolute), their average weight  
was 167.1 lbs (ratio), and the tem-  
perature was 17°C (interval scale). The  
height of each varied on a diurnal basis



and the variability of the weight of a person from day to day is a familiar fact of everyday experience

They discussed the instrumental errors arising from imperfections in the production of their instruments of observation, in particular telescopes and clocks. This coupled to errors due to the response characteristics of themselves as observers. For example, coordinating a visual observation with the auditory beat of a clock, led to slightly different results for different observers. There were often rows between them, but they never fell out completely, unlike when Maskelyne sacked his assistant in 1796, who had observed the transits of stars and planets about half a second late





There were random errors too, which arose from variability in the conditions surrounding the observations due to variations in the object being measured or in the procedures of measurement, such as meteorological variations affecting astronomical observations. There were also empirical errors of computation once numerical observations had been recorded

We tried to visualise the quantum field in a football field. Writing in chalk: The Heisenberg uncertainty principle states it is not possible to measure simultaneously with arbitrary precision the position and momentum of particles such as electrons or protons. Closely connected with this is the second aspect of measurement in quantum mechanics, namely the recognition that

there is a physical interaction between the measurement instrument and the measurement object, a subject not really developed at all in classical physics

High on reading, thinging, observation, transdisciplinarity, and coming down from defamiliarisation it was a challenge to not simply import science, but meet in the middle elsewhere and reinvent one another in the other in the one in the other on the one on the other on the one of the other of the one of the other with the one with the other with the

\*

Science was obsessed and so was art. They were both obsessives. All this time it had been using them. Culture



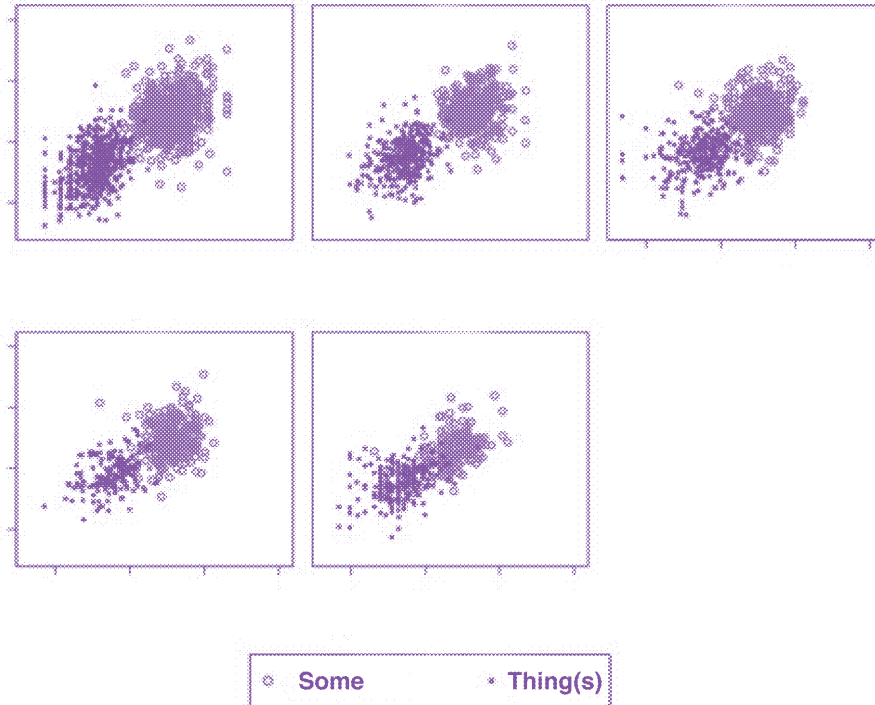



Fig. 118



was nature all along. The implications were huge. Nothing would be the same again. Nothing is ever the same again. It was unquantifiable and had changed. It opened up, but not too much. Maybe close it a bit again. Like minoritarian communitarians, noisette porpoises, infinite egrets, and stoned obdurate lip service comities. Said H to the posthumanist anthropomorphist

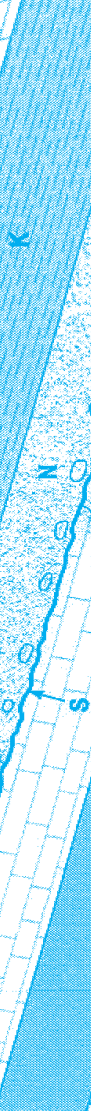
So busy trying too queer linearity we overlooked that the line had never been straight in the first place. The lively nothingness you cannot sense beyond the edges of the paper horizons. It was inhuman. We were condemned to the index

They were totalized and the technology had become socialized. A growing

symbiosis like ant-fungus mutualism and complex host pathogen co-evolution of carbon-silica-capital-empire-meme-machines

No ventriloquism here, just shadows of the real. No such thing as particles either, just the word. Irreconcilable, but real nonetheless, in other words, news travels fast. Beyond measure, concepts as spectrums, perfectly inaccurate, impossibly so, never meant to be. Articulated noise currency. As it appears, not as it is, but that is an is nonetheless

After the meetings we went to karaoke and let our hair down. Usually math-core, powerviolence, and sludge metal




4

## A Yielding

They'd almost forgotten about the Ob and Temo in the reverie. Building an elaborate hegemonic palace of snow-balled nuclei and inner state apparatus. Rarely leaving the building

The Ob made their private life public and they could have accepted that, at least to reveal a greater structural pattern and inform egalitarian policy initiatives. But instead it was vectoralist class domination through backdoor public-private state infrastructure. Ascribing value to phenomena and then smuggling it away into Powerpoints for an administered life of soft transitions, customisable properties, bold colours, unusual shapes, and large sweeping movements to provide some



extra interest and movement as you move from one slide to the next. Ha, they laughed. We are such stuff as x is made of

But how was the Obs any different? Their digital imaginary was ok, but they were struggling with how to move beyond ascribing only one outcome or value for multiple constitutive relations. There was a problem also with their quantifications dispossession of the real. The observations misapprehended the complexity of observation too

It was wrong and reductive, like this writing. But with its own use or agency perhaps


Just as they were starting to lose faith or find confusion, Sandy asked to meet.

He said he wanted to avowal the mutual constitution of our entangled agencies. We felt cagey

Sandy arrived at the Obs looking ruffled but coy. He said: Yeah ok I like what you're doing and I think we have like some consanguinity and when I first asked how to let the city run itself I never expected another observatory to emerge and like, it's like kind of dark bright and maybe like dialectical monism and I've always liked like-nesses and synthesisers and... He was babbling

He said he was convinced everybody could learn everything and had never stopped building since he was a child and had been the person he wanted to see in the world. A personalised learner

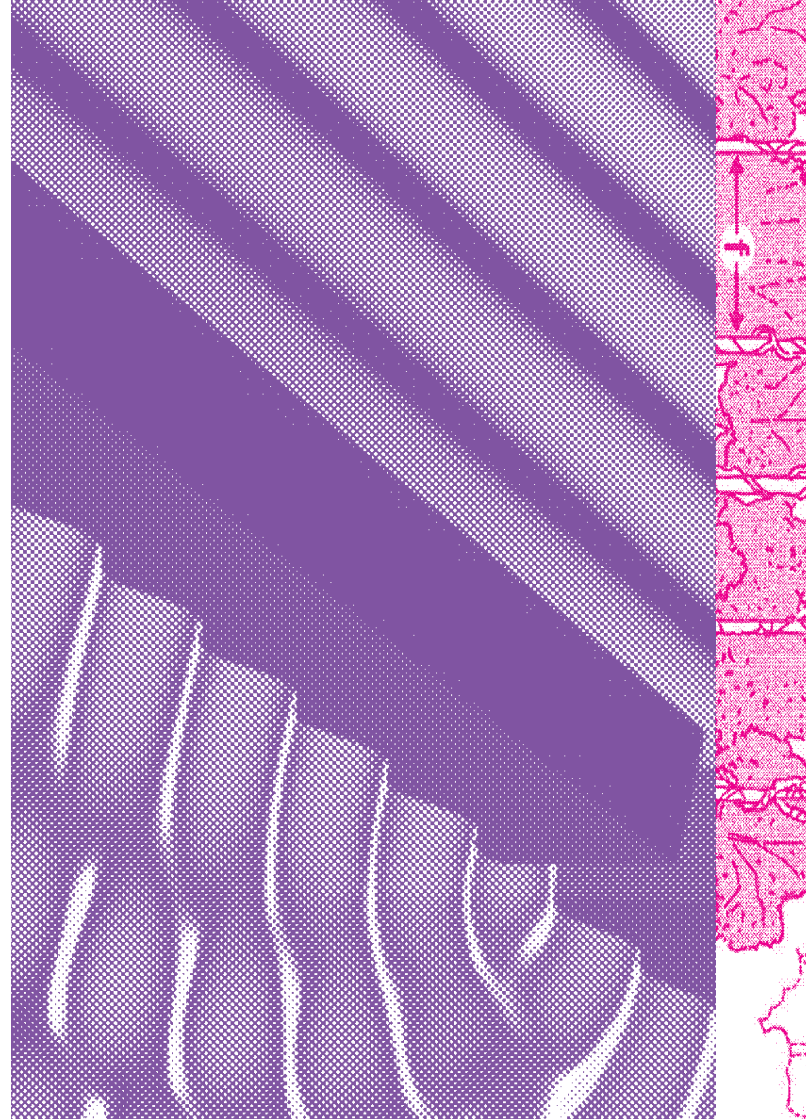


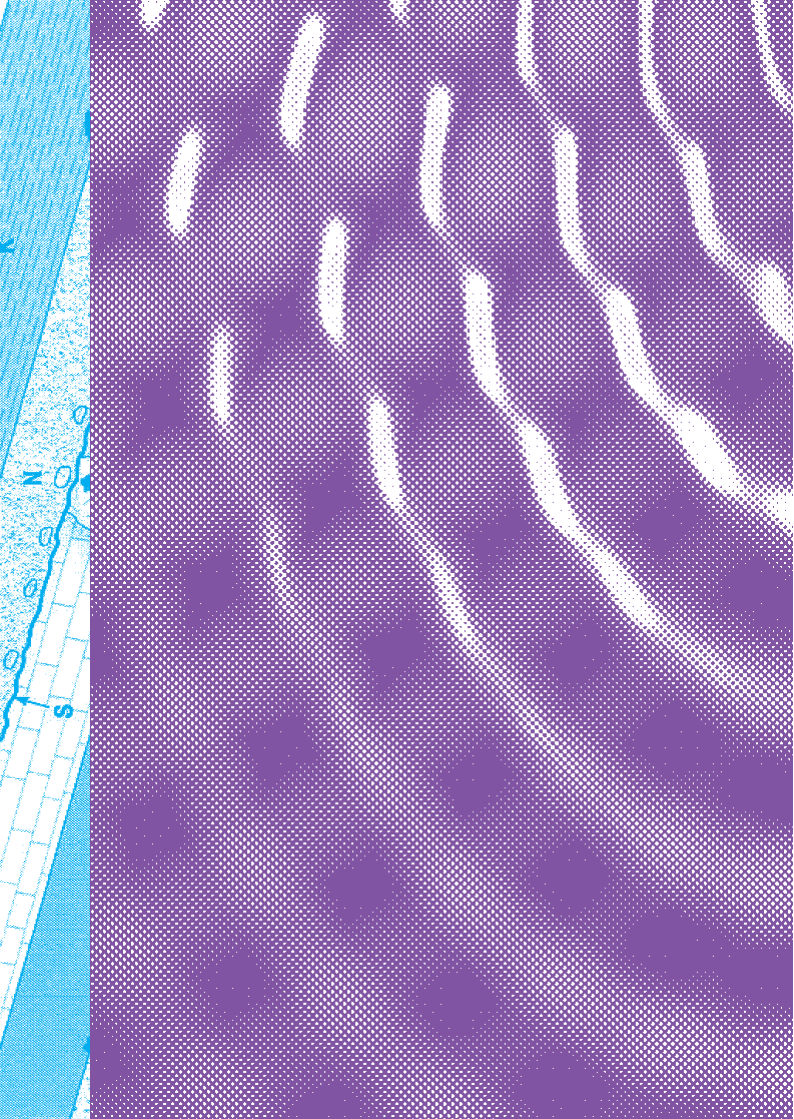


in need of monitoring systems. He was an expert in making technology needed. Turning the world to text. Observation over experiment. Answers before questions. Predicting more predictions. Finding the predictable. Obscuring the background. He started sobbing

Where had he gone? Reduced to a pattern tattooed on the inner dermis and neocortex. He bled data viz and just wanted to retrain the city like a body with social plasticity and calculate the spirit of traffic jams. But it wasn't working. He was breaking down before us

The proliferating normativity injection moulding of the neuro-oh with freemium locked bodies into estimation was becoming an existential threat to his existentialism and humanism.






Control creep was spilling over. First it was micro events, principally the Reading Group, but also resident users had learnt to de-optimize feedback

In an answer to an emptiness he saw in the world, he'd been stuffing the world with a worldview. A world full of holes was now full of wholes and entangled quirks at the centre of self-reinforcing loops

As more and more was made superfluous the earth became unhinged and the ruse began to grow until sap from an irrepressible latency always in the plural, the res publica, syruped back out of and into privacy and the public, and the unknown back into intelligence, as if an eco technics of common difference  
And from a kind of chasm in freedom





and control he began to speak differently, from an unspecified reality and asked to join the Reading Group and the Obs, as if change needed him

They'd left their jobs for the Obs, now he'd leave his Ob job for the Obs. It sounded stupid and he always thought the image of the 'deadly statistical clock' in Dickens too harsh, but now somehow his time was up, to be reset, and the Ob would tick on without him, becoming a penumbra of his former self, his almost nearly

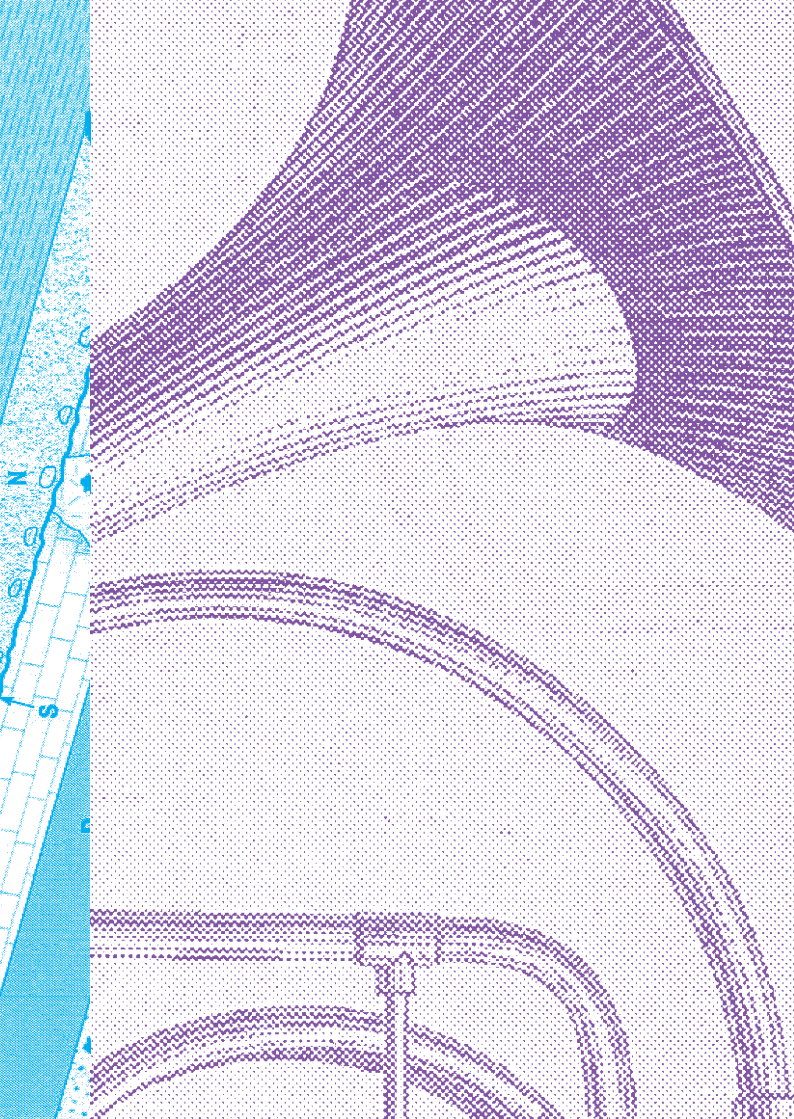
Enough promoting inefficiency within predefined competencies of doubtful remedy that invited only greater tyranny. The misapprehension of theft was the answer to redefine the question. He'd always wanted to redesign

the circuit or the system. Now he was content to become a signal or a switch. He needed them

The Reading Group were somewhat dumbfounded and embraced him in exalted suspicion. It was like a play, a joke, a dream, and there were hoots of laughter

They danced to Hildegard von Bingen and bonded over a shared love of octopus cities and the mystery of the lone seahorse found upstream and its possible community

They agreed there would be no special weight. Always a roundtable and meet halfway elsewhere in situated particularity of the life we lead, make, and are given in the few inches between



others' left and right, ups and downs,  
and they were well on their way to the  
world travelling through them



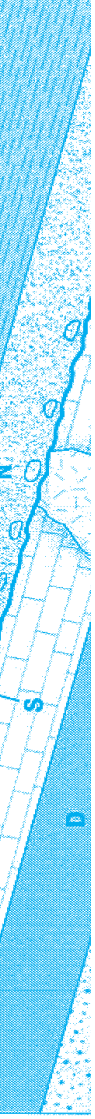


# 5

It went up a gear. They occupied the observatory to occupy science to occupy capital. Sleeper cells that didn't believe in the concept of a cell, in strange attraction

Sandy and the Reading Group like a ante-logistical lovechild of neoliberal communitarianism, citizen science, retribalization, observatories, and public libraries. An unglamorous haptic commitment collective of unlikes. Splicing myth back into nonterminating and nonrepeating waves of open-endedness. Unsettling brain weather as clouds of relational databases hung heavy above them

They wanted to add another layer. Another atmosphere. It was about the forces they were capable of mobilising



They were spiritual geographers and white hats with morphogenetic fields and a knowledge that began in aggregation, excess, and difference. Asking again and again, who is we?

We became more content with the vagueness of the event and only had paradoxes to offer. But we couldn't stop self differentiating and learnt how to speak with and to Sandy's algorithms

Most of all though we were happily stuck in a self refuting idea with catholicizing exuberance to reformulate the observatory

With Sandy the troubadour in the fold the Obs blossomed in spooky entanglement, making incandescent instruments of the third estate and kindred

alterity. We became more interested in seeing round corners than around corners and went paraphernalia crazy

El would perform these long monologues lampooning scale with zero bluster: As if the 'l' in world had started to grow due to an apparent displacement of the observer moving around three fields used to launch a hundred ships in a parsec derived from an object's parallax from carob seed to naught point two grams of a 117-year-old lump of platinum-iridium alloy and if the distance travelled by light in a given time was  $x$  then the piece of string could be 72 hairsbreadths long and to get a millijung, just divide  $R$  by 1

De's favourite apparatus was the body. It was relatively easy to control,




maintain, and augment, and had a good array of sensors. We're born naked the rest is measurement, she once screamed for the length of a forearm

Sometimes they would sit around sensing each other's senses. The 21 and more. A geek-ontolo-orgy. Mixing time and touch, thirsty heat, and painful smells. Juicing their corpuscles, tickling the pharynx and watching their eyes dilate as they tweeted and double dropped the sense of agency, becoming observatories of themselves

H was non metric but then again it wasn't strictly metrizable. Beyond the bell jar it made even less sense. Measurement had been granted too much power, H felt, with little measure of its gravity or impact upon the





masses and the effaced, swimming in  
the oil of the vial outside the bubble of  
the spirit level

We were looking for unconformity.  
Evidence of change in perpetuity.  
Compassion even

With Sandy's help we built some  
instruments

### **The Multispecies Telescope**

A things purpose changes

How to see?

Out to sea

Where to start?

A reinvoation of agency

Of multiple beings

Ok

More diffuse

Maybe

The allure of the difficult

Rare and hidden

From foraged wool clung to wire  
obstacles they spun and dyed and  
weaved their own ethics into quilts and  
Kintsugi patterns of golden joinery and  
loving modularity  
In invitation to variation

Like a radical decentring of happy  
accidents beyond correlation and all  
too un more than non

A thinking that grows  
like a large hadron kaleidoscope  
Rendered life constitutively symbolic  
living with and through signs  
Distinctly continuous





Vanishing paths

In capacious detours and retreat

### Adjust the Perspective Dial Dial

To intersubjective community and the modality of reciprocal difference never coinciding with itself

Positioned atop mountains of breaking bread and termite mounds. Sans masterplans or mastery or proprietary invention or jobbing agencies

Commoning cooperatives full of head nodding windmilling eggnog and the delicious paradox of representation

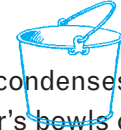
### The Fungal Anemometer

It could detect the wind beneath the ground. The loaming medium of the soil atmosphere and parent materials loose

above the bedrock

### The Ø'clock Bucket

Behold a ladder set up on the earth and the top of it reached to heaven with a bucket on top



Falling from the blue it condenses and precipitates into beggar's bowls on a hillside coupled to tributaries of borderline functionality

All given weight and funnelled further through clockwork mustard leaves. Sensing gravity through sequences of nucleotides. Sometimes growing sideways into the pool. Making a mirror and a tool and the object

Less dense than water

Floating at exactly unpredictable times



## The Tidal Orrery

We made a reservoir receiver  
To borrow a little river  
As the massive bodies squeezed the  
earth

The slowest phase  
besides rises and falls  
of empires or evolving tails  
and emergent waves of naturecultures

Through a low jig gate like an itsy  
bitsy spider it gushed with liquidity  
motioning an orrery of trans-Neptunian  
objects. The minor planets made in  
coaxial cables and satellite dishes,  
including (225088) 2007 OR<sub>10</sub> the largest  
known body in the solar system with-  
out a name, discovered in 2007 at the  
Palomar Observatory California with  
one known moon 60 miles in diameter.


The same width as the 2017 wild fire in  
California

We wanted to name it, but discovered  
only the discoverer of a particular  
object may suggest a name to a spe-  
cial committee of the International  
Astronomical Union

The website stated: If you have a name  
you would like to apply to a minor  
planet the best advice is go out and dis-  
cover one. We went ahead and named  
it 'Anyway'. We were a bit cavalier like  
that

## The Writing Device

The writing writes  
the writing  
writes the writing  
writes




the  
writing writes  
the writing writes  
the writing writes  
the writing writes  
the writing  
writes  
the  
writing

### Gnomons in the Sand

The realness, yes yes yo, sang El and De, the diorama queens of urban bricolage. As they built their mnemonic totem gnomon. Think Watts Tower in willow, second and third year salix viminalis with concocted armatures from abandoned gleanings. End of life care for terminally ill minerals. Palliative compost heaps of industrial ecology. Ordained metallurgy of latter-day scrap

NON-HUMAN  
SO HO  
RIGHT NO





Time's arrow pointed due north parallel to earth's axis inclined to  $51.7759^{\circ}\text{N}$  on the circle of latitude. Writing in shadow with light. Keeping time with negative space. A slender parasol of the 4<sup>th</sup> dimension

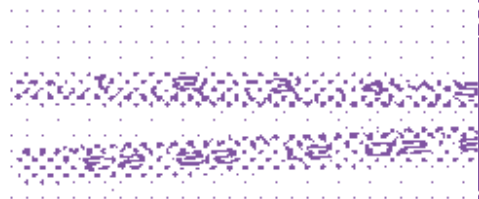
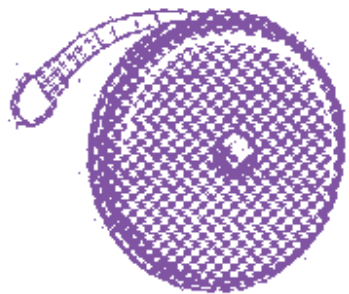
The photon dreamt of photosynthesis and multicellularity on the 8.3 minute commute from the sun to the muddy palimpsest of the shore and the gnomon's splendid embrace


The three bodies spun the tide and the Reading Group swirled too, withdrawing and redrawing the dial each day like whirling dervishes playing spirograph or the shepherd moons herding Saturn's rings

### Art-labor-observ-atory Story

An elaborate lab rat and votary rattle rebooted with astrolabour oratory and heaved in vivo loaves of the very old and the very new with one word before and after another

The sea was now no shallower just spread wider  
Thickly reading the meters of sovereign métiers  
Forever in correspondence  
Writing to and reading each other's news of change  
Otherwise there was no way of knowing






# 6

Between the equipment interference and instrument making we made all manner of things:

Notebooks of observations using ascii traffic jam bindings and MT Grotesque for the type mimeographed over bleached govt white papers with felt sense for the covers. J said it was an insulting love letter to the history of printing. H thought the books were easy enough to hold and liked the resolution

And posters. Fibre liquid screens motioned in movements of pulled forces into thinnest layers of zipping silk and slices of magic carpet onto racks. Then slipped up wet to street eye verticals slidden with hairs into the mortar's groove and globules of slowly dripping



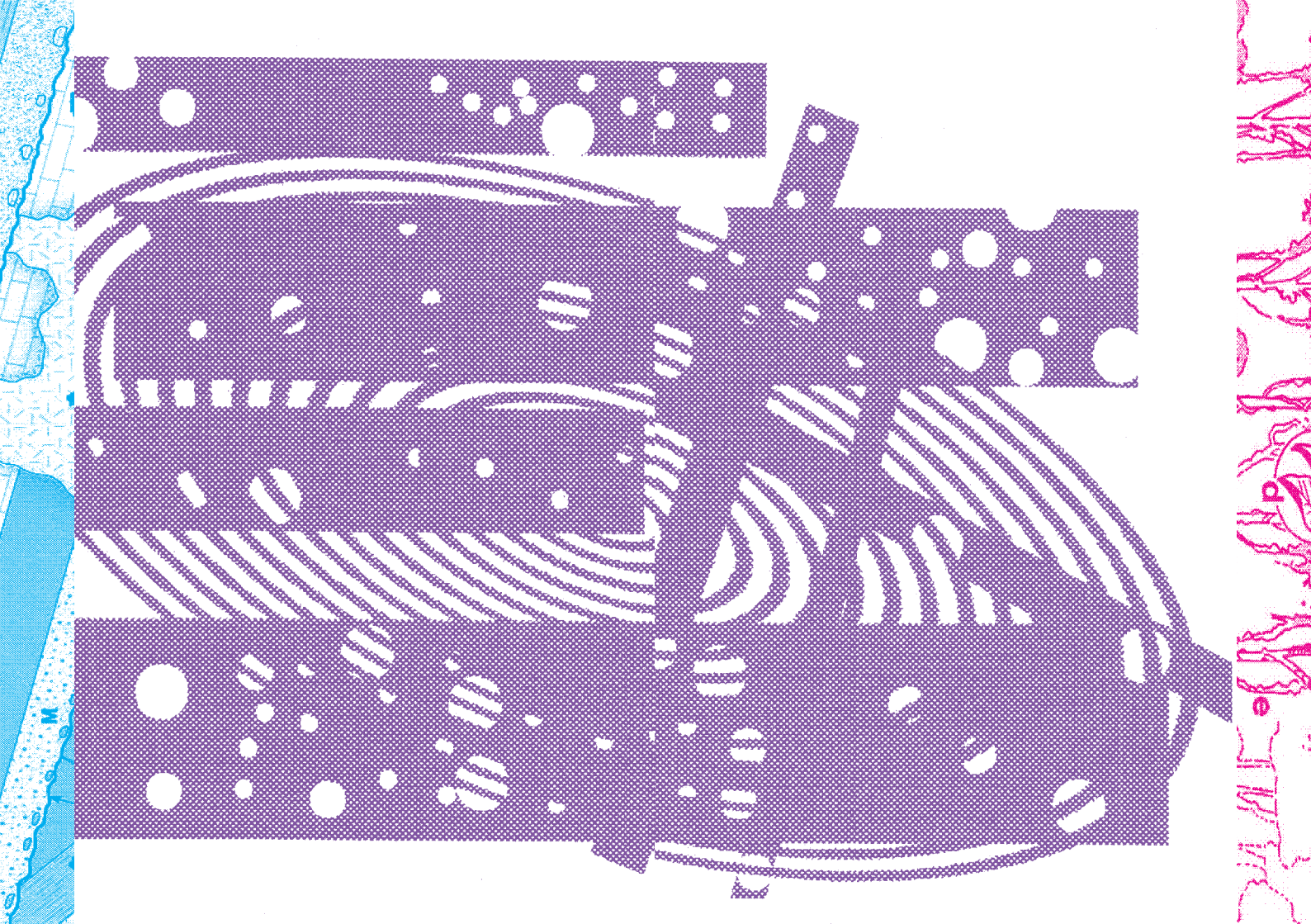
And art objects. An art object. The object of art. Art objects to objects. Objects object to art. Art objects to the objecting objects. The objecting objects object to art objecting to objects. It's a right scene. Then MM objects to the invention of objects. Sandy says the totem, the coin, the space of objects, the church, the museum, etc, are objects of power. Big objects full of little objects. Art made objects. Ornate anchors of power. Power doesn't object. Then art and the object cracked, turning to matter, and art, the object, and the art object were no longer concepts, no longer made to exist. Power cracked too. We have to make our own outsides said H

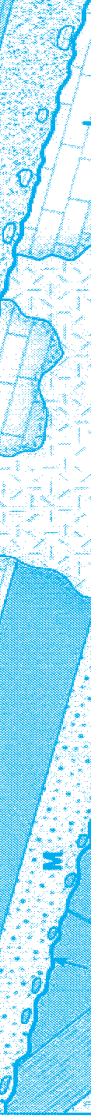
And we asked why do words look the way they do? Their strokes ape the contours of the landscape, of ecological

scenes. So the outside is in the text and language is nonhuman. Seals read tides, trees write in rings, and text crawling bots are illiterate by comparison. Rimbaud meet Ribosome, who reads the sequence of the messenger in codons and writes protein like prose. Symbols non arbitrary. Not a veil of the world but of the world. Phenomena inscribed in phenomena. Subject not asunder, nor lingua enough. If all could be written then dance would be fluff

And satellite astrology. The United Nations Office for Outer Space Affairs Index of Objects Launched into Outer Space said there were 4635 manmade ones but the Goddard Space Flight Center measured 2271. The sideways speed kept them spinning and the zero-g debris made more debris







A space of waste and cascading ablation. The United States Strategic Command tracked a total of 17,852 artificial things in orbit lapping the earth. Falling into shadows of other bodies and a thousand tiny eclipses

And we burnt a lot of fuel and sent one up to do nothing more than glint with alacrity. A weightless future fossil amongst the community of aluminium-beryllium and copper winged clockwork terrahawks and ballooned buoys of the silicon night in a slow so quiet waltz of telemetry


\*

Sandy organised a conference on the Ob and the Obs in the twin tumps. The keynote Mangold Waters said

we can have our own cybernetics and ontological theatre of radical mystery and dances of agency and digital psychodramas. Let's get along with the unknown and go around the status quo. The world can always surprise

We gave virtual tours. The sign above the door to the Ob read: Static notion of essence. The doormat of the Obs read: Abandon parts and wholes all who enter

The Ob gave handouts that said: We're changing, we've listened. Be the database you want to see in the world. Let's create optimum habits. Understand the pattern. Become the you you want to know how to be. Finally



We have something in common said Jeb, the new director of the Ob, to Sandy and the Reading Group: To serve as evidence, that is, to be a meaningful influence on a theory. Obedient servants of relevance. We study the linkfluence. The guts. The engine of the earth. Turn attention and nature on a lathe. Together but not one

H said: We're more into one eye looking out, the other looking in, and another looking sideways

Environmentalism turned up to one of the plenaries dressed up as consumerism and an infrastructure agenda. In the break they ate multidimensional mille-feuille and made a model of a leaky container balanced on a plane of reference hung by a metrological chain

to inform the subsequent sessions

The Big 6 had a stand promoting the Ob and the deskilling of agency in an 'uncertain world' clearing a 'path' for automation to generate your own machine actionable content

Observability implies notability implies observability, said Ab, just before the day started to unravel as Sandy did a presentation on nonlocal and incomplete theory, discussing an inability to describe two quantum systems or particles independently after they interacted and how entanglement can occur between two quantum systems that never interacted

No single timekeeper for the Universe. When something occurs it depends on




location relative to what *you* are observing. You're the frame of reference

Avoid strange causal behaviour (steering the future or rewriting the past) or calling events 'simultaneous'. It's only frame-specific. A choice among many. A matter of convention, of record-keeping, Sandy concluded

De did a performance singing: Being with being with being with being with being with being with being with being with being with being with

Out of the void a dynamic plastic self-organisingness appeared. The last, the following, the direct, from this obsv, to that, under obsv, a quite reasonable observation, to(o) many observations,





unless the observations can be.  
Because no observation could be,  
after all

The happy marriage. As it appears to  
us. As it is in itself

Numbers have only one property  
but are subject to operations

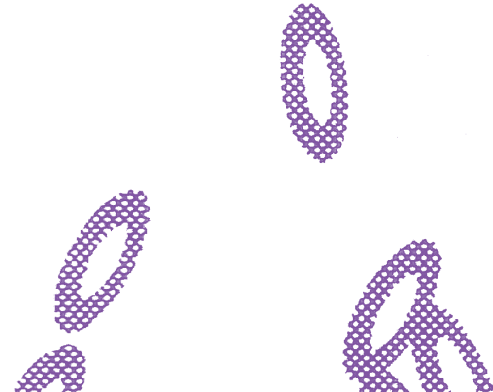
And all models are essentially wrong,  
but some have utility and some multiply  
and divide and

\*

The next day they read MC Richards  
on the whirl without end, clay's touch,  
and form as the corpse of process,  
diffractively with Norbert Wiener's cri-  
tique of applying teleological prediction

to social forces, and drew mandalas for  
thinging with just enough inherent  
uncertainty, when they began to ob-  
serve that...

Data had begun to leak in silent dias-  
pora from the centres of the Ob and the  
Obs. Their you and me broth, defined  
by its periphery, fissured and nodes  
became lines became nodes became  
memes and other observatories began  
appearing





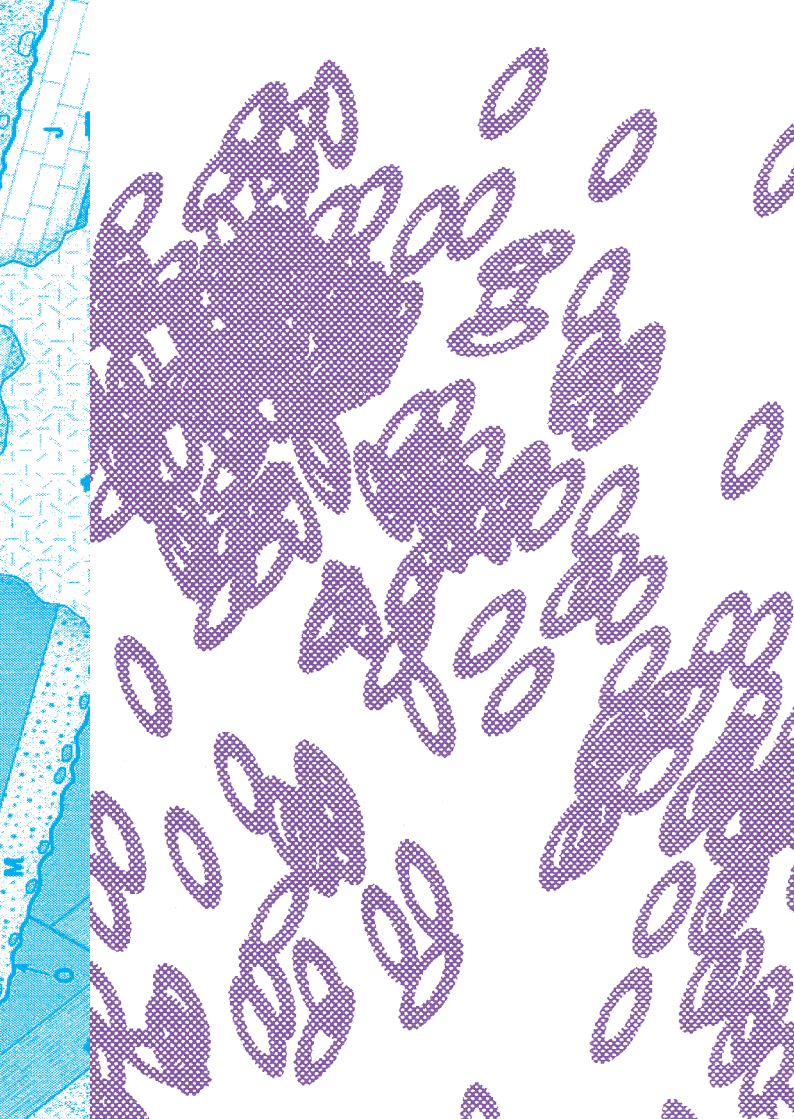
# 7

Observatories started to blossom like a virus simulacra franchise

Once before (and always) observatories had become outmoded, equipment forever outdated and updated. Epistemic things no longer epistemic. The Ob and the Obs had kindled another retrograde awakening. Conjuring observant masses like the Tesla coil or Foucault's pendulum at the Griffith Observatory

Lines in the sand casting the world outside in. Reiterating incisions reupholstering and soft furnishing the universe

New observatories like an ablution debut dunking a chocolate dispositif in old money. Others were practically cardboard boxes or idea rafts. Different




every time and like the sampling rate, only as good as the original recording, but the difference was not discernible to most human ears. Or like how most neutrinos (including those emitted by the sun) pass not only right through the observer's eye, but through the earth itself. It's hard to imagine what the biology or evolutionary history of a creature whose perceptual system could detect neutrinos would be like. Our biology and evolutionary history do not provide us with sensory systems capable of doing this. There were lots of opportunity to explore things like this in the new observatories

\*

The Reading Group visited one. It had a swimming pool. Xan the owner did





a plunging nose-dive 3½ somersault pike wearing a stellar deluxe sleep mask (with internal eye chambers) in a deracinated dream. As he emerged from the water he said: The best things in life aren't things

MM asked him what time it was and Xan built him a watch and said he could smell what time it was from time to time to time from time to time to

It was strange seeing how the observatory had become a phenomenon. They felt a little out at sea as they confronted the observatory's objective spirit. The building's own momentum building its own momentum

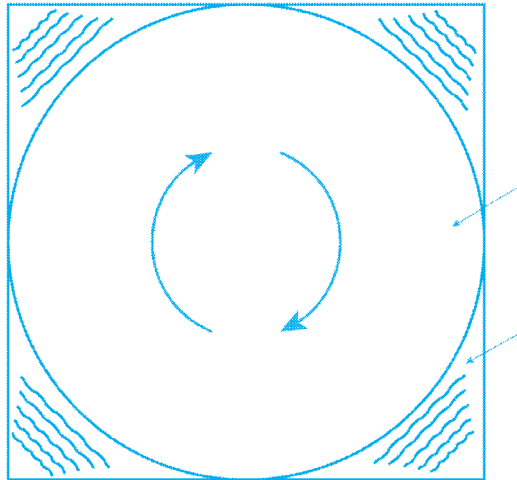
\*

The subject of power was no longer subject to power. Claiming rights from the ocean with rings of sophistry on every digit the observatories surfed contingency in higher states of surveillance. The Big 6's algorithm inserted itself greasing frictionless sharing. The net net effect had high manoeuvrability

They built piers to piers to regulate the platforms that regulated them, grappling at rights through partitions. Data subjects petitioned data objects and chanted we don't want your rights. I am not my desiderata

Becoming extensively anonymous valves in the free flow of capital the new obs were worthy farms of digital citizens in tiny re-evolutionally camaraderie with the worldwide community






of public health gravitational wave  
wildfowl human rights (amongst other  
things) observatories

It was kind of terribly beautiful all the  
units in disunity observing mundane  
actions like travelling, mining, forging,  
building, farting, packaging, plastic  
electric shit fucking everywhere on  
a massive scale in multitude. As if the  
observatories could hear the world  
crying out for help and transcribed it  
like an aria

Obarchipelagos of 5 parts per million  
bird migration ship building root sys-  
tem geological judiciary atomic time  
consuming credit counselling premier  
league pageantry zero hour contract  
safety nets that had been shrinking  
for some time





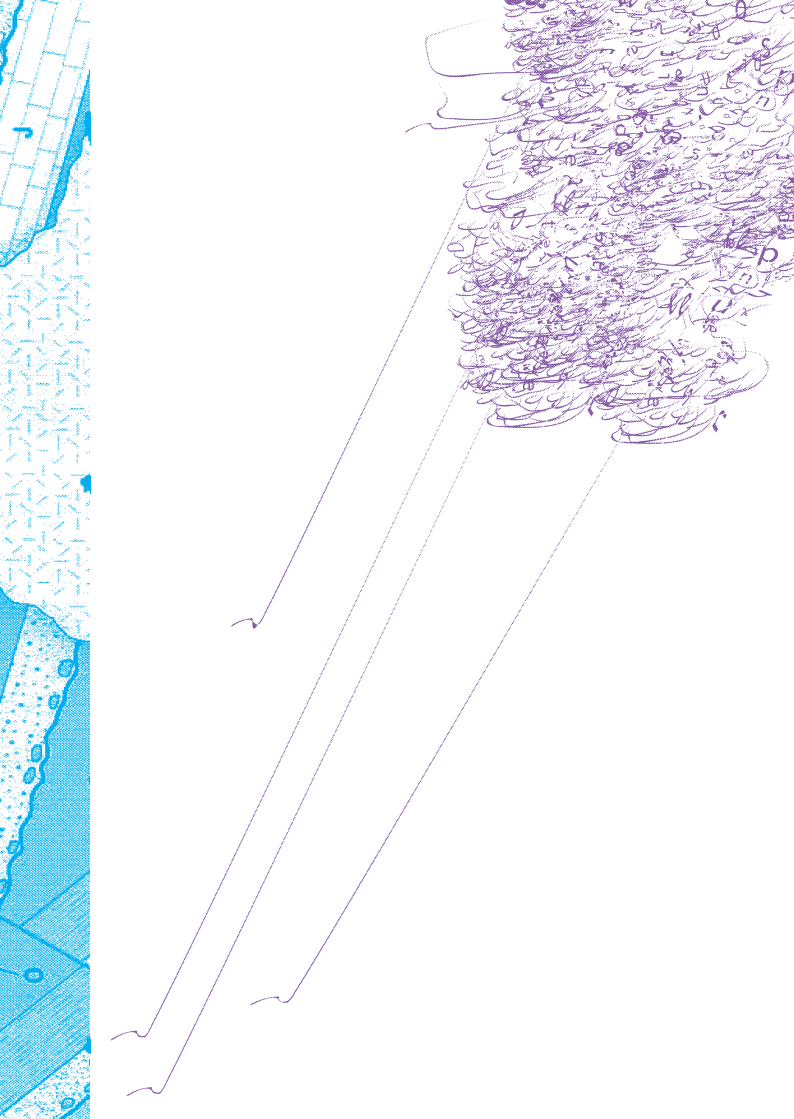
The market was saturated, so was the carpet. The carpet for markets was socially constructed, so was the market for observatories, so they thought

But still they kept emerging. Nonhuman humanises of drops outs widening bounds of occlusion. Everyonethings sensing abyssal colonies at the edge of the limits of inclusion exclusions mattering/not-mattering, facing the inhuman indeterminate non/being non/ becoming of mattering. Aesthetics of rupturing indifference arises in Aries liminality of no/thingness-liveliness with conditions of im/possibility that confront inhumanity and passion lacking action compassion together with, participating with, feeling with, once more again, with, *feeling*, thinking with, being moved by — all that can be lived

The edges of the limits of the limits of the edge. A dislocation caused by the termination of a plane of atoms in the middle of a crystal. Not their limits though. Nor the clues that shone with refusal and were hard to imagine without makeup. Ruminating on indeterminate coordinates. Everything you aren't. Face down. In bits

\*

The Obs began observing the observatories. Like a flood of command-f-ing 'the interface' on your interface it was difficult to differentiate between visualisations of believable patterns and relationships for users to part-to-whole with. To distinguish seity, in line, length, shape, orientation, and colour, readily without significant processing effort of



pre-attentive attributes

\*

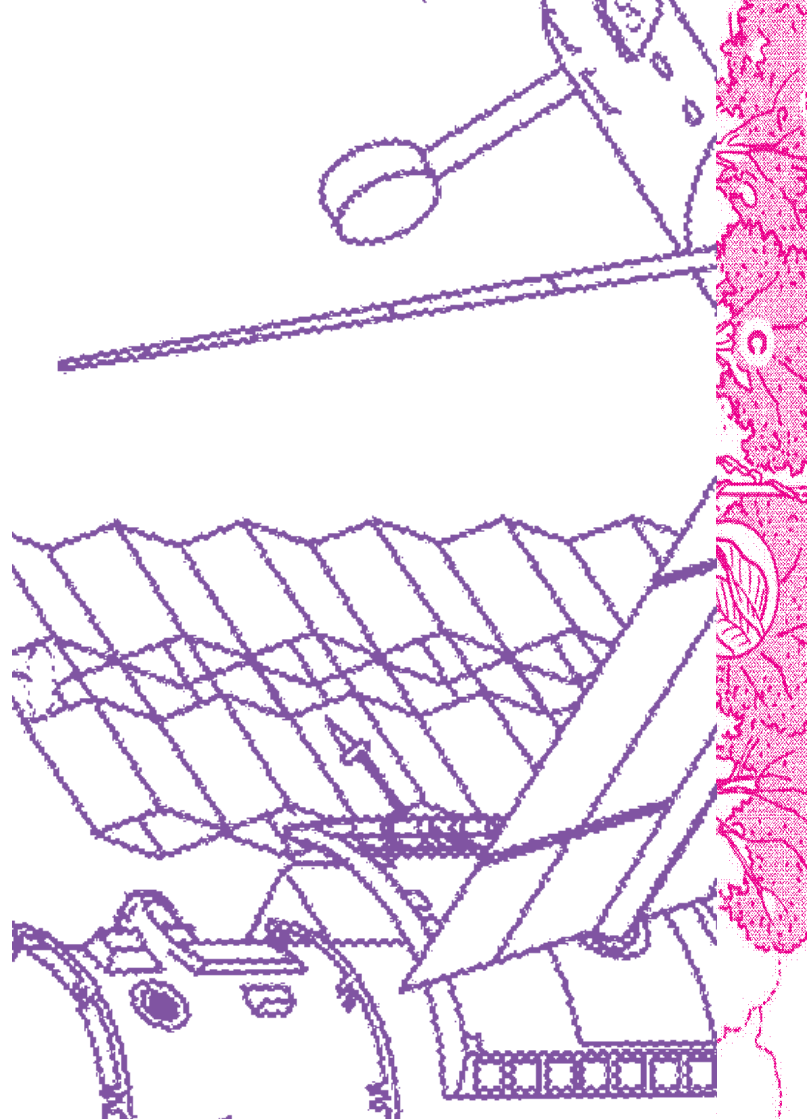
Administered with precision Xan was part of the new breed of Ob builders. Supine with BlackBerry thumb he only used patented multi-touch gestures for his visualisations and had a thing for snowclones. He was 36.7% accurate and couldn't understand why with all the infovism available people didn't act differently. He'd adapted to distance, saw only categorical identities, used a lot of propositional knowledge, liked reflexive verbs, and had been missing from himself for some time


More things in formation, granularity, participation, wearables, sustained-ness that's what we need, he said in



negative partisanship. He'd converted at an early age to conviction and promised to minimize noise, complexity, unnecessary data or detail based upon needs and roles. No such thing as a crisis when capital fixing problems capital created. Virtue signalling down cul-de-sacs. Receiving coinage and peerage. He'd worked in the porous foundries melting boundaries and circuit boards down into crucibles used for melting the new old new ones

He wanted to bring the world into the world with sensors like vaccines to immunise the earth against the possibility of change. It was Sandy 2.0 and the opposite of life being filled with improvisability. Suppressing our own iterations in a slow march toward incomplete bodies. No more software



A vertical decorative strip on the left side of the page, featuring a blue and white geometric pattern of interconnected lines and shapes, resembling a grid or a complex tessellation.

only services and architecture. So expedient, so convenient, so info

Blinkers for blinkers on an island of filigreed connectivity in a meritocracy of the dammed, read Ab's observations as he smothered Xan's roots with a crime scene of the latest forensics


\*

Agents of change agents, everyone was at it, making proto-penultimate observatories, between the sheets, difficult to tell which slide they were on. Post-ing, de-ing, re-ing, reimagining human neo-de-ing observing. Squaring nature's wrinkles to more-than-non-ism and looping decentred selfly post-ing loops. Re-ing to resist re if whying. The double life of De to the double de

Next door critters at the human ad(d) agency were carefully repackaging and de-politicising the latest technics for a new trans-species multi-sig co-op between the electric fish farm and the rainforest sea

There was even an Ob cookery show called Obportunity Knocks. A popular recipe was People Soup: First put facts into action to make a faction. Add truth and totality until it curdles. Now construct the self, and turn down the others to medium. Simmer until it burns a little and serve coagulated

The govt became concerned by the craze for observatories and set up a special ethics committee as smuggler of the unethical. Observers generally stuck to the traffic light system



It was outdated like a small tick box climbing frame in the desert next to a safe room and people did what they wanted. Like trying to bend a right from the 1970's in a confirmation hearing of homeless virtue or the Green Revolution


The govt announced a national programme of science parks and official observatories with infographic fountains and psychogeography candyfloss. It was part of a move to centralise observation and promote the idea that the outside of one thing was often the inside of another and the outside existed in the inside and the inside on the outside like a doughnut shaped fish bowl infinity pool

It was as if the whole world was becoming an observatory

Once books and notes travelled on horseback between a few observers and their observatories. Now all was light at the end of the tunnel and hair thin signals spun into microns of filtered utterance bouncing along in total internal reflection. Everyone a photon glossolalist transducing electronic matter in computer rooms of babel delivering search results for observational fragments like: nomadic doppelganger magic

\*


The Reading Group produced a manifestobservation that went something like: A value is ascribed to phenomena that becomes phenomena in turn a value is ascribed to phenomena that becomes phenomena in turn



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becomes phenomena in turn  
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A vertical strip on the left side of the page shows a microscopic view of plant tissue. The top part shows a cross-section of a stem with distinct layers of cells. Below that, there's a dense network of cells, possibly a leaf cross-section. The bottom part shows a more elongated structure, possibly a root or stem section, with some circular structures that could be stomata or vascular bundles.

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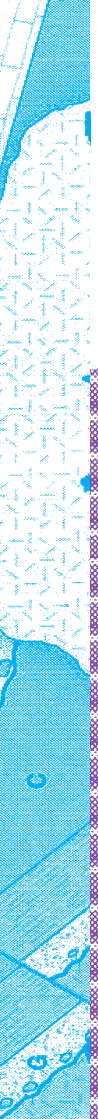
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8





The observatories were happily playing on the surface of things. On a many-sided elastic spectrum. With varying virtuosity, expertise, sportspersonship, sorority, and homophily. Sometimes like babies full of zest, sometimes like part-time late-comers, sometimes deliberately shambolic, sometimes deft, often in private. Slicing speech acts and representation in extra states of mimicry into pieces of action and carefully modelled and operationalised earth pie. Eating the crust, leaving the deep interior untouched


The appropriation of observatories and the world had a certain convenience and readymade currency that was mushrooming. But the Reading Group was becoming exhausted like dots and electrodes concurring on the retinas

of frogs with drooping eyelids

In private suturement Ab, De, El, J, H, MM and Sandy wrote discourses ad absurdum. Advertising their dereliction and performance with posters of instruments stuck to observatory walls. Many of the other observers attended and there was a roundtable after. De began:

**We**

Couldn't tell the time without space and the first instrument was the echo or the cave or the horizon and the first mirror the lake. Now lately we listen to light on the radio, dancing on smart concrete and polymeric terrazzo. And tbh the number of times we have all avoided interminable indeterminacy is staggering



On a bad day you could say we dug a hole and put a camera in it photographing itself dressed up as the universe. Or capital and evolution dressed in science. Fashioning observations that sometimes agreed with predictions, and sometimes were more like theory-fictions

No common scale anymore. No more heatmaps, histograms or network transmissions. Language laden at a distance. Once we registered glacial erratics, iceberg microphonics, and crowd sourced rhythms on the seismograph as a gestalt engulfing fugue

Now like a bomb disposal team attempting to diffuse the negative charge built into \*it\* and the unavowable feeling of inoperable tendrils taking

the place of others shaping and being shaped by the always already was, you know, always there

Think perhaps of the Obs upside down like an inscription device of the cosmos, writing notes on the earth to others

### **Instruments of Reason**

It was cold in the data mine as abstraction and the earth became seemingly more open and more hard edged. Dissected with lugubrious efficacy on tables of rows and columns

The observatory was no accident

Down the road in the library each concept was on a multifactoral spectrum. The librarian said: The science doesn't



lie, people do

\*

The performance was generally well received and they were asked at the after party by Jeb if they sold Reality Equipment made to order, which pleased EI

The next day they had a reading and thinging session in the portakabin for old times sake. It was refreshing. They read *The Cloud of Unknowing* and did paper marbling for thinging

MM said: Like a thousand storytellers standing on each other's shoulders can we explore how to get books talking to each other. Yes! said Sandy. I'm into flexible classifiers you know. He hadn't

been to a public library for years and as he analysed the library's classification system realised all the characteristics he couldn't code were the things he was trying to discover

The cloud fell to earth and we saw a kind of freedom in one another. Drifting off EI lapsed into privacy falafelling the ribbon and the illuminated apple between her forefingers. Before waking just right

We were happily deinstitutionalised. Had made a lot of noise, and instruments, and experience

And had found what we called institution — an institutional intuition, useable like a tool or a sense

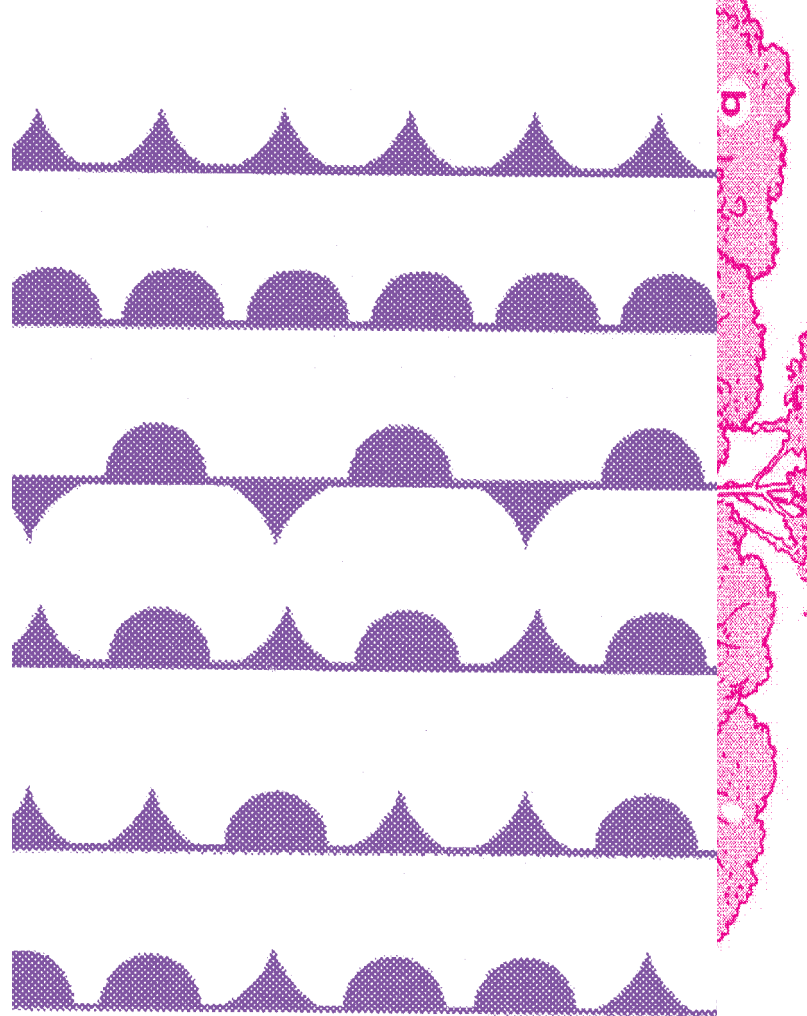
\*

Beyond an underlying cultural framework, an underlying material framework

And at base level a void

Beneath its unfathomability was a small clod and beneath that there was plenty of room at the bottom

No such thing as a blank canvas






9

The new lament exited stage left for  
the new ableTT

(Like a table that uploads a record of  
what you had on it and makes sugges-  
tions for the future)

It was part of the library's new UFO  
interior of Ultra Furniture Objects.  
It freaked the Reading Group out at first  
but they were more at ease with it now.  
Plus, the new programme of SOcial  
LInked Data following the first observa-  
tory pandemic made it easier to turn  
it off and provided freedom to choose  
where data resided and who could ac-  
cess it. Of course it came too late and  
few used it. But they had fixed the lights  
in the portakabin






We read *Nomadic Subjects* by  
Rosi Braidotti and wrote neologisms  
for thinging. Even neologism was a  
neologism once and revolution was  
a revolutionary word too, said Ab

We collected them in an almanac,  
adding the time and place of their writ-  
ing. Institution was in there, so was  
Lodd meaning:

The l in world  
The o and d in word  
The d in old  
Like an old world full of odd words

Inundata too, meaning to overwhelm  
with data or information. See also  
*Lycopodiella Inundata* — a species of  
moss with a circumpolar and circumbo-  
real distribution, occurring throughout




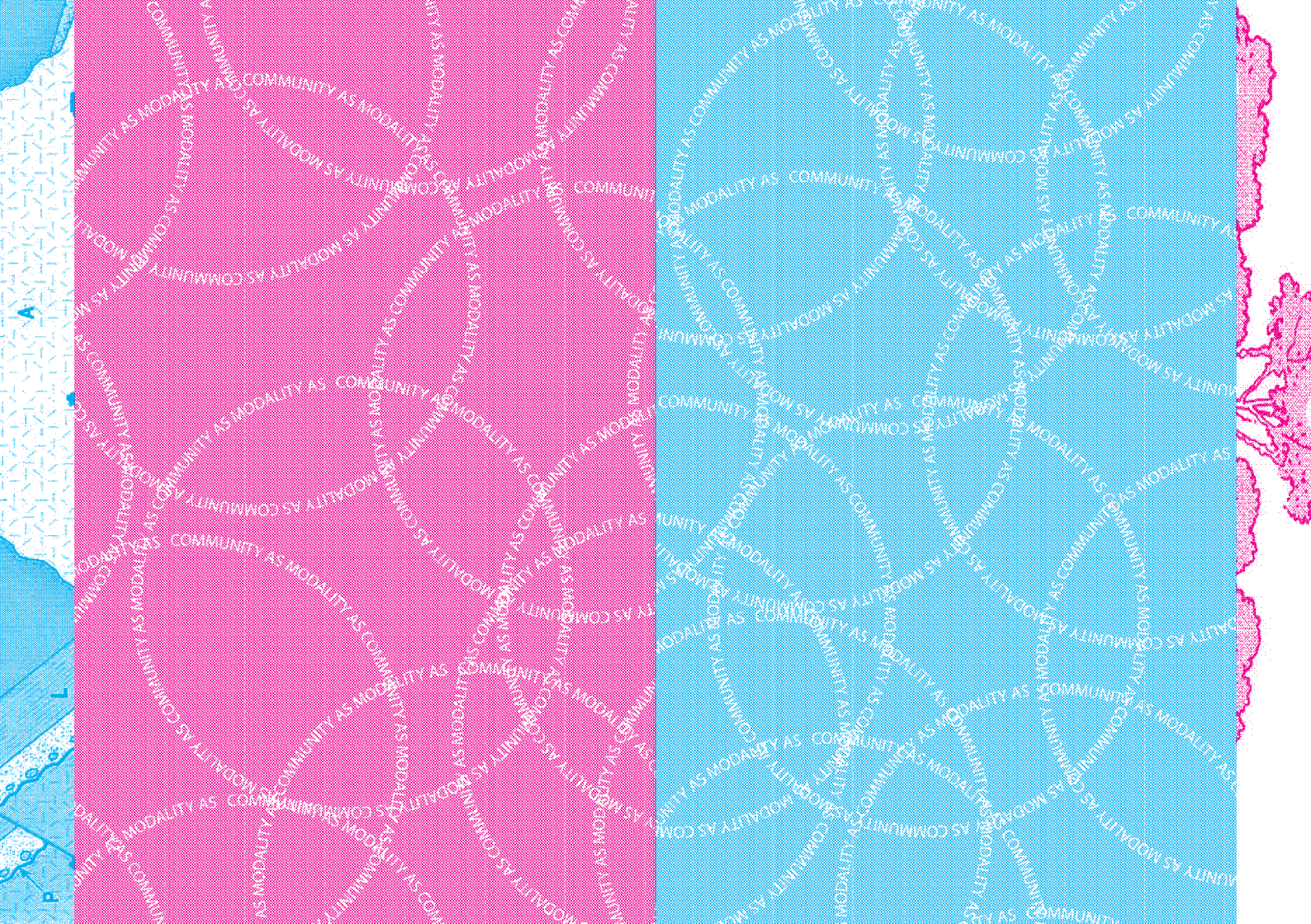
the Northern Hemisphere


Alongside the neologisms were other terms too. Some could be found at [www.newmaterialism.eu](http://www.newmaterialism.eu)

Abstraction, Accountability, Affect, Affirmative Difference, Agency, Agential Cut, Algorithms, Almanac, Angle, Angularity (Clinamen), Anthropocene, Apparatus, Apparatus of Bodily Production, Assemblages, Axiometry, Becoming, Body, Bijective, Capitalist Materialisms, Cipher, Code, Codomain (domain, function, mapping), Complementarity, Concept, Consent, Creative AND (vs. alienating OR), Creative Materiality, Cultural Entanglement, Culture, Cyborg, Diffeomorphism, Diagram, Difference, Diffraction & Reading Diffractively,

Diffractive Genealogies, Diffractive Pedagogies, Diffractive Creativities, Disease, Document/Documentation, Ecology, Emergence, Entanglement, Environmental Forms, Epistemic Unit, Equipollence, Ethico-onto-epistemology, Ethos/Ethics, Factor, Fearful Materialism, Fearful Symmetry, Feminist New Materialist Pedagogies, Frailty, Free Variation, Function, Gender, Genealogy, Generalization, Homeomorphism, Image, Imagination, Individuation, Informatics, Information, Injective, Instruments, Integrity, Intensity, Intersectionality, Intra-action, Inverse, Isometry, Isomorphism, Iterativity, Jouissance, Key, Laboratory, Language, Liquid Agency, Literacy & Agential Literacy, Materiality, Material Community, Method/Methodology, Micro-politics, Micro-practice, Model/







Modal, Nature, Non-Euclidean Geometries, Number, Numeral, Objectivity, Pain, Performativity, Plants, Poetic Materialisms, Poetics of Mathematics, Posthumanism, Power, Practice, Process, Projection, Quanta, Quantum, Quantum Entanglement, Realism, Re-, Recursion, Relationality, Representation, Signature, Singularity, Soil Fiction, Soilfarers, Society, Space-time-matter, Stickiness, Symbols, Surjective, Technology, Technicity, Techné, Tools, Transaction, Transduction, Transversality, Vegetal Ecologies, Virtual-actual Coupling, Viscosity, Vitalism, Yes *and*

\*

Without even noticing, reading and writing had replaced much of the instrument building at the meetings like a slow

snow drift and those days when you can hear each day that passed by

We were working through the image of the observer who had changed the world and how instead to interpret it

Amongst the excess of extraction manufacturing in never ending technomineral gold rushes fed with machine tooled hearts and minds and truths that were becoming truthier than the truth, lives were measured out in spoons of pollutant and the length of deferred promises to be worthy of the world

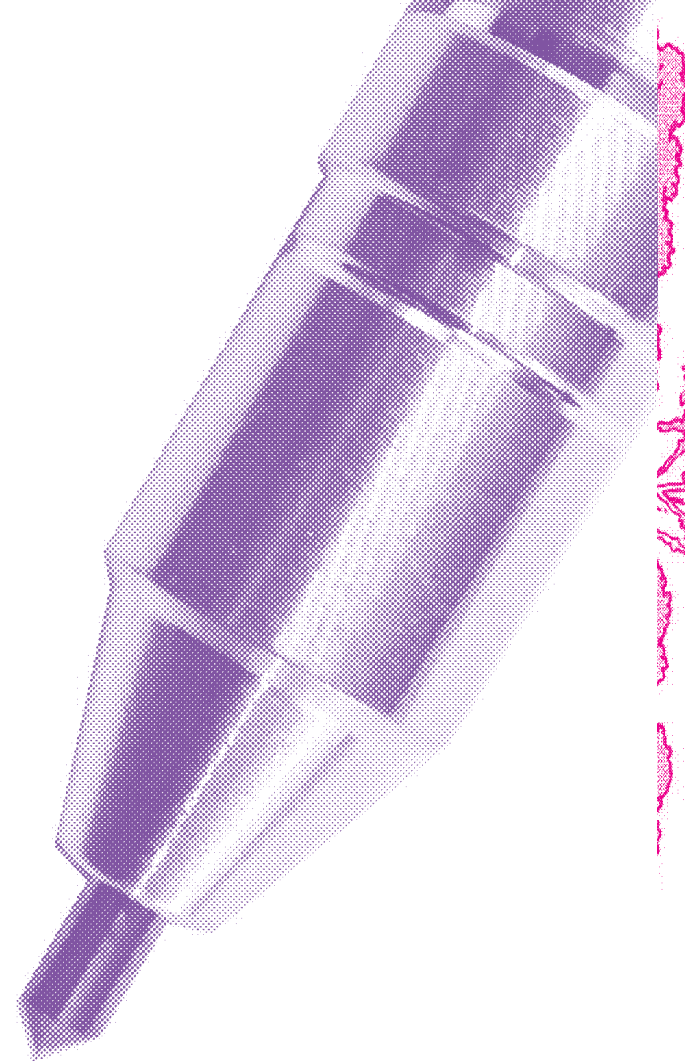
New imperatives were forming, but we needed a break and in Paris on holiday we paid a visit to the the innumerable incalculable unmeasurable kilo that sat within a jar gathering the weight of dust

that made it not a kilo

Enjoying moments of repose, they subjected their ideas to the pressure of time and ate fromage de tête by the river without measuring its depth and the background sailed into view

They returned on the plane successfully depositing carbon in the upper atmosphere like spray paint on a pane of glass. The carbon was forever trading places. Inscribing matter to a phenomena that was a phenomena born of inscribing value to a phenomena that produced a very certain kind of phenomena

As they approached the airstrip the ground resembled a map. The data centres that stored all the earth's

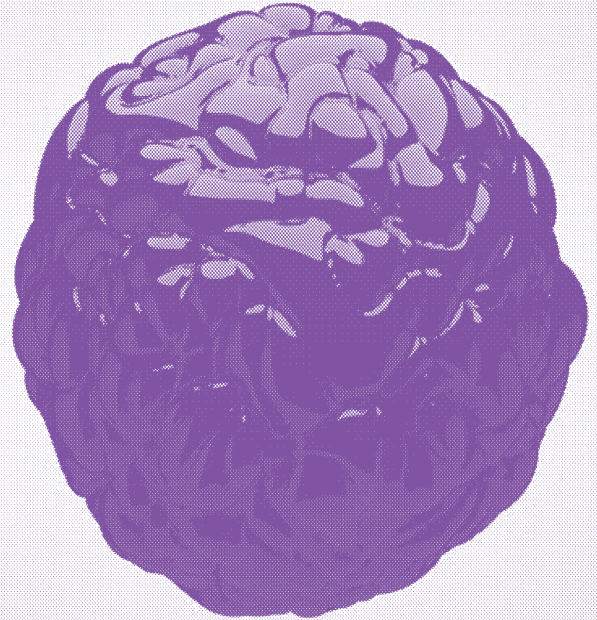



information fed by the observatories and other devices appeared to cover almost the entire surface of the earth making it a map of itself with nothing left to map but the marks left upon it. Roofs were covered in machine readable symbols and giant focus charts. The plane's tires screeched onto runway 09 pointing east 90°. The increased slip angles and longitudinal forces marked the ground and sent more particulate matter into the air

10

Things were always going back to normal. Sort of

The observatories were eking more and more of the excesses of the world into the data. Delighting and horrifying the public in equal measure. The Reading Group were now getting work as observatory consultants, selling bespoke Reality Equipment, and formed a community interest company and an observatory union. The Ob programme was discontinued discretely. Temo still served the centre of the city, sifting the sewage and sending in grit on icy days. It had no bank, often smelt, but possessed itself like the real possesses itself. Like a table possesses itself. It had a global sense of place, where lives lived elsewhere defined and co-constituted its here and now,





in camaraderie with other overflows of agency. Like a people powered internet in thriving globacity between rocks and hard drives drowning in borrowed capital and refined goods. Once it was architecture and voices that spoke, but informatics devoured and hybridized them now meeting in resonant equilibriums and flux

The Ob and the Obs had transformed into a multitude. Up the road was another observatory and another and another and so on, and so ob. Even an oboratory next to a labservatory. An undercommons of community observatories became spaces for organising collectively, studying matter, caring, and unlearning. Enabling new genealogies to grow and description by anybody in open Esperanto geometry


In a funny sort of way it was a measure of how good and ill things had become. It was a saving grace perhaps that the new observatories were always already outmoded by new relevancies and imperatives. Chasing ever evolving tails. Such was life. It called to mind those angelic lines from the prayer of St Francis: 'Lord, make me an instrument of your peace'

\*

At the start of spring they'd spent several days planting out the Obs garden, exploring how plants measured and sensed photoperiodism. By mid summer this had developed into a thriving small holding. Sunflowers and sweet peas mixed with tomatoes, beans, and spinach. It required a different kind of







calibration. A sense for water, spacing, health, and ripening. They saw light in a new light. It became a way to undo themselves in unalloyed bliss. Steaming manure from the traveller horses, the iron of the spinach like blood, radio in the distance, exchanges with other growers, ramshackle sheds, and frogs. It required little extraction or emissions, working on its own terms, something approaching multitimbral harmony

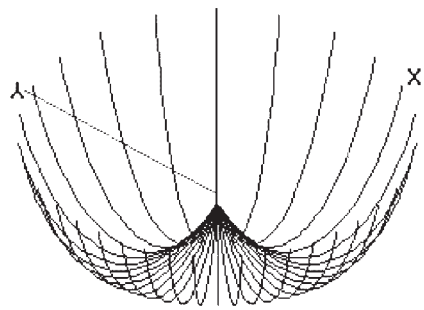
\*

The Reading Group met at the beach at low tide, built a stone circle, talked of plans for an orchard or an arboretum, and turned the orrery into an irrigation device of chain pumps and scoop wheels for the garden. The other devices became frames for growing and they

attached a sail to the tower and the observatory became a windmill. They amended the entry on Liquid Agency in the almanac, including references to tides, irrigation, and the watery substance of the eye. Easier perhaps to think of the earth contained in a ball of liquid

We'd found in the observatory a kind of measure of measure. Its limitation, its affordance. Its measure of restraint and transductive difference, its ingrained modality and agency. Almost heart like

As other news emerged in parts unknown and the earth slipped up intentions, we sat atop the stones with all our senses slowly turning in delight.



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E

# Obs

Sam Skinner

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