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Mapping a lived experience in landscape: An artist's analysis of GPS and GIS data

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Mapping a lived experience in landscape: An artist's analysis of GPS and GIS data.

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Author's Signed Declaration

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Doctoral College Quality Sub-Committee.

This thesis has been proofread by a third party; no factual changes or additions or amendments to the argument were made as a result of this process. A copy of the thesis prior to proofreading will be made available to the examiners upon request.

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- 2017 27th June: *Re-imagine Your Town*, Virtual Reality (VR): *Learn, Experience, Imagine*, Knowledge Spa Royal Cornwall Hospital Truro.
- 2017 19th August: Exhibition of Research, *Rubbing of Bench*; Galleria Kopio University of Lapland, Rovaniemi.
- 2018 6th: October: Walking in Brooklyn under instructions from Falmouth New York / Falmouth Art Gallery.
- 2018 February: Open studios, projected maps. Fish factory, Penryn.
- 2019 18th October: Drawing in VR, *Fun Palace* Falmouth Art Gallery.
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Abstract

Becalelis Brodskis

Mapping a lived experience in landscape: An artist's analysis of GPS and GIS data.

This thesis involves a critical analysis of data types and digital interfaces used in a socially engaged arts practice aligned with the concerns of participatory mapping. The research identifies a problem which occurs when the development and use of technologies begins to conflate data with its visual representation or, conversely, reduces the experience of reality to what can be documented. The thesis aligns with a concern that this impacts the perception of, and sensitivity to, available qualities or indeed possibilities of experience.

Responding to this concern questions are raised relating to how and why qualities of objectivity or subjectivity are associated with certain types of data and perceptions of landscape. Employing an autoethnographic research methodology, using Henri Bergson's theories on perception as a lens, the research progresses through a series of mapping experiments informed by arts practice. It then undertakes a critical analysis of both qualitative and quantitative data, which extends to what effect interfaces have on the interpretation of the data and subjective experiences of landscape.

The first experience is a participatory community mapping project that combined 3D game engines, geospatial data and audio-visual documentation of residents' participation in arts practices into a 3D interactive model. The next intervention is a dérive in Lisbon documenting perceived relationships between matter and memory on a smartphone. This device, whose effect and potential use Guy Debord foresaw in his *Society of the Spectacle*, integrates the technologies of Global Positioning

System (GPS), Geographic Information System (GIS), and audio-visual recording equipment used to participate in 2D mapping.

A critical analysis of the subsequent psychogeographies revealed how qualities of empirical data, associated with objectivity, such as GPS, are distinctly different to the qualities of their representation in GIS. Conversely, the analysis of Audio-visual data identifies the absence of lived, subjective experience from the documentation. The final chapter proposes an alternative interface orientating lines between data points towards a diagram of a virtual experience. Virtual, in this context, is used in an applied sense to describe a reality that cannot in its fullness be represented.

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Introduction

This thesis takes an autoethnographic interdisciplinary approach, including arts practice incorporating technologies of mapping, to explore how qualities of data and their representation relate to lived experience.

It proceeds from the observation that although a representation of something is not real, there is often a conflation between the thing itself and its representation, and this can have implications for our lived experience. This observation arose following an arts practice I was engaged in prior to my doctoral research; a participatory arts project, 'Reimagine Your Town' (hereafter RIYT), that used 3D CGI, LIDAR data, virtual reality (VR) and games engine technologies to create a representation of a local landscape in response to a community consultation for a proposed housing development. Due to the potential social application of the project, particularly as it incorporated 'the possibilities and challenges presented by rapidly evolving technologies' (3D3, 2023), I was awarded a 3D3 PhD scholarship to undertake related research.

The thesis is presented in three parts. The structure, whilst not linear, aligns with the narrative structure of a hero's journey (Rogers *et al.*, 2023, p.754) which although not necessarily obvious to the reader, is used as a method to present arts practice as research, in such a way that it may be accessible, at least in part, not only to artists engaged in mapping but also to the participants they engage through their creative practice. The research inquiry that arose out of RIYT, a project centred around the familiar, a hometown, led to the collection of data from further afield, in an unfamiliar country, described in Part 2. Finally, the analysis of the collected data, in Part 3, produces a creative response to the inquiry.

Each part of the journey, whilst a separate project, contributes to the overarching aim, examining how qualities of data and their representation portray subjective experience in a manner that is insightful to participatory mapping.

Participatory mapping, according to Cochrane and Corbett (2018) citing Aberley (1999) and Flavelle (2002), is 'a mapmaking process that strives to make visible the relationship between a place and local communities through the use of cartography' (p.2). It emerged from critical cartography, a field that began to emerge in the 1980-1990's leading to a number of different approaches to creating visual maps 'serv[ing] other interests than hegemonic ones' (Felsing and Frischknecht, 2021).

One of the outcomes was that visualisations of landscape in the form of maps are no longer the domain of experts. 'The ability to make a map, even a stunning interactive 3D map, is now available to anyone with a home computer and an internet connection' (Crampton 2015, p.12). Though the research projects carried out for this thesis are an example of where the practice of mapping did not stem from the specific discipline of cartography or geography, they are examples of how 'the expanded role of artistic and creative practice-based research' (Hawkins 2013, p.3) contributes towards the concerns of geography and methods of participatory mapping through a critique of the technologies often used for these practices.

Each project uses different technologies to represent the data documenting participants' lived experience within a landscape. Viewed through the lens of Henri Bergson's theories of perception, all three parts engage in a critique of qualities of data and demonstrate how interfaces represent or negate the qualities of that lived experience.

In Part 1 the context of the research journey is introduced through the project RIYT, where the aim was to facilitate residents of Penryn, a town in Cornwall, to gather data in order to construct a 3D CGI representation of the landscape, reflecting their

perceptions of and concerns about their locality. In hindsight, this was a participatory mapping project due to the way residents were engaged in both the design of methods and gathering of data.

A question that emerges when making a representation of a landscape concerns what is imagined, what is real, and what is just a perspective on or an idea of the landscape, because the idea itself has a certain material reality. Bergson's description of matter in *Matter and Memory*[3] as an 'aggregate of images' (2011, p. 11) provokes thought. His use of the word 'image' can be confusing since he is not talking about a form of representation, as in a drawing, a photo, or a 3D CGI model, but 'a certain existence which is more than what the idealist calls a representation, but less than that which the realist calls a thing' (Bergson, 1991, p.9) As such, the word 'image', as used by Bergson, is not limited to any singular perception but serves to bridge the divide between idealist and realist perceptions of reality and our relationships with matter. To incorporate these two opposing understandings of reality – realism and idealism – in one term can make it a slippery one to grasp, not least because we are being asked to put to one side what we think we know of 'the reality or ideality of the external world' (Bergson, 1991, p.17). Bergson 'will take the entire book' (Guerlac, 2006, p.112)[4], to describe how images can be both the innate qualities of matter and the qualities of our perception. So, rather than do Bergson an injustice through a poor explanation of his use of the term, in this thesis 'image' is used as a conceptual tool that aligns with his theories of perception, in contrast to the word 'representation' and will be placed between quotation marks when referring to this use of the word.

In many ways, our cultural base is structured according to where we stand in relation to the divide between realism and idealism. The word 'image', by side-lining these differences, is an invitation 'to interrupt our usual habits of thought so that we

3 translated from *Matière et Mémoire*, 1896

4 Matter and Memory

might think differently' (Guerlac, 2006, p.13). The reason why Bergson's concept of the 'image' is relevant to this thesis is that technologies directly related to mapping (GPS, GIS and the smart phone), as well as those touched on in chapters 1 and 2 (LIDAR, 3D modelling and game engines), affect how we perceive our place in relation to this landscape and, in turn, participate in forming this relationship. Bergson's model of perception thus not only inspired the objectives of the thesis but was also used in its critical analysis and evaluation.

According to Bergson,~~)~~, our body, being matter, is also an 'image' 'distinct from all the others, in that [we] do not know it only from without by perceptions, but from within by affections' (p.17). How we engage with matter affects what we perceive, but while both matter and perception are part of the 'image', Bergson emphases their independence from one another, stating that 'what we perceive does not in itself change the nature of the material nor does the material itself produce in us perceptions' (p.9). Indeed, our perceptions, or the 'images' in which we exist, are related to the potential actions we take. Memories are tied into this relationship because they both influence what actions we take and in the moment of action – as illustrated by Bergson's cone (see figure 1, chapter 1, p. 59) – they filter down into our present engagement with matter. In turn, the actions we take influence the relationship between matter and memory, and inform our perceptions (Bergson, 1991, p. 232).

In Bergson's view there are two primary categories of memory. The first is 'motor mechanisms; habitual [memories] that inform reflexive actions and "secondly in independent recollections' (1991, p. 78). An example of habitual memories can be found in the act of walking, an action that once set in process is a habitual motor mechanism. The habitual qualities can be compounded when walking to or from a certain location also becomes a habit of daily life. The second category is 'image memories' or 'la memoire qui revoir' (literally, 'the memory that sees again').

The critique of interfaces of representation in Part 1 begins and concludes with introducing an object with symbolic significance to one participant; a gate stop in a landscape he belongs to. This symbolic object initiates the second research project, Matter and Memory in Lisbon, where the researcher, crossing the threshold, takes on the role of a participant. Using 2D GPS technology objects of personal symbolic significance are mapped onto an unfamiliar landscape during a walk, which are then contrasted with qualities of the technology documenting and representing this walk[5] according to certain notions of realism with the focus of attention on a letterbox. Both representations of physical landscape, Lisbon and Penryn, were constructed using accurate measurements; quantitative data, whilst the experiences within the two landscapes, the qualitative data, were documented as assets upon their respective surfaces.

In Part 3, 'Diagram of a Letterbox' the researcher returns home and engages with alternative interfaces of arts practice to apply new knowledge. Using a diagram on a pinboard a thought experiment is conducted using a spool of golden thread that connects the letterbox to experiences in different landscapes, creating different connections between space and time and suggesting an alternative method of both representing and engaging with qualities of lived experience in landscape.

Only once the thesis research began, was RIYT's speculative relationship to town planning and alignment with participatory mapping replaced with a desire to understand the qualities of the data and the effect of their presentation as a mnemonic for a landscape. As a result, this thesis considers four factors: (i) the context of the technologies used in the construction of 'landscapes'; (ii) the mixture of qualities of data that informs their construction; (iii) the transference of qualities between the data

5 The data was documented using a combination of the technologies integrated into a smartphone, including a Global Positioning System (GPS) and the interface of a Geographic Information System (GIS).

when integrated in a digital interface; and (iv) the effect of representation on the lived relationships within the landscape.

Drawing on examples of artists' research, alongside a reading of Bergson's *Matter and Memory* (1991), the thesis takes each project through a number of stages. It begins by considering how geo-spatial technologies begin constructing a landscape from a realist position; a bird's eye view based on empirical data. It then progresses through a series of experiments, zooming into the data to analyse the qualities they encapsulate and investigating which qualities are transposed to the representation. The outcome of these experiments suggests that there is a conflation between the objectivity of qualitative data and their representation. The thesis argues that this conflation denies the aesthetic qualities of the interface and in so doing attributes a subjective dimension not originally present and often denied by proponents of these technologies. This finding is replicated in the aesthetics of the diagram in the thought experiment, in which the golden thread begins to unravel the 'straight lines' (of a GPS trace) in relation to representations of landscape. The aim of this thesis is not to deny the fact that between two points there is a line, but rather, it is concerned with the qualities that are defined as lines between the points.

In this respect, Bruno Latour's 'Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern' (2004, p. 225) was useful in terms of not denying facts but looking into the bias of certain representations. Latour's reflections suggest a momentary regret for his role in undermining the idea of empirical truths, suggesting as a result that 'we now have to reveal the real objective and incontrovertible facts hidden behind the illusion of prejudices' (2004, p. 227) – a statement whose relevance increases daily in this era of disinformation. However, he asserts that this does not imply he is turning away from critique and turns the focus onto 'matters of concern' by acknowledging that:

The mistake we made, the mistake I made, was to believe that there was no efficient way to criticize matters of fact except by moving away from them and directing one's attention toward the conditions that made them possible. But this meant accepting much too uncritically what matters of fact were. (Latour, 2004, p.231).

Latour's words marked a turning point in the research focus; to understand why the technologies I was using for an arts practice engaged with the concerns of participatory mapping were believed to produce data reflecting objective, measurable observations of fact.

However, if the question arises of why, aside from this introduction, Latour or actor-network theory[6] (Michael, 2017) are not mentioned in this thesis, I would point towards Martha Blassnigg's essay, in which she selects the introduction to *Matter and Memory* to promote Bergson's theories on perception within the 'heterogeneous field termed "Media Archaeology"' (Blassnigg, 2014, p.58). In so doing, she helps to move the parameters of the discussion away from the technology as object towards a relational dynamic that encompasses context and 'the co-creative, participatory and co-constructive role of the user', using theory and practice to engage with 'the potentialities of the human mind' (Blassnigg, 2014, p.59). As such, inspired by Blassnigg, *Matter and Memory* is the foundational text for this research.

6 Actor–network theory (ANT) is an approach to social theory that was promoted by Callon, Akrich and Latour, which posits that everything in the social and natural world exists in constantly shifting networks of relationships. Michael, M. (2017) *Actor-Network Theory: Trials, Trails and Translations.* 1 edn. London: SAGE Publications.

The Background to the Research

The following section presents a summary of related fields of research. Because project one, RIYT, was a pilot suggesting the use of participatory arts as a vehicle for community consultancy within the contemporary democratic context of the UK's Localism Act (Clark, 2011), which established the right for communities to draw up a neighbourhood plan, Claire Bishop's (2012) survey of participatory arts and Markus Miessen's (2010) provocative series of books characterising local participation as a pseudo-democratic act were of critical relevance. These assessments also harked back to earlier criticisms of community arts practice as a 'sticking plaster' for wounds in need of considerably more care (Kelly, 1984).

The relationship of the project to town planning introduced me to the architectural and related spatial concerns of Henri Lefebvre (1991). In this context, Jane Rendell's (2006) term 'critical social practices', influenced by the theories of the Frankfurt School, was useful in extending 'the "critical" as defined through critical theory into practice'. RIYT's use of art workshops and fun (See Appendix 1) and its mode of representation, an interactive 3D CGI map that used gaming technologies to construct a residents' dialogic archive that could be communicated to town planners, connected the research with other models of community engagement, from smart cities (Saunders & Baek, 2015; Townsend, 2013; Aurigi, Willis & Melgaco, 2017). RIYT's use of art workshops and fun (see Appendix 1) for methods of engaging citizen participation is aligned with projects like 'playful cities' or 'playable cities' (Lange, 2019). The latter term was used to describe an annual event, launched in Bristol in 2014, promoting 'a people-centred counterpoint to the notion of the Smart City' ('Making the City Playable,' 2023). It responded, through creative acts of play and enquiry, to an acknowledged weakness is the smart cities' focus on technology and infrastructure, rather than the lived experience of residents. In 2014, the National

Endowment for Science and Arts (Nesta) ran a smart cities programme to highlight projects enabling people to use technology to influence government decisions. Geoff Mulgan's forward to the Nesta-sponsored report, 'Rethinking Smart Cities from the Ground Up', highlights that many smart cities are developed by engineers and technologists, and are introduced into communities without their 'informed consent', paying insufficient attention to social dynamics and social life (Saunders and Baek, 2015).

Its focus on the qualities of representation and critique of the dominance of geo-spatial technologies also links this research to the concerns of *Mapping Beyond Cartography* (Frodsham, 2015), a thesis which, aside from a comprehensive overview of artists who creatively engage with technology as 'locative media' (see Chapter 7), acknowledges the influence of the Situationists and the *dérive*, a method of using urban wandering to map psychogeographies[7], prior to the invention of GPS. The development of this method towards an arts practice with direct political applications (Pinder, 1996) can be accredited to Guy Debord, founding member of the Situationist International (1957) and author of the influential *The Society of the Spectacle* (1994). A primary objective in Debord's dérive, which was informed by a mixture of Marxist critique (Bunyard, 2011) and surrealist relationships to space (Sadler, 1999, p.78), was to break our habitual ways of relating to a city in order to 'contribute to the construction of a "psychogeography" of the modern city' (Bassett, 2004, p.402). According to Debord, this could be achieved by walking through the city in a semi-intoxicated state, with no destination in mind. At the same time, however, the aim would be to arrive, by asking companions to cross check impressions, (Knabb, 2006, p.63) at objective if as yet unnoticed observations. Debord describes how 'dérives enable us to draft the first

7 Psychogeography is a method of investigating and representing a landscape, in particular a city. It is considered to have evolved from the arts movements of the Letterists International and the Situationist International who under the leadership of Guy Debord applied a more direct political application of this method of mapping. The derive was a central component to this method of mapping.

surveys of the psychogeographical articulations of a modern city.' (Knabb, 2006, p. 66). This could then support insurrection by identifying potential flows within the space of the city. These might be points at which an unnoticed connection might create a route of escape or attack.[8]

Although the intention of this research is not one of direct insurrection, Debord had an early influence on my research trajectory. This not only in terms of adopting an aspect of the dérive that Debord's describes as integrating 'playful constructive behaviour and awareness of psychogeographical effects' (Knabb, 2006, p.62) as a method of research (project two) but also in questioning the use of technologies of navigation that encourage an adherence to the habitual.

Further insights from related contemporary arts practice were acquired through interviews (for example, with Prof. Daniel Belasco Rogers, 2017), conversations with artists I commissioned, who are experienced in participatory mapping (Etheridge & Persighetti, 2023), and publications providing surveys of contemporary practice. These include *Walking and Mapping: Artists as Cartographers* (O'Rourke, 2013) and Ferdinand's (2019) in-depth study of a selection of contemporary artists. The relationship of arts practice to the field of geography in this research was enriched through Hawkins's 'progress reports' fuelling a discussion into the ways in which the expertise of artists contributes to Cultural Geography in terms of artists' expertise in the question of 'what do mediums do?' (2021, p.1711). This reflects the key questions of this research: how does technology document lived experience and what does it do when it represents the data as a map?

8 The use of the dérive is related to tactics of the Israeli army Weizman, E. (2006) 'The art of war: Deleuze, Guattari, Debord and the Israeli Defence Force'. @mutemagazine. 03/08/2006 - 14:52. [Online]. Available at: https://www.metamute.org/editorial/articles/art-war-deleuze-guattari-debord-and-israeli-defence-force.

The Contribution to this Thesis

This research is an active response to Blassnigg's 2014 call to consider Bergson's theory of perception as a device with which to 'establish an understanding of processes of interaction in media environments'. The thesis expands the context in which Blassnigg suggests the application of Bergson's philosophy from media archaeology through object-oriented ontology (Blassnigg, 2014, p.59) to the intended application of this research; the participatory mapping of the landscapes in which we live.

Just as Bergson offers a way of 'rethinking the problematised divide between humans and objects, objects and things, or matter and spirit' (Blassnigg, 2014, p.59), so this research offers the practice of participatory mapping a method of analysis that deconstructs the problematic division between qualitative and quantitative data. As this division, in certain contexts, can undermine the value of representations of landscape that do not adhere to the qualities conceived within a purely realist framework, this thesis suggests a bridge between the qualitative and the quantitative. Thus, perceptions of landscape that might otherwise be discarded as idealist can be given, if not equal weighting, then at least proper consideration as part of the 'image' of reality.

The term participatory mapping can be applied to the RIYT participatory arts practice (Bishop, 2012) as it was used to engage residents in concerns that could be applied to the local neighbourhood plan. The combination of participatory arts practice applied to mapping is one that 'recognizes the intrinsic value of crafting an inclusive environment where all voices have the space to be expressed (Rambaldi *et al.* 2006; Cochrane & Corbett, 2018).

Kim (2015, p. 217) framed a critical question for participatory mapping as '[…]what kind of difference in participation we think can happen through new visualizations'. This thesis contributes to the body of research in the field of

participatory mapping through an exploration of qualities of data in terms of what qualities of the participants' perspective are actually documented and how the representation of data, in terms of these new visualisations infers a certain relationships to landscape.

Firstly, the context of RIYT, was 'aesthetic and political, encouraging active participation in map making' (Perkins, 2007, p.128), incorporating an innovative use of 3D CGI and game engine technology with participatory art practice as a mode of community engagement, clearly aligned with participatory mapping.

Although projects two and three were then undertaken by an individual rather than a community group of residents, the premise was that, as a subject of autoethnographic research, I was taking on the role of an individual participating in a mapping project using GIS. These projects, which address questions arising from critical reflection of the technology used in RIYT, incorporate the technology of GPS and the interface of GIS into the research methods. The analysis of outcomes using Bergson's theories on perception as a lens and the concerns of arts practice, in terms of the aesthetics of representation, demonstrates how the technology represents or frames qualities of lived experience according to a certain relationship to space and time.

Engaging in a critique of this technology was important because of 'the emergence of public participation GIS (PPGIS) that focuses on ways the public can use geospatial technologies to participate in public processes for decision making' (Brown, Reed & Raymond, 2020, p.1). As such a critical analysis of the relationship between the qualities of representation and qualities of lived experience is relevant to the concerns of participatory mapping .

The conclusion of project three draws the research together proposing how a method of using a diagram as a device can engage a participant in an expansion of qualities relating to the data producing an alternative visualisation. Using an alternative

method such as this an individual in a participatory mapping project would have a method of enriching the data with additional memories producing outcomes that may not have been previously envisaged.

Overview of Thesis

As already noted, the chapters are divided into three parts, each of which centres around an arts project, of which Part 1 (chapters 1-3) begins with a description of a participatory arts project which aligns with participatory mapping considering the qualities of a 3D CGI mesh representing a landscape. This is followed by an in depth overview of the digital technology employed, honing in on the gate stop to illustrate how objects within such a mapping project are documented using this technology, examining the relationship between the lived experience, and the digital representation of the landscape.

Chapter 1 describes and assesses the artist-led mapping project 'Reimagine Your Town' (RIYT) which provided the background from which the research for this thesis evolved. The chapter analyses the practice of participatory mapping and its socio-political relevance to how notions of subjectivity and objectivity inform representations of landscape. The exploration begins with a critical look at one aspect of the project – a 3D digital representation of Penryn. It outlines the initial objective of the project to harness what appeared to be the potential of technology to bring residents together to reimagine the local landscape through a co-produced representation of the town. The aim was to place their diverse subjective meanings within the supposedly objective, realistic framework provided by the technologies of representation. The chapter then moves on to a discussion of the technical construction of a representation of the landscape, focusing on the commonplace conflation of computer-generated images (CGI) with notions of reality. It begins to deconstruct the idea of the CGI mesh as a neutral, non-qualitative representation of an empty landscape, highlighting ways in which the aesthetics of the game engine technologies impose an already constructed view, a set of presuppositions that fundamentally influences technologies' qualities of representation.

In line with the autoethnographic methodology of the research, this opening chapter introduces my position as the researcher who, at the time of initiating the project, was viewed as an outsider (or 'incomer') in the local community. While documenting my investigations into my temporal relationship to the landscape, the chapter introduces Bergson's (1991) theories on perception and the relationship between matter, memory and experience in relation to time, including his notion of durée, a qualitative, subjective experience of time distinct from the quantitative, segmented notion of time measured by clocks [9],which I use as a critical lens through which to focus on the research.

Chapter 2 considers examples of research being conducted in the fields of animation (Jukes, 2017) and digital games (Denham & Spokes, 2021) that turn to philosophy to help disentangle the digital creation of a 3D surface as a representation of a landscape from the lived experience of spatial relationships. The chapter draws on Jukes' practice-based thesis, which involves a close study of the process of digitally constructing a 3D form and its presentation to an audience. Jukes begins by considering the qualities of the most basic of 3D digital forms – the visual connection between three nodes on a plane, a 'polygonal triangle' – and then proceeds to explore how one outcome of engaging with a digital representation can be a 'blurring' (Jukes, 2017) between illusion and reality.

The second part of the chapter considers an example of 'an open world game', *Red Dead Redemption*, through Denham and Spokes' application of Lefebvre's concept of the 'spatial triad' (Lefebvre, 1991; Shields, 1999) to the players' interaction between the interface and their lived experience. The authors' introduction of Lefebvre into their research provided an opportunity to consider the intersection between spatial relationships in reality and the representations of landscape, reinforcing points raised in

9 A fuller definition of concept of durée is in Methods on page 47.

Chapter 1, including the idea that the tools of production provide a 'conceived space' rather than a 'blank canvas' on which the communal experience could be projected. This is a form of space that, according to Lefebvre, reinforces hegemonic control, which is arguably an essential part of the players' experience of the game's top-down, design-oriented expectations and rules. One of the ways conceived spatial experience is introduced into the game is through the placement of symbolic objects, called 'assets'. This is then related back to the aims of RIYT's participatory project.

Chapter 3 moves the research from an overview of RIYT's representation of landscape to a detailed example of one of the assets placed within this representation by a participant. This asset can be seen as a document of the man's memories of a particular object that anchors him in his local landscape, Penryn, and as such can be used in conjunction with Bergson's concept of durée[10] to help us engage with perceptions of reality.

The chapter opens with a description of a walk, documented on video, that I took with this participant, referred to as 'JT', towards an object of personal significance to him: a gate stop (see Appendix 2). It establishes a relationship between JT as a local and myself, the researcher, as an outsider – a process that relates to the autoethnographic methodology of the research. The writing meanders, like the walk, into an analysis of the documentation of the gate stop and its place within RIYT's representation of landscape. It exposes the contrast between the impersonal nature of Google Street View (GSV) and the intimacy of a mapping practice oriented around the interests of the participants. This intimate relationship of memories in relation to matter introduces a further research experiment which I conducted in Lisbon, documenting the lived experience of a walk using a mapping application on a smartphone and its related technologies.

10 Definition of concept of durée in Methods on page 47.

Part 2 of the thesis, Matter and Memory in Lisbon, is concerned with how an experience in landscape is documented and represented using GPS, GIS and audio visual media. Chapter 4 engages critically with an outcome of the above-mentioned research experiment in Lisbon: a line representing a walk, commonly referred to as a GPS trace. While this chapter looks closely at the qualities of the line, an analysis of the relationship between the line and the lived experience of the journey the line depicts is left for subsequent chapters. Instead, it considers anthropologist Tim Ingold's (2007) critique of the difference between a line that is drawn and a line that connects a series of points – equivalent to the difference between inhabiting a landscape and a surveyor's report. The chapter proposes that nothing is known about the line; hence, I refer to it by the placeholder name of 'Untitled 01'. This in turn means there are multiple ways of perceiving it – for example, as a line or as a form – echoing Bergson's theoretical ideal of 'pure perception', a concept that embraces all potential perceptions of reality.

The chapter proceeds to build on my experiences during my wanderings in Lisbon. As the research progressed, I increasingly projected memories and emotions onto points connected to the trace or line with the intention of engaging in a practical fashion with Ingold's distinction between the qualities of 'dwelling' and those of 'surveying'. I took his suggestion to dissect a line printed on a page in his book, *Lines: A Brief History* (2007), literally and used it as part of a research experiment (See Appendix 4). This became a prelude for a discussion concerning the different qualities of real and imagined experience, and a critique of the technological construction of the line in terms of its ability or lack of ability to document the experience of inhabiting or dwelling in a landscape.

Chapter 5 charts the development of the Global Positioning System (GPS) and, in so doing, addresses the question: 'What is GPS data?' As one of the concerns of this thesis is how perceptions arise, the chapter seeks to understand the reason why the quality of objectivity is attributed to GPS (Kennedy, 2002). It summarises the historical development of GPS (Guier & Weiffenbach, 1997) and the way in which it works. This includes theories that indirectly inform its system of measurements, specifically the Doppler Shift, as well as its incorporation as a georeferencing system by the US navy and air force, and its subsequent viability for commercial, non-military use. The chapter, echoing the concerns of critical geography, suggests that the GPS system (and its related data) is informed not simply by objective observations but also according to the subjective interests of its developers.

This chapter therefore not only discusses what a GPS data point is and how it is produced, but also aims to demonstrate how it has implications beyond simply representing a point in the landscape, showing how the way in which we choose to mark this point has implications which go beyond objective representation. This is contrasted with a further elaboration of Bergson's concept of durée[11], looking at non-linearity in relation to time and experience. It concludes that, far from being a simple tool of objective measurement, GPS could be seen as a tool of socio-cultural dominance – one that influences our very perceptions of time and space. However, by exploring the qualities of GPS in more depth, the chapter goes on to argue a case, not for discarding this valuable source of information, but for considering ways of incorporating and utilising it, in full awareness of its limitations.

Chapter 6 moves from the single data point, the subject of interest in Chapter 5, towards its integration within the 2D interface of a Geographic Information System (GIS). This interface integrates the quantitative data of GPS, as it tracks changes in

11 Definition of concept of durée in Methods on page 47.

location, into the GIS overlay of qualitative data, documenting subjective, lived experience. This apparently seamless integration has led to widespread uptake of the technology and its employment in participatory mapping projects.

The chapter's breakdown of the structure of the interface begins by describing the use of GIS to document a research experiment that drew on Debord's method of urban wandering, otherwise known as a 'dérive', to establish a psychogeography that emphasises interpersonal connections to places along this arbitrary route. By using an adaptation of this method, the experiment sought to locate objective observations of relationships between matter and memory. This became an unlikely cross-fertilisation of Debord's and Bergson's ideas that began with the supposed blank canvas of GIS awaiting the participation of the researcher and the technology to populate it with data.

The chapter scrutinises the assumptions behind the popularity of GIS and, by way of an analysis of its history and its different layers of representation, discusses a number of often overlooked conflations. First, it demonstrates how the GIS interface does not offer a blank canvas but is oriented according to a colonial perception of the Earth's landscape (Ahmed, 2006). It then draws on Marxist feminist theory (Smith & Katz, 1993), the work of feminist geographer Mei-Po Kwan (2002), and the related academic fields of critical and qualitative GIS (Elwood & Cope, 2009; Kwan & Schwanen, 2009; Schuurman, 2000). It suggests that the objectivity of data is compromised, pointing towards the way in which the supposed 'objectivity' of technology negates the aesthetic qualities the interface attributes to the representation of data. Through the introduction of aesthetics, the chapter creates a bridge to Part 3 of the thesis, which considers the subject within the context of arts practice.

Part 3 is concerned with the final project, Diagram of a Letterbox; an experiment conducted to explore an alternate way of mapping subjective data taken from project two, and in which my role was both researcher, and arts practitioner.

Chapter 7 highlights how the technology of GIS has its own aesthetic qualities. Using examples of work by other artists, (O'Rourke, 2013) the chapter begins to interrogate the aesthetics of representation, demonstrating that there are alternative ways of relating to location-based (Russell, 1999) data and representing relationships between GPS points. It asks a key question: If we see the line as simply an interpretation of the distance or space between two points, why does it have to be straight? What does the straight line imply and what does it omit?

To examine the aesthetic qualities of GIS, the line or 'Untitled 01' is run through a modest visual experiment that involves zooming into it using a high degree of magnification. This reveals the unacknowledged aesthetic qualities of the interface and points towards how the aesthetics of a line gives the interface qualities of a subjective nature that are additional to the quantitative data it is said to represent.

Having looked under close magnification at an example of the representation of quantitative data, Chapter 8 takes the research further by analysing the inherent qualities of data that are considered to have subjective associations with a landscape. The chapter describes how a similar degree of magnification to that applied to the line in chapter 7 was used to progressively break down a transcript of an audio recording of my thoughts during my wanderings in Lisbon and my encounter with a letterbox. The breaking down to the level of the qualities of a word could be argued to be taken to a level of absurdity. Prior to the analysis I considered that this qualitative data documented a perceived connection between the letterbox and my memories. In doing so there was a resonance with the gate stop, and the related memories it evoked for JT, the Penryn resident, described in chapter 3. The personal nature of the data allowed the research to incorporate my bias more fully.

The chapter begins, however, by acknowledging certain problematic elements in the analysis. One is that it was undertaken by the person who made the recording. Thus, certain qualities may be perceived within the transcript that are dependent on my memories rather than being present within the data. This problem relates to the division between realist and idealist perceptions of matter which Bergson's theories attempt to bridge. In order to bracket my bias, the chapter breaks down the transcript, descending from an analysis of the paragraphs to a somewhat absurd isolation of individual words into categories (inspired by Bergson's theories of perception) recorded on a spreadsheet. Having described the stages of this experiment, the chapter moves on to an evaluation of the categories, providing a further reflection on Bergson, as well as other theories, including those of Ahmed (2006) and Lefebvre (1991), that relate to the lived experience of space.

Chapter 9 describes a thought experiment, instigated by the previous chapter's identification of the absence of contextual qualities in the transcript. To redress this absence, this final chapter adopts an alternative interface for a re-representation of the data considered in previous chapters. Similar to the other arts practices mentioned in chapter 7, it is both inspired by and related to GPS and GIS, but suggests an entirely different logic of connections between the lines, one not based on linear time and space but on their qualities of durée[12]. The analogue and kinaesthetic nature of the chosen interface and the necessary kinetic interaction, using a golden thread to connect pins on a pinboard, creates not only a different aesthetic but a different relationship to the documentation of the letterbox in Lisbon. In so doing, it responds to the question posed in chapter 7: What does the straight line imply and what does it leave out?

12 Definition of concept of durée in Methods on page 47

After introducing the concept of a diagram, referencing its use by philosophers and artists (Deleuze, 2003), as a method and its relationship to a reading of Bergson, chapter 9 provides a select list of commentaries on some nodes of the diagram on the pinboard. The commentaries are extracted from notes written at the time when I was submerged in the process of creating the diagram. The chapter describes reconstructing what has been deconstructed in previous chapters, through the creation of the diagram. The outcome infers a virtual relationship to space, one where the connection between nodes creates a relationship between the letterbox in Lisbon and a shed in Cornwall in which the final stages of the research took place.

The term 'virtual', in this context, is used in an applied philosophical sense to describe not the implied 'almost-reality' of digital simulation (as in VR), but as used by Massumi (2002) and Deleuze (2003), influenced by Bergson, a concept to engage with a potential that can be actualised (Pearson, 2005)[13] and as such the virtual has the quality of something that is neither real nor abstract. It is what we extract from the multiple possibilities of reality in order to arrive at a perception of lived experience. For clarity, throughout the thesis the abbreviation of VR is used to describe computer simulations, and the word 'virtual' restricted to its philosophical definition.

The conclusion of the thesis gives a summary of the outcomes of the research described in the foregoing chapters and suggests an application for subsequent arts practice as research and participatory mapping projects. It does so by proposing that aspects of the research methodology, in particular its approach to the qualitative aspect of all data, could be developed as a method that would allow participants to critically engage in the process. This conclusion also chimes with a contemporary queer reading of phenomenology (Ahmed, 2006), in terms of suggesting a further application of the

13 A philosophical understanding of 'virtual' is quite different to its use describing computer simulations that create illusionary spaces for 'immersive' experiences, such as 'virtual realities'. These are said to be remembered as an 'almost reality'. The philosopher Brian Massumi (1998) describes how, in this 'decomposed state', the term virtual 'became a creature of the press, a death warrant on its usefulness as a conceptual tool'.

research to the orientation of an outsider's place within what could be defined as a foreign landscape structure according to straight lines.

The Context for the Methodology

Three key factors informed the research for this thesis, the first two being forums of scholarship. The majority of the research was undertaken within the Transtechnology Research Group at the University of Plymouth. In this forum, critical engagement is enriched by the intersection of disciplinary fields spanning the arts, health, technology, geography, anthropology and philosophy, using 'practice-based methodologies to understand aspects of creative agency in the process of technology – especially media technology – acquiring meaning' (Punt, 2014, p.11). A secondary influence was the 3D3 Centre for Doctoral Training, which provided a number of opportunities to exchange research ideas across partner institutions; UWE Bristol and Falmouth University of the Arts. In addition, research excursions in Finland, hosted by the University of Lapland and Lisbon, hosted by IADE (the Faculty of Design, Technology and Communication), helped me understand how I could develop my arts practice as a method of research. My experience in Lisbon then instigated a research experiment, which produced much of the data on which chapters 4 to 9 are based.

These research experiences opened up a rich mix of potential avenues to follow. These included the three primary lenses that I chose to focus on in my research. The first lens was Bergson's *Matter and Memory*, which I was inspired by Blassnigg's (2014) essay (mentioned above) to use as the theoretical backbone of my research, and the second was my own arts practice, which draws on my professional career as a stone carver, animator and community arts facilitator. I used both the ontological inquiry of the first and the aesthetic considerations of the second not to create a work of art or contribute towards a philosophical debate but simply to inform my method of analysis – taking a reflexive approach towards the research subject – and the direction of the research.

The third lens was that of dyslexia. I was diagnosed with the condition at the age of thirty five. Now, at fifty five, although it continues to hinder my absorption of the meaning of written text, to slow up the process of writing and to frustrate with my lack of memory for words (Morgan, 2000; Eide, B. & Eide, F, 2012), I began to see the mental entanglement as a mixed blessing in as far as the research was concerned. The relevance of what could be called my 'learning style' was its effect on the trajectory of the research. When a detail relates to audio-visual representations I am confident of my judgement in deciding when I have the right to distort, deface, interpret, recreate or delete parts or all of an original or its reproduction. My confidence does not mean I am right, only that – due to my professional experience in the arts – I feel able to proceed. I do not have the same confidence when it comes to the interpretation of words. In attempting to understand a word or express a thought clearly in written language, the obsessive quality that is often linked to dyslexia sometimes means I focus on granular detail, which can either become an elaborate distraction or can reveal an inspired connection that would not otherwise be obvious. This quality is of course not exclusive to dyslexia; however, by considering this mental process as offering a different perspective on my research rather than hindering it, I was able to overcome my fear of misunderstanding or, worse, misrepresenting.

An example of this can be seen in a simple intervention concerning the meaning of a word in the second year of my research during preparation for a seminar presentation, 'Revisiting ideoplasticity: contingency, action, and imagination' (see Appendix 1 for the presentation of the paper). One of my supervisors, in the context of my presentation of a CGI model of a landscape, asked me to define what I meant by 'landscape'. What would seem to be a basic question prior to undertaking my research project had a significant effect on the subsequent direction of my research.

This is illustrated by the shift from Part 1 of the thesis, which begins by considering the qualities of a 3D CGI mesh representing a landscape in RIYT, finally focusing on one asset, to Part 3 which engages with the meaning or interpretation of individual words from a transcript documenting a perceived relationship to a detail in that landscape. These details – a gate stop in Penryn (from project one) and a letterbox in Lisbon (project two) – became a device for the research to experiment with by applying Bergson's theories on perception to a representation of landscape and led to the eventual creation of project 3, Diagram of a Letterbox, described in chapter 9, which presents an alternative method of considering the relationship between the data of lived experience collected during project two, Memory and Matter in Lisbon.

In mentioning words, however, a misconception may arise that this research is about words. It is, but only as far as this form of data is used to engage with and share an understanding, or as Jonathan Culler (1992) might say, an 'overstanding' of the landscape. Culler, in his essay 'In Defence of Overinterpretation', describes 'overstanding' as asking questions that do not seem to relate to the intended direction of the narrative (see Appendix 1). It is in this sense that this thesis can be described as not about words; however, the dyslexic need to repeatedly revisit the supposed meaning of words was incorporated into a methodology of repeatedly revisiting the same data using different forms of presentation.

The Methods

This thesis inquires into the complex interplay between realistic and idealistic perceptions of landscapes, using comparative analysis that juxtaposes lived experiences within landscape with qualitative and quantitative data used to visually represent them in a 3D and 2D digital format, as the core research method. The research is interdisciplinary; bringing together critical studies, informed by the forum of Transtechnology Research, and arts practice across three different yet interrelated research projects. It is concerned with how representation intervenes in our understanding of the world and the possibilities for action within it. There are many ways in which this has been discussed in the past, from philosophy, the arts, and geography to data design. What is missing, from the point of view of this research, is thinking about this problem from all those positions at the same time.

The research is positioned within Judo-Christian, post-industrial Western European, and Mid-Atlantic discourse that acknowledges the bias of technologies used for mapping in terms of 'the Western convention of the homogeneity of the surface and the continuity of the grid' (Felsing & Frischknecht, 2021) which is based on the Greenwich meridian with colonial undertones (Sobel, 1996).

The arts practice project based methodology behind the research developed out of a critical appraisal of project one, RIYT, considering its socio-political context and the claims of technologies to assist in both the objective representation of landscape and the realisation of imaginary realms in 3D CGI representations of space. It was guided by a combination of my intuitive skills as an artist and a theoretical understanding of the depth and complexity of Bergson's ideas on perception, informed by Blassnigg's application of his theories to the technology of the cinema in her book *Time, Memory, Consciousness and the Cinema Experience* (2009), in particular, the concept of durée.

Durée is an extensive theory in Bergson's philosophy of time used in his first major work *Time and Free Will : An Essay on the Immediate Data of Consciousness*, (2004) translated as duration. When applied to perception it distinguishes the quantitative, fragmented notion of linear time from the lived qualities of time which are 'a continuous flux of the whole of our internal states that are not spatially distinguished' (Blassnigg, 2009, p.17).

Bergson uses the analogy of watching the hands of a clock to describe the difference between these two concepts of time. From an external perspective the hand moves from one position to another and 'there is never more than a single position of the hand and the pendulum, for nothing is left of the past positions. Within myself a process of organization or interpenetration of conscious statuses going on, which constitutes true duration.' (Bergson, 2004, p.108).

The translation of durée to duration is, as Guerlac points out, problematic due to it signifying ‘a period of elapsed time considered retrospectively (bounded by time limits of a beginning and end)’ (2006: xiii); as such this thesis will follow Blassnigg 's example and use the term durée.

In *Matter and Memory* (1991), Bergson's theory of durée encompasses the phenomenon where memories are drawn into the present moment through our interactions with objects, thereby shaping our current perceptions. According to Bergson, these actions are not only shaped by past experiences but are also influenced by their potential implications for the future. This integration of past, present, and future reflects the continuous flow of durée. As Bergson explains, "The psychical state, then, that I call 'my present,' must be both a perception of the immediate past and a determination of the immediate future" (1991).

Across the three projects of this thesis a reading of Bergson’s theories of perception, supported by the work of Ahmed (2006), Debord (in Knabb, 2006),

Lefebvre (1991) and Ingold (2007), informs the analysis of qualities of the data and its representation and relationship to perceptions of lived experience in landscape, critiquing conventional views of CGI representations; questioning their neutrality and technological influence on perceptions of reality.

Where project 1 (chapters 1-3) sets the contextual, theoretical and methodological groundwork, using open source quantitative data, for a 3D representation of landscape to be populated with the qualitative data gathered by participatory mapping, project 2, Matter and Memory in Lisbon, (chapters 4-6), explores the quantitative data of GPS data and its qualitative representations using a 2D digital interface collected from an autoethnographic experiment, whilst chapters 7-9 turn to the analysis of qualitative data, concluding, in chapter 9, with a description of project 3: Diagram of a Letterbox, which adopts an innovative diagrammatic method to visualize and enrich the data from project two, integrating arts practice with an ongoing philosophical inquiry.

Data collection methods in the participatory arts project RIYT were twofold. Firstly, through participatory mapping; 'a method used to create a common map to integrate perspectives [and] recognize alternative ways of knowing' (Laituri *et al*., 2023; Okotto-Okotto *et al*., 2021), and secondly interdisciplinary arts workshops (Hawkins, 2013) which were used to engage residents in expressing their personal narratives and perceptions. Contributions were documented using digital media including video, photography, and audio recordings. This qualitative data was then used to populate a 3D digital landscape symbolising the community's multifaceted lived experiences.

The representation of the terrain was constructed using open-source LIDAR data (Tapete *et al.*, 2017; Crutchley, 2010) and advanced 3D modelling techniques on to which an overlay of collected qualitative data was applied. This model synthesized both the measurements of landscape, associated with perceptions of realism, and the

qualitative data gathered from participants. Using game engine technology this formed an interactive platform that prompted further discourse on the perception of landscape.

Chapter 1 challenges the perception of the CGI mesh as a neutral, non-qualitative backdrop. A comparative analysis of the literature covers participatory arts, digital mapping, urban planning, and the technical construction of 3D CGI, critically examining theoretical perspectives on realism and idealism, particularly drawing from Bergson (1991) and Hawkins (2021) in terms of the contribution of arts practice to social geography and Meissen (2010) in relation to the politics of particiaption. The analysis, which is enriched by anthropological concerns (Ingold, 1993), highlights how the aesthetics of game engine technologies not only present a constructed view but also embed a set of presuppositions that deeply influence the representation of landscapes.

In chapter 2 a comparison of the literature features two examples from different disciplines; a practice-based PhD by Jukes (2017) and an academic paper by digital games scholars Denham and Spokes (2021). Both employ philosophical frameworks to unravel the complexities of creating digital 3D representations that reflect lived spatial relationships. Jukes' close study of digital construction processes reveals how engagement with a digital representation can blur the lines between illusion and reality. His application of Kandinsky's practice (Jukes, 2017, p.113) provokes an inquiry into what concepts inform the aesthetic choices applied to 3D CGI representations of landscape. This insight is critical to understanding the interplay between spatial relationships in reality and their digital counterparts.

Denham and Spokes' research applies Lefebvre's concept of the 'spatial triad' (Lefebvre, 1991; Shields, 1999) to the gaming experience in Red Dead Redemption, highlighting how symbolic elements within the game echo creative participatory methods used in the RIYT to create representations of landscape. The exploration in chapter 2 sets the stage for chapter 3, where the focus shifts to the participatory mapping

methods used in RIYT and the implications of placing an asset within a digital landscape, investigating its resonance with lived experiences.

A recognition of the relationship between matter and memory, as described by Bergson (1991), led to a specific instance detailed in chapter 3, where the method of walking was employed to identify significant elements for a participant. This encounter was documented using video, resulting in qualitative data that captured a gate stop, subsequently used as a playable video asset within the project's CGI landscape. The gate stop documentation was compared with other interfaces like Google Street View to highlight the contrasts between impersonal and intimate mapping practices.

The narrative style of writing adopted in this chapter explores a non-linear perception of time, emphasizing the interrelation of present experiences, action, memory, and data documentation, taking a phenomenological approach influenced by Bergson's concept of durée (2004). Alongside the unusual presentation, which is resonant with the meandering nature of the walk being described, the analysis integrates personal memories and experiences, drawing on Sara Ahmed's use of 'orientation' in *Queer Phenomenology: Orientations, Objects, Others* (2006), suggesting that our physical, emotional and cognitive positioning relative to objects influences our perceptions. The narrative structure not only advances the research but also invites the reader to appreciate the complexity of the perception of landscape as a multifaceted and deeply subjective experience.

In order to examine the relationship between the action and perception of an individual, in terms of the memories the action draws into the present moment, (Bergson, 1991), chapter 4 introduces research relating to project 2, where there is a shift from participatory group dynamics to a more introspective approach, marking a transition in methodology, built on the reflections and data collection methods established in earlier chapters. The chapter, which explores autoethnographic

phenomenological experiences of the landscape of Lisbon, delves deeper into the comparative analysis between qualities of data and their representations.

The data for project 2 was gathered by myself, as both the researcher and the participant using a research method influenced by Debord's practice of the dérive (p. 28). Over a week of intensive fieldwork I embarked on an autobiographic ambulatory exploration of Lisbon, taking intentional arbitrary routes, to construct a "psychogeography" of Lisbon. This method allowed me to explore the city, letting a relationship between the urban environment and my memories guide my movements, aiming to capture my personal perceptions of the city through the lens of phenomenology, influenced by an unlikely cross-fertilisation of Bergson's durée and Debord's dérive and driven by a need that arose out of my own diasporic heritage to seek out my place within this unknown space.

The spontaneity of this approach was critical in ensuring that my experiences and data collection remained unstructured and organic, reflecting a true psychogeographical journey. Whenever an object in the landscape caught my attention or a memory surfaced, I documented the experience. This approach was not only about recording what I saw or remembered but also about how these experiences connected to broader philosophical and phenomenological theories.

Data recording was facilitated by using an open-source mapping application, Open Street Map (OSM). [14] This technology provided the tools necessary to capture qualitative data such as photos and audio recordings, alongside quantitative data like GPS logs. These diverse data forms were crucial in documenting the lived experience in Lisbon, shaped not by preconceived notions but by my personal engagement with the theories of durée and dérive.

14 which is readily accessible on smartphones.

The combination of these methods, gathered using a smart phone with integrated GPS yielded a rich dataset, intended to capture both the ephemeral qualities of personal lived experience and the concrete data of geographical navigation. The relationship between these qualities became the foundation for project 3, where data documenting a letterbox was the focus, as outlined in chapters 8 and 9.

Chapter 4 initiates the critical analysis of the fieldwork outcomes from Lisbon by scrutinizing the representation of quantitative GPS data depicted as a line. This line, commonly known as a GPS trace, meticulously recorded the paths I traversed. The discourse is broadened by integrating literature, particularly Tim Ingold's critique "Lines: A Brief History" (2007) where the line represents not the experience of 'dwelling' but rather a network of GPS nodes similar to a surveyor's measurements. Engaging with Ingold's suggestions led to a literal dissection of a line printed on a page, unveiling differences between real and imagined experiences in relation to a line.

A pivotal research approach, initiated here, and continued in chapter 7, is the examination and attribution of distinct qualities of different technological interfaces for the qualities they lend to the GPS line, whether viewed on a smartphone or a printed sheet, each interface framing the line differently, to explore how these mediums influence the qualities of representation and relate to an exegesis of a text.

The unusual presentation of the description of the representation of GPS data in chapter 4 attempts to avoid the influence of prior memories in order to engage with Bergson's notion of 'pure perception' (Guerlac, 2006, p.106), which entertains all possible realities. This method of writing allows for an unfiltered observation of the data’s inherent qualities or those attributed to its representation. Subsequent analysis of the writing highlights how specific language choices frame the walking experience in relation to varying perceptions of space and time. This framing is taken forward into chapters 5-9 where cultural anthropological definitions of quantitative and qualitative

data are questioned and social science approaches to data categorization (Bernard, 2017) are critiqued.

Chapters 5 and 6 separate the technologies used in producing a line from their inherent qualities, delving deeper into the qualities associated with the GPS trace. The method of research focuses on an analysis of the qualities by combining the method of close description used in chapter 4, inspired by Jukes' engagement with a close study of process (2017), described in chapter 2, drawing on methods of research used in 'Critical GIS' (Schuurman;1999) informed by Marxist-feminist theory *(Smith and Katz, 1993).*

The analysis extends to consider these technologies of mapping not in isolation but in terms of their association with structures of power and positivist epistemologies (Elwood & Cope, 2009), revealing other associated qualities, beyond quantitative data, which offer different perspectives. Bergson's theories on perception are employed to juxtapose the technological mapping of lived experience with the qualitative aspects of such experiences.

Chapter 5 focuses on the raw data components of GPS technology, examining military (Guier & Weiffenbach, 1997) and commercial developments (Parkinson & Powers, 2010; O'Connor *et al*., 2019) and their intended navigational purposes. Bergson's concept of 'pure perception' (Guerlac, 2006) is used to consider these intentions and how they shape perceptions of lived experience. In contrast, chapter 6 shifts to explore the underlying infrastructure of GIS technology and its 'blank canvas' approach. It considers how GIS frames data within a colonial mapping system (Sobel, 1996) and reflects on the practice of walking during data collection, examining how the geometric logic of GPS data translation into lines might affect the perceived qualities documented.

The final part of this thesis is concerned with project 3: Diagram of a Letterbox; a representation of psychogeography which is described in chapter 9. First, chapter 7

revisits arts practice methodology, analysing the aesthetics of the GPS trace through researching the work of contemporary artists. This includes interviewing Daniel Belasco Rogers from Plan B, a review of the literature that included Karen O'Rourke, (2013), MacDonald, (2018), Ferdinand, (2019) and Hansen, (2005) and, in terms of the influence of locative media in relation to this genre of arts practice, Leorke, (2017); Russell, (2004); O'Rourke, (2013); and Zeffiro, (2012). Hansen's (2005) alignment of Kurgan's use of GPS in 'You Are Here'(1994) together with Bergson's durée are used as a primary method of research that considers an arts practice of mapping in conjunction with Bergson theories of perception, to examine how technologies impact or indeed inform perceptions of our lived experience. An analysis of the aesthetics of representation through the magnification of the GPS trace using different software to highlight a range of aesthetic qualities follows.

In chapter 8, the research extends the scrutiny, focusing now on *qualitative* data, collected in project 2, specifically the transcript of an audio recording examined under the guiding principles of grounded theory (Knigge & Cope, 2006). Qualitative data was chosen for its potential to provide insights related to both physical objects and, in line with autoethnographic methodologies, the researcher's memories. The aim was to achieve, if not an empirically based assessment of the qualities of the transcript's text, then one that at least distinguished the qualities of the text from the projection of my subjective memories onto the data.

The method of analysis developed through first taking a social science approach to the coding of qualitative data (Saldana, 2021; Skjott Linneberg & Korsgaard, 2019) and then adopting an intuitive interpretation of key terms used by Bergson so as to construct a set of categories under which each word of the transcript could be codified. Each stage of the coding was followed by an evaluation that led to a fuller understanding of Bergson's concept of perception and a greater awareness of the gulf

between the qualities inherent in the data and the qualities perceived to be in the data. The outcome was the application of an absurd, even excessive quality of objectivity to the data gathered in Lisbon. This led to a phenomenological inquiry that documented the relationships between matter and memory. The method drew on a reading of Ahmed's work on queer phenomenology (2006), which analyses the role of intimate objects in answering the need in diasporic culture to place familiar items within new homes.

Transcribing the audio data was performed via computer into a Word document and subsequently printed out. This method was attentive to the discrepancies between auditory perception and transcription, capturing spoken words while omitting ambient sounds, reflecting the problem of variance highlighted by Gibson and Brown (2009). A 'top-down approach' using Bergson's theories initiated a detailed breakdown of the transcript, beginning with highlighting sections under the terms 'matter' and 'memory.' Subsequent stages progressively dissected the text, with Bergson's concepts aiding in the development of categorical terms.

Utilizing a 'bottom-up approach,' which responded to the apparent qualities in the text as it was coded, added layers of complexity to the classification. Initially using tables and later spreadsheets, each word was categorized, carefully considering how perception of these words might be skewed if not influenced by memory or contextual association. Once categorized, an evaluation ensued, creating a taxonomy from the coded data which involved comparing the qualities of words within the same categories and reflecting upon how theorists referenced throughout this thesis might interpret these terms. This dismantling and re-evaluation of data led to the development of project 3, Diagram of a Letterbox, an experimental methodological approach described in chapter 9 which draws on Rita Cachão's creative use of a diagram 'The Mouth of the Monster and the Hollow Body' in her doctoral thesis *The Ontology of Space* (2015). Meeting

Cachão, now a post-doctoral advisor to the Transtechnology Research Group, while walking in Lisbon, was instrumental in the development of my understanding of diagrams as devices with which to capture and communicate the sense of a virtual relationship to space.

The diagram, described by Cachão as ‘a framework that is archaeological, self-reflective, [and] aesthetically driven’ (2015, p. 39) integrates arts practice with philosophical inquiry, encapsulating both an analysis of data and a perception of landscape. This method not only demonstrates a novel approach to data analysis but also enriches the understanding of how qualitative data can be interpreted and represented in research.

Thus, chapter 9 describes the construction of a diagram, which is considered as a tool in both the arts and philosophy (Deleuze, 2017, p.11; Zdebik, 2012) to explore and communicate complex ideas that are not reducible to a single point illustration. Drawing from Cachão's research (2015), the diagram is formed by pinning words identified during the transcription coding in chapter 8 onto a pinboard. This setup facilitated a dynamic engagement with additional data from project two, where printed paper outputs were also pinned to the board. The diagram evolved by connecting these pins with golden threads, not in relation to linear time as the GPS data might suggest but in a manner reflecting Bergson’s concept of durée, where perception intertwines with memory. This process of continuous reconstruction, guided by the aesthetics of the golden thread's path, eventually stabilized to a point deemed sufficient for research purposes. The emergent ideas and memories were recorded via written notes and audio on a mobile phone, contributing to structured commentaries on each pin, which was treated as a node of data, enhancing the reader's understanding and engagement, by helping navigate the diagram's complexities.

The combined methodologies and methods in the 3 projects critically engage with how different technologies, data, and its representation, influence and inform our perceptions of lived experiences. The inquiry questions the objectivity and qualitative potential of GIS and related technologies, and, in chapters 8-9 points towards a method for respondents in participatory mapping projects to engage in a critical evaluation of the data said to represent their lived experience.

Throughout the thesis, autoethnographic perceptions of an outsider in a new place, informed by memory, are explored in some detail. The adoption of anecdotal descriptions as a method reflects how the chosen methodology "opens up a wider lens on the world, eschewing rigid definitions of what constitutes meaningful and useful research" (Ellis, Adams & Bochner, 2011). This choice of autoethnographic methods enables an oscillation between an acceptance of personal bias when considering memories related to the data and the need for the analysis to acquire a distance from what is intimately known in order to achieve a relative objectivity (Pethybridge, 2017 p. 22). Reflecting this oscillation, acknowledging the subjective point of view of the researcher in terms of influence on the research, the written text through the chapters of this thesis moves between using the first and third person, the former being reserved for my role of research subject as well as making researcher bias transparent, as in chapter 1 (section 1.1). In the experiment described in chapter 8, (see p. 39), bias was not only taken account of but incorporated into the methods.

Hence, the changing roles, incorporating personal experiences, method development and execution is made transparent, and my bias, as both researcher and research subject made explicit, all described as integral components of the research process.

As the research progressed to a more granular analysis of data, the approach began to draw upon my previous arts practices. Echoing the tacit skills of stone carving,

where the sureness of the decision to cut away parts of the material lies in the carver's confidence that the form already exists within it and the material just needs to be gently excavated for its essence to be revealed. Likewise, seeing non-linear connections between points was similar to the illusion of animation breathing life into a sequence of drawings. Here, the relationship to movement lies not in the individual drawings but in the experience between the frames – the artist Paul Klee's metaphor of 'taking a line for a walk' made literal[15].

15 This quote is the misrepresentation of the actual phrase used by Klee :'a line goes out for a stroll' as discussed in chapter 6 pg. 200. Which is distinctly different in terms of agency.

Conclusion

This research began by examining a bird's-eye digital view of places within a specified location formed by measurements taken between data points. After a discussion which highlights the context of geo-spatial technologies, it ends with the integration of intuitive aspects of arts practice into the research methodology. The result examines a different orientation between points of data, taking Ahmed's 'queer phenomenology' as a starting point, but in place of queerness, it is the orientation of place that can no longer be captured in straight lines. Hence, this research neither conforms to a realist nor an idealist position but adopts a form of Bergson's approach that bridges the two. From a gatepost in Penryn to a letterbox in Lisbon, the following chapters slowly unravel a connection between points through questioning qualities attributed to the data, both quantitative and qualitative, based on a linear relationship to time and space at the negation of subjective qualities of experience. The final chapter then reconnects them through the concept of durée, the period of non-linear relational time, expounded by Bergson, that relates to lived subjective experience.

Part 1

This part introduces the first project, RIYT, and critically examines the digital technology employed in creating a participatory mapping experience, considering how a digital representation of landscape can relate to a spatial experience within landscape

Chapter 1: Re-Imagine Your Town

The research for this thesis developed from conceptualising and producing the participatory arts project Reimagine Your Town (thereafter RIYT) prior to commencing doctoral studies. Examining the project, both during and after its execution, revealed some hidden assumptions and limitations to using gaming technology for community engaged arts practice, which will be outlined in this chapter.

After introducing the project RIYT, and the potential research questions that arose after its execution, the relationship between matter and memory will be considered from a Bergsonian perspective. Next, the socio political context of the project will be explained and the rationale for why methods of Computer Generated Imaging (CGI) were adopted as primary tool for facilitating participating residents' engagement with a representation of their town's landscape in the RIYT project. In section 1.3 close description is used to make explicit the use of subjective and objective data in CGI. The process of beginning to address questions asked after the execution of RIYT in section 1.4 reveals a hidden assumption associated with the use of CGI to represent actual lived in landscape, using Tim Ingold's distinction between a surveyor and a journey through landscape as a starting point. Relevant attributes of digital gaming, used in RIYT, will then be introduced, providing an insight into how, during technical construction, quantitative and qualitative data begin to conflate into a CGI representation of landscape. The chapter ends with a description of the gamification of participatory mapping and the challenges associated with it, as highlighted in RIYT.

Taking a bird's eye view, the chapter breaks down the technical construction of a computer-generated image (CGI) representation of a landscape. The landscape in question can be identified as the parish of Penryn, a small town in Cornwall, The CGI representation was produced within the town itself as part of the participatory, artist-led project RIYT, which used creative workshops to engage residents in different ways of

experiencing and documenting Penryn. The idea of creating a 3D CGI model of the town began to emerge in 2015 following a demonstration (BBC 2015) opposing plans for a new housing development on fields and woodland which locals had been using for their leisure for generations.

The CGI representation of the landscape of Penryn, which was already part of my portfolio of art practices prior to the present academic research, had succeeded in a primary intention of directly involving over 200 residents in its creation. As such, it could be defined as a participatory arts or community arts project. RIYT's objective of engaging residents in an artistic practice that explored the relationships between a place and its inhabitants was related to the concerns of the community and involved participatory mapping of the landscape (Guldi, 2017, Emmel, 2008), thus integrating arts practice and social geography (Hawkins, 2017) acknowledging the role of intuition which is a 'crucial aspect of Bergson's creative philosophy' (Williams, 2016, p.1158).

During the initial doctoral research process, academic colleagues in the research forum Transtechnology[16] raised deceptively simple yet invaluable questions regarding the specific qualities of the landscape being represented in RIYT and the ways in which the technology itself influenced these qualities. This enquiry will be engaged with in section 1.4. There first follows an overview of the socio-political context of RIYT.

As the seeds for the project were sown at a demonstration that took place in the town, let us begin with the residents who were involved in the protest. Although the demonstrators shared the goal of preventing property developers from encroaching on an area of meadows and woodland – with all the inevitable ecological implications – in which local people had always been free to roam,[17] there were differences among them: some had known this landscape since they were children, while others like myself were

16 Transtechnology Research is a transdisciplinary research group situated in the Faculty of Arts and Humanities at Plymouth University.

17 The 'right to roam' has been bought to wider attention in 2023 when large scale acts of trespass were held to bring attention to a landowner, Alexander Darwall attempt to overturn the "right to roam' on parts of Dartmoor he owned. Nimo, O. (2023) 'Monday briefing: The long legal fight for the 'right to roam' England's countryside'. [Online]. Available at: https://www.theguardian.com/world/2023/aug/07/first-edition-right-to-roam (Accessed: 2023-08-07).

relatively new to Penryn[18]. Indeed, if there was an argument for building on this land, it was the increased need for housing that was due in part to people moving into the town.

Residents born and raised in Penryn often refer to themselves as 'Ryners' and call those who have moved in more recently, 'incomers'.[19] A somewhat romantic distinction between a Ryner and an incomer refers to their respective connections to the landscape; a Ryner is born into a relationship with the landscape whereas the outsider is born elsewhere and has adopted or, in some cases, seeks to be adopted by Penryn. While the category of incomer can be problematic (Miessen, M. 2010), it is of particular interest here because it relates to two of the concerns of this thesis, one being the relationship between the politics of participation in terms of the Localism Act (Clark, 2011) and RIYT's relationship with the local government's neighbourhood plan using participatory arts practices (Bishop, 2012 p163; Pethybridge, 2017 p.63), the other being the autoethnographic method of research, which acknowledges the position of the researcher (myself as an incomer) in relation to the landscape being documented.

1.1 Perceptions of Landscape

The consideration of ancestral ties to a landscape takes into account time in relation to space, or landscape. Although time or duration can be defined by clock time and be linked to the calendar of days, months and years; it can, alternatively, be considered from a philosophical perspective as a qualitative experience of what Bergson called durée (see pages 47). In terms of linear time, for example, my relationship as an incomer with the landscape of Penryn is of a recent nature. Yet, certain details in this landscape – material things such as a specific path, stone or tree – often intermingle

18 At the time I had lived in Penryn for 6 years.

19 I also produce a local zine, which is distributed to every household in Penryn, called Rynzine. The title incorporates the word 'Ryners' (locals). While most of the production is the work of incomers, the ultimate aim is for Ryners to make or be the subject of the content published in Rynzine.

with or evoke distant memories related to other landscapes which become associated with these details and thus help form my perception of Penryn.

Bergson uses a drawing of a cone (1991, p.162) to represent how memories of the past inform perceptions of the present (figure 1).

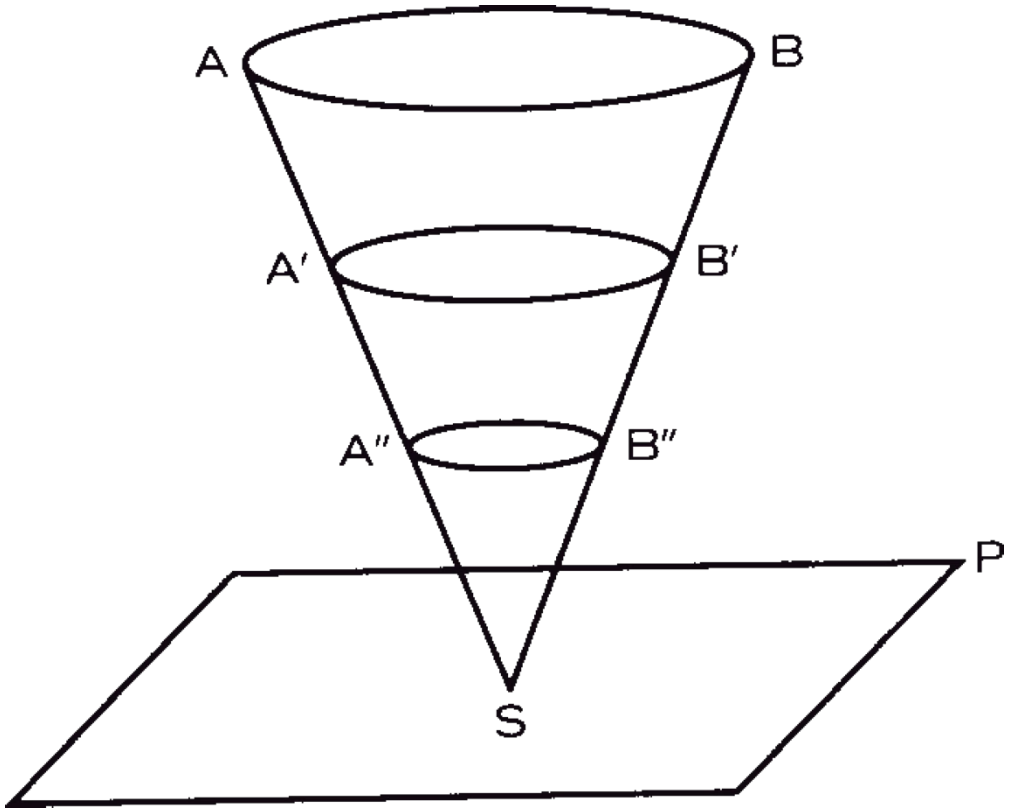

Figure 1: Bergson's Cone (a)

The central focus in this drawing is the point of the cone, S. This represents the 'sensory motor mechanism' (Bergson, 1991, p.152) which, in the action of the present moment (represented by the plane P), is the point of perception. At the base of the cone is the circle AB, representing 'recollections in their totality' (1991, p.161) In the present moment, Bergson posits, we only recollect a fraction of what has happened. These sections of the 'totality of AB are represented by the circles A'B' and A''B''. How we perceive, he continues, is the effect of the action (S) in the present moment (P) drawing in recollections A'B' and A''B'', and so on. This model of perception points towards why our experience of time is not one of a linear progression of points in time but one of durée which this thesis applies to lived experience in landscape.

This quality of durée is the lens through which the data in this research is analysed, amongst other methods, in subsequent chapters. In chapter 3, for example, where an example of the documentation of a material detail, a gate stop in the RIYT project that bears a direct relationship to one Ryner's memories of childhood experiences in the landscape of Penryn is examined (see Appendix 2).

Both the *Ryner* and the *incomer* are aware of certain qualities attached to their past memories that relate to their present-day experience; the difference between them lies in the location of these memories[20]. This difference can have an implied value when it comes to the discussion over what happens to the landscape in question. For example, the number of years a Ryner has lived in the landscape represents quantitative data that could be thought to give their opinion greater weight than that of the incomer. An alternative valuation, however, could be made by calculating the amount of time the Ryner or the incomer has spent wandering in this landscape, or by assessing the quality of the attention they paid to its details. Of course, to try and place a value on either a quantitative factor of years or a qualitative factor of attention is highly problematic, and yet there is a justifiable case when it comes to legal arguments about the award of land ownership rights to indigenous populations who can demonstrate a quantifiable or qualitative relationship to a landscape over time.

In the case of Penryn, the local council's ownership of the contested area is in accordance with laws set by central government, and this ownership confers the right to decide what can be done on the land. However, the residents (myself included) who came together to demonstrate against the council's proposal to sell the land to a property developer questioned both the wisdom and authority of this decision. We were a few hundred in total, but the lack of a positive response invoked in me the memory of previous disappointments over the failure of public opposition – even when expressed

20 Or to be more precise from a Bergsonian point of view it is not the memories that are located but the locations where actions were taken that drew these memories into being.

in far greater numbers[21] – to influence the designs of government or private enterprise. Indeed, despite acknowledging there would be concerns, the council did not appear to take them into account: 'The town council recognises and understands that this decision will not be popular in all quarters but also has to recognise responsibility to plan for the inevitability of population growth' (BBC, 2015).

As I walked on the hillside contemplating the inevitable fact that, despite local opposition, the development would still materialise there,[22] my attention was diverted by discussions with other residents, mainly incomers, about the need to present the council with alternative plans to meet the need for housing, as well as justifications as to why this part of the landscape should not be built on.[23] The politics of participation has an acknowledged advantage if, as in this case, it includes 'outsiders' or recent incomers, who are often less bound by the need to seek the approval of the community and can be more critical or radical (Miessen, 2010, p.15). The outsider may also introduce new ideas or methods of resistance.[24]

In my case, I could bring certain skills to the project. A little over ten years earlier I had been employed as an animator working with 3D modellers as part of a design team for a digital arts media company which specialised in the 'art of persuasion'. My role had been to prepare 'assets' – that is, to create items with which to populate photorealistic 3D CGI models of building projects. The company would use these to produce 'visual experiences' – films, interactive walk-throughs and virtual reality – to sell its (commercial) idea. These models and related animations were made and continue to be made at great expense in order to secure planning permission, raise investment, attract buyers or tenants, and build public support. The company claimed to 'help visionary thinkers and institutions make the radical a reality' (SquintOpera, 2017).

21 One example of this was the million-strong demonstration in London against the Iraq War in 2003.

22 In 2017, the construction began, and it continues to expand across the hill today.

23 It is customary for an opposition group contesting a new development to submit alternative plans to the planning authority. However, the costs of doing so are often prohibitive, especially for community groups with limited means and a lack of expert knowledge, and they often struggle to provide these by the required deadline.

24 The incomers have indeed introduced a greater confidence and willingness to question local government policies in Penryn.

Leaving aside the rather dubious claims of the sales pitch, a question emerged as to whether commandeering the technology for a community of residents to use to communicate their own vision for their town would give future opposition to the imposition of housing developments greater credibility. Even if a planning application for a development project is agreed by a local council planning committee, the decision can be overruled by the county council and in the last resort by central government. The further the decision-making process travels from the locality, however, the more those contesting it rely on documentation to communicate their arguments. As such, the question of aesthetics – how ideas are presented – becomes a vital part of the art of persuasion. Hence, after the Penryn demonstration, an idea began to develop among some of the residents, not to produce some incredible architectural design, but rather to initiate a participatory arts practice with the socio-political objective of creating a representation of the landscape containing what they wished to see in it.

1.2 A Veil of Aesthetic Realism

At the same time as RIYT began to develop as a project, Penryn council was preparing to launch its neighbourhood plan (NHP). NHPs, introduced in the Localism Act 2011, were a key part of the legislative programme of the 'Big Society', a socio-political concept adopted by the government of the time. The then Minister of State for Decentralisation wrote in the forward to *A plain English guide to the localism act, 2011* that centralisation of the decision-making process creates 'the very opposite of the sense of participation and involvement on which a healthy democracy thrives' (Clark, 2011 p.915). In contrast, an NHP is described in government-funded literature as 'written by the local community' (Locality, 2023) with the aim of taking a 'local' perspective on the interrelationship between planning and socioeconomic and environmental concerns.

If the NHP is to be 'written by the local community', however, the question is what qualifies as a 'local community', and to what degree do residents participate? The NHP guidelines infer the close involvement of local residents, but aside from the need for a local referendum (which, in the case of Penryn, failed to engage the majority of the community),[25] if the local council simply demonstrates that a 'consultation' with residents has taken place, this appears to suffice. In effect, an NHP can be authorised by locally elected representatives and '[t]his means that community representatives lead the plan, often with support from their preferred consultants' (Chetwyn, 2018, p.b2) Given that the 'community representatives' are either councillors or people invited by councillors to act as representatives, the participation of residents not already involved in local governance in some way is minimal. Hence, the claim that the NHP is 'written by the community' is only true if the 'community' is defined by those who govern it.

In addition, previous experience of local consultants working for other NHPs suggested that their remit appears to be to remind residents of the limitations of its scope. For example, an NHP may not undermine plans for the local area, such as new housing allocations, that are made at a national or county level (Chetwyn, 2018). A stark difference with RIYT lay in the fact that the latter's ideal intention was to do precisely that. After all, the idea for RIYT developed out of a demonstration objecting to part of Cornwall's housing allocation being built on landscape that held a particular importance for local residents. The vision of RIYT – to encourage local participation, unrestrained by more 'realistic' concepts that appeared heavily biased towards fulfilling the plans of property developers and local and central government – was undoubtedly utopian, but it decided to use technology to mask these utopian ideas with a veil of 'aesthetic realism'.

25 The Penryn NHP was passed on a turnout of just 12.5% (Penryn Council, 2021, p. 918), a minority of the community.

However, the NHP and RIYT did share a common objective of producing representations of the landscape and gathering the opinions of residents concerning its past and future use. This commonality, as well as the RIYT's underlying socio-political aims, led to those involved putting forward a proposal to the council that the project would create an interactive community representation of Penryn, and the data this produced could be used to inform the NHP. The potential benefits of applying an arts practice to community consultation satisfied the funding criteria of the Arts Council – a government-funded body whose members are appointed by the Secretary of State for Culture, Media and Sport (Arts Council England, 2023, p. 923). It is worth noting here that government-funded projects cannot have an openly political agenda beyond that of widening participation in democracy. An additional factor in the award was the proposal for what at the time (2015) seemed a novel use of VR and games engines to facilitate residents' participation in the creation of an interactive representation of their landscape. In fact, this aspect of RIYT, the aim to build a 3D CGI model of the whole of Penryn that could be 'wandered' through using VR, also appealed to some of the NHP steering group. This is evidenced by a photograph (figure 2, below) that appeared in the local press depicting the then mayor standing among the project's participants.

Figure 2: The Former Mayor of Penryn with RIYT Participants

There were two reasons for using the technology of 3D CGI and game engines. One was a (questionable) understanding, prior to undertaking the research for this thesis, that the technology would facilitate participation by providing an interactive interface that could document the outcome of residents' participation and visualise, with the help of a realistic representation, the qualities of the landscape that they sought to maintain, change or develop. This sort of understanding is heavily promoted by the manufacturers of these digital technologies. The reason why this premise is questionable relates to the subjects that this research interrogates, particularly the qualities of the data and the framework of representation, and will be discussed further as the thesis proceeds.

Another reason for using these technologies was drawn from my previous professional experience. I knew that they could provide the ability to simulate the aesthetics generally associated with realism. Consequently, the intention (although, in hindsight, possibly misguided) was to use this aesthetic to gain a hearing for ideas that may otherwise have been passed over as being 'unrealistic'. For example, the presentation of the creative results of residents' participation in collage or

psychogeographic arts workshops could be veiled in the aesthetics of realism and thus afforded a sense of pragmatism. This aim will be discussed further when unpacking how and why the representation of the landscape was made in sections 1.3 and 1.4.

Perhaps unsurprisingly, the NHP steering group did not take up the RIYT offer to become the method of public consultation; instead, it employed consultants experienced in NHPs – and with a more conservative outlook – to deliver the community consultation and its related maps and documentation. Whether this was because RIYT's participatory arts practice did not constrain residents' contributions within notions of realism or central government parameters is not known. However, what is more certain is that the methods selected by the NHP steering group would avoid undermining a hegemonic system of power. Indeed, it could be argued that the whole purpose of the NHP was to provide an illusion of participation in a decentralised system of governance, while reminding any residents who did engage in the consultation process that they had to work within the confines of the systems framing.

On the other hand, a valid criticism of RIYT is that it also remained bound by the system even while claiming that it was not constrained by it. For example, the impact of the project was aimed at and thus remained within the system of local governance, while the technology itself brought its own barriers to participation, including limited access to the tools of production. A further, more general ethical concern relates to art practices that involve the participation of community members, and the extent to which the invitation to participate turns them into the equivalent of an object within the artwork itself (Bishop, 2012, p. 176). Lack of awareness of this risk means that there is often no proper acknowledgement of the participants' position, nor are they informed of their rights to the work. In the case of RIYT, there is a further concern that the invitation to participate in a utopian idea was based on the questionable

premise that residents' involvement could have an impact on the delivery of a viable alternative.

This critique notwithstanding, it is interesting to note that residents' opinions on the plans for Penryn, as documented by RIYT and supplied to the council, were not incorporated into the NHP consultation documents. This was despite the fact that quantitative data recording the numbers participating in both the NHP and RIYT indicated that substantially more residents engaged with RIYT than with the NHP open days.

1.3 The Technical Production of a CGI Landscape

The following detailed account of the production of a CGI landscape may seem obvious to the informed reader familiar with CGI, 3D modelling and the production of digital games, and the temptation may be to skim over the technical description. However, one of the key observations of this thesis is the degree to which the influence of these technologies rapidly becomes invisible to the user. The reason for this detailed description is not as a technical guide but as part of a process demonstrating how objective and subjective data are combined to create a 3D CGI representation of a landscape. Leaving aside the more in-depth arguments over the definition of objective and subjective, this section studies the combination of objective data, which it defines as data taken from measurements of a specific landscape (Penryn), with subjective data that infers certain aesthetic qualities associated with this landscape. This process is crucial for the next stage, the purpose of which is to show the degree to which the apparatus and the politics of participation conform with a version of realism that lies outside of both.

In 2015, when it was decided to make a 3D representation of Penryn, light detection and ranging (LIDAR) data (Tapete *et al.*, 2017) had recently become publicly available (Crutchley, 2010). LIDAR data is collected by firing Air Borne Lasers (ALS) onto the landscape below. The data is extracted from the reflected light of the lasers, which provides different height points across a landscape, and its level of accuracy is such that it can distinguish a pulse of light returned from a leaf at ground level (Hancock *et al.*, 2017). As if overnight, it became possible for one individual with basic 3D computer modelling skills to realise ideas for large-scale 3D models emulating the topography of real landscapes (previously only conceivable by large corporations employing huge production teams). In the case of RIYT, millions of points of height data could be downloaded instantaneously onto the hard drive of a computer,[26] imported into a 3D software package, and transformed according to the laws of geometry into a digital mesh[27] of the topography of the parish of Penryn.

The process of CGI is arrived at by representing each LIDAR point, or elevation of data, as the vertices of a polygonal triangle. If the form undulates, it does so according to the difference in the elevation between one LIDAR data point and another. Since all of a polygonal triangle's vertices represent a particular point of elevation in the real landscape, the number of points-of-elevation data taken within a certain area will influence the accuracy[28] of the CGI surface in terms of the visual representation of the topography of a landscape. It is important to note that the term 'accuracy' is used here in relation to the elevation data existing on a hard drive. As such, the only quality this mesh – basically, a wire frame of interconnected polygons – contains is the elevation; it has no other qualities relating to the surface of Penryn's landscape.

26 The computer was located in a shed in the garden of my house in Penryn.

27 The digital mesh is a visual representation on a computer screen of the connections made between data on a hard drive.

28 At the time, the LIDAR data (to which the production team had free access) relating to elevation points in Penryn was considered to have an accuracy of within a meter.

1.4 The CGI Surface and the Experience of Landscape

The research documented in this thesis began to consider questions concerning the qualities of data through a critical engagement with the association between the CGI surface and the landscape of Penryn. The CGI mesh cannot be considered as a representation of the landscape, at least not until it is associated with further qualities – thus, to begin with, it is in effect a visual representation of a surveyor's report, a topography. Ingold makes a clear distinction between 'the task of the surveyor' and a journey in the landscape, describing a surveyor as 'mobile, yet unable to be in more than one place at a time' (Ingold, 1993, p.154), while a journey in the landscape travels 'between points', where each place is an experience inseparable from the whole. The elevation data of the 3D CGI mesh contains nothing of the qualitative experience of the landscape other than (perhaps) those related to elevation. Even an experience of elevation, however, would not concern the individual points of elevation but the experience between these points, and this is not present in LIDAR's quantitative data.

Whether we agree or not with Ingold's distinction, the representation of a landscape using quantitative data is clearly a reductive one. If the association of this CGI mesh with the landscape of Penryn is not considered ridiculous, it will often be because quantitative data is gathered using methods related to the science of maths and geometry (the relevance of Euclid's first postulate is discussed in Chapter 6) and is associated with objectivity and realism. Indeed, the CGI mesh embodies the paradigm of realism in that representations of a landscape are drawn using the technical method of perspective – a foundational drawing technique – involving measurements and connections between points that are observed to exist in space. Although, if seen from a certain angle, this wire mesh has many of the qualities of a drawing in perspective, if it were shown to residents in Penryn it is likely that many would find it lacking in the

qualitative attributes they associate with the reality or indeed even with representations of their landscape.

So what qualities are missing from this CGI mesh? They are not the objective qualities of measurement, but the subjective qualities experienced in a landscape. Ingold (2011) uses the term 'dwelling' to describe how these qualities of experience are inseparable from the whole. Put simply, these are the qualities of lived experience, some of which can be ascribed to the surface of the ground we walk on. As such, the next stage in the production of a representation of Penryn was to create an illusion of a surface that residents might associate with their lived experience of the landscape. In the 3D-modelling CGI industry, one method of creating such an illusion is to give the polygonal CGI mesh a surface or skin. This is called 'texture mapping' and involves mapping a digital image file with information about tone or texture in relation to the coordinates of the CGI mesh, giving the visual impression that the planes of the mesh are covered by something with a material quality. An analogy of texture mapping is the effect gained by projecting an image[29] or video onto a surface to create an illusion of texture. For example, in his thesis '3D Computer Generated Animation and the Material Plane', Jukes (2017) describes this illusion as the 'basic function and process of texture mapping (in [a] basic fashion)' (p.117). It can be assumed that Jukes clarifies that it does so only in a 'basic fashion' in order to acknowledge the qualitative difference between the projection of light onto a material object and the basic function of computer processing data. Critically, this basic function is why the qualities presented within a 3D CGI representation of landscape are limited. The constraints of the software lie in the relationship between the coordinates and data in the hard drive and the interface.[30]

29 NB Bergsonian use of the word.

30 Other potential relationships exist beyond that of the hard drive and data, but these are not inherent qualities of the CGI 3D model. They will be discussed later, in Chapter 2.

In relation to the concerns of this thesis, it is interesting to note that at this point in the technical production (texture mapping), the construction of a CGI model begins to conflate subjectivity with objectivity. For example, when a green tone associated with grass (qualitative data) is applied to a 3D CGI mesh based on LIDAR (quantitative data), a conflation between data types starts to occur. The realistic appearance of the landscape is no longer based on objective data but is integrated with qualitative attributes relating to subjective interpretations of it. This point of conflation will be further illustrated in the following section.

1.5 Game Engines and the Landscape System Library

Converting a polygonal mesh into a textured representation of qualities associated with landscape can be accomplished with 3D-modelling software. However, as one of RIYT's objectives was to encourage residents to interact with this representation, the next point of production involved exporting the 3D polygonal mesh into a 'game engine'. A game engine is a term that began to be used in the mid-1990s – usually in reference to 'first-person shooter games' – to describe the software and production framework that lay behind many video games (Gregory, 2009, p.13) A straightforward way of describing the game engine is a production framework where components of the game's technical aspects can be divided into the following categories: software, assets, and the game's narrative or 'rules of play' (2009). Assets are described by one game engine manufacturer, Unity, as 'anything that goes into a video game – characters, objects, sound effects, maps, environments'.[31] In essence, a game engine is designed to clearly identify different assets as separate components, rendering them interchangeable with updated assets, so that the game engine can

31 Available at: https://unity.com

‘seamlessly’ orientate the player’s experience of these new assets in the updated version of the game.

Before proceeding further, a pedantic yet necessary question needs to be raised concerning the definition of an asset. From a technical point of view, Unity’s description suffices as the company is not discussing perception; the player’s subjective relationship to the experience of playing the game is not considered to be part of ‘anything that goes into a video game’.[32] A line has been drawn between the game itself and the player’s subjective experience when playing it. Nevertheless, the philosophical questions relating to perception and data need an analysis that is more precise than the ‘anything’ cited by Unity, which is in danger of inadvertently conflating the representation with the experience. This thesis defines an asset as audio-visual information or data existing on a hard drive in the form of 3D models, 2D images, sound and movies. These assets often represent the characters, objects or elements of video game environments, and can be animated or still. One primary asset in the 3D model of Penryn was the representation of the elevation data that stood in for the landscape’s surface.

At the time of producing RIYT, game engines were not engineered to be directly compatible with LIDAR data (Virtanen *et al.*, 2020) so a compatible format was exported from the polygonal mesh, then imported into a game engine as a height map. A height map remains a visual representation of the quantitative data but the game engine’s ‘landscape system’ provides a method equivalent to texture mapping and this can be used to create what is described in the Unreal Engine manual as ‘expansive outdoor environments’ ('Landscape Quick Start Guide,' 2023). The word ‘environment’ is used because these tools extend beyond texture-mapping the mesh to containing libraries of assets (for example, trees and large boulders) that can be used to populate a

32 Ibid.

landscape. In addition, the landscape system provides options for animated representations of weather systems, programmed to influence assets placed within the scene. In a demonstration of a 3D representation of a landscape, for example, an animated representation of the sun appears to rise, casting its light on the scene, and as it moves across the sky, the light not only changes the tones of the texture but also the length of the shadows cast by the assets. Thus, an asset of trees can appear to cast a shadow that changes in relation to where the asset of the sun is within the representation of the sky. In effect, the 'landscape system' library marks a point of departure from the representation of landscape as a representation of quantitative data based on objective measurements. At this stage of production, the objectivity of measurements becomes wrapped in decisions that have a subjective relationship to the landscape in question.

A qualitative difference between the height map and the qualities of texture or animated weather systems applied to this surface is that the former derives from a system of measurements and the latter is a matter of selecting from the qualities available in the 'landscape system' library. This point in production could be described as the moment in which subjectivity adorns or indeed is conflated with a surface of objectivity. As the Penryn representation progressed, choices had to be made, albeit ones that were restricted to what was available on the database, and a question arose concerning which qualitative texture should be applied to this surface, and to what extent. The answer was informed by the participatory aims of RIYT: the qualitative attributes needed to be sufficient for its creators to recognise the landscape as a representation of the Penryn they knew. At the same time, there had to be missing assets relating to their subjective perceptions of the present, or to their memories of the past, or ideas about the future, in order to encourage the residents to engage with the completion of the landscape.

When the project was first conceived, a few months prior to the public availability of LIDAR data, a central consideration was how residents would be drawn into participating in a 're-imagining' of Penryn. Inspiration as drawn from Lars von Trier's *Dogville* (2003). In this film, the entire set is black and lacks any horizon, as in Samuel Beckett's play, *Waiting for Godot (1965)*. The only architectural features are the basic outlines of houses, marked out on the floor, like white chalk lines on a playground. An odd collection of household objects lie in some of these designated spaces, as if scattered across a giant stage. (Portilla, 2013) describes the film's *mise-en-scène* thus: '[y]ou would need to imagine all the missing information in a kind of mental extrusion of physicality.' In this minimal stage set, the audience, triggered by the actions of the actors, draws out of this emptiness whatever they imagine to be there. *Dogville*'s aesthetics suggested a way to achieve the participatory objectives of RIYT on the relatively small budget of a community arts project.[33]

However, soon after the project's conception, the public availability of LIDAR data and the commercial interests of game engine manufacturers in providing free access to a framework of production made it financially viable to produce an accurate topography wrapped in an animated aesthetic of realism. While the game engine's 'landscape system' did not dictate what aesthetics should be applied to the mesh, the expansive library of options leaning towards this aesthetic had a significant influence. The aesthetic moved from the sombre, bleak tones of *Dogville*, reminiscent of a concentration camp, to an animated weather system predominantly composed of sunshine, blue sky and green grass. Choosing the latter option could be viewed as a 'commercial consideration', as it would make the representation attractive enough for residents to consider engaging with it. Whether misguided or not, over the course of the production, a combination of what could be described as commercial considerations and

33 RIYT had a budget of £16,000 spread across different related projects. The actual building of the model had a budget of under £5,000, which included the purchase of a computer capable of running the program and handling large amounts of data.

the project's technological methods helped shift the representation of Penryn from the simplicity of a black-and-white stage to a complete theatre of romantic realism. There are of course many arguments against adopting the aesthetic of romantic realism, one being that it introduces a conformity with realism into the politics of participation that aligns with an approach to the perception of landscape based on quantitative measurements.

In addition to the influence on aesthetics, the next stage of production was to consider how the game engine's interactive interface could facilitate residents' participation in developing the representation of the landscape they live in. In effect, this introduced the concept of the game narrative, orchestrated through the available methods of interaction. In this context, interaction could be described as taking additional actions, followed by a period as a 'passive' observer of the representation of the landscape. It is worth noting that this description, if not defined by further parameters, could include any number of unintended interactions. For example, a resident, either frustrated by the programming of the interface or so taken by the illusion of CGI, could decide to drive their hand into the screen of the computer interface. This kind of interaction is clearly not part of the component described as the 'rules of play' (Gregory, 2009, p. 13), nor is it related to the game's narrative. In terms of the technology of game engines, the parameters of interactivity are limited to what has been programmed as an action in the menu of options. One method of selecting an action is by using buttons on a device known as a game controller. Participating residents could use the game controller to access available options, including adjusting their 'point of view' (POV) by selecting from the assets visible in the options menu and commenting on specific points in the representation.

The ability to adjust a POV is an interactive feature that is used in most video games. Within the game engine, the surface of a representation of landscape is often set

to become a reference point for the orientation of a POV. A player's interaction with the POV might be considered through the lens of Bergson's notion of durée, time as it is experienced, which was introduced in section 1.1, where any action that is taken in the present moment draws upon the actor's memories which was introduced in section 1.1, where any action that is taken draws upon the actor's memories. The POV can be set to any position from a bird's-eye vantage point, which, in the case of RIYT, meant that it could sweep over the entire topography of the parish of Penryn or zoom into a detail within the representation. In the context of a video game, the movement of the POV to different positions in the landscape is often associated with the movement of a character, and this association could also be applied to the residents moving the POV within the CGI representation of Penryn.

Describing this interaction as 'movement' could be considered an innocent appropriation of a quality of lived experience. Nevertheless, it is interesting to observe how the *qualitative* experience of movement, which includes far more than simply a visual experience, is associated with what is in fact a change in relationships between sets of *quantitative* data[34]. Within a system of co-ordinates along three axes – X, Y, Z – sets of numbers determine positions within an abstraction of 3D space. Depending on the interface, the representation of this change in quantitative data is displayed on a screen or through a virtual reality (VR) headset. The orientation of this POV or the speed at which it changes can be dictated by whatever hardware device has been programmed to make that change.

In the context of video games, because changes in the position of a POV in relation to a representation of landscape is associated with movement, a player's adjustments of a POV are also affected by the third component of the game engine, the 'rules of play'. These may prevent a POV from moving to certain positions. RIYT

34 This association between points of locative data with movement is carried forward into the description of works by artists in chapter 7.

wanted to encourage residents to explore the representation of the landscape, and while the 'rules of play' prevented the POV from going under the surface, it did allow residents to select a bird's-eye POV. From this vantage point, the expansive topography of the parish of Penryn included, for example, the familiar shape of the estuary, textured in animated tones of rippling blue. Residents could also select how the topography should be textured. In this case, there were two choices: either a romantic aesthetic suggesting the quality of moorland, which was supplied by the developers of the game engine, or a detailed map of Penryn, provided by Cornwall Council, which RIYT added to the database.

1.6 The Gamification of RIYT

Although RIYT was not conceived as a game, one of the purposes of using a game engine was to apply the concept to the exploration of a landscape and thus engage residents in its representation. In fact, 'open world games'[35] generally encourage players to explore a landscape, one example being *Red Dead Redemption*, in which the player takes control of a 'cowboy avatar' to play a game that – aside from 'killing' animated characters – involves moving a POV in relation to 'sprawling countryside vistas, barely trodden trails and emergent urban landscapes' (Denham & Spokes, 2021). This idea of using modes of play to encourage people to participate in creating a representation of a landscape parallels the 'gamification' of geography (Martella, Kray & Clementini, 2015) – a term used to describe the employment of the sort of incentives found in games and their related interactive design. The gamification of mapping is now an established method of encouraging the public to participate in crowdsourcing data for online maps. Examples of this are OpenStreetMap (OSM), created through 'volunteered

35 In video games, an open world is *a virtual world in which the player can approach objectives freely*, as opposed to a world that is more linear and structured.

geographic information' (VGI), which hosts events where volunteers can get together, or Google Maps, which awards badges to participants who contribute a certain level of data (Martella et al., 2015).

The aim of the RIYT project was the evolution of the representation of Penryn from an initially 'empty landscape' to a more populated one as residents inserted their own perceptions of it, real or imagined, into the CGI textured mesh. By using the option to toggle between the moorland surface or the parish council map, the residents' ideas could be situated within locations that corresponded to the physical landscape of Penryn. However, unlike a physical representation of landscape such as a map, where additions can be pinned or drawn on different points of its surface, any additional contribution must first exist as a compatible digital file in a related database before it can be considered as a potential asset and included in the game. Unless a file has already been introduced into the database and then programmed into the game play,[36] players cannot interact with it – at least not within 'the rules of play'. This is an example of how the concept of interactivity is limited by the parameters of the game engine and the need for technological compatibility. While the game engine's technology had a relatively straightforward method of insertion that was within the capabilities of the production team, it was still beyond the technological skillset of most of the participating residents.

To overcome the constraints of many of the residents' lack of technological skills and their limited access to the technology, identified as points of exclusion, RIYT gave the production team the role of 'digital scribes'. These scribes helped residents convert their contributions (in the form of audio-visual material) into a compatible format, upload the file onto the game engine database, and then introduce it as one of the components of the game engine – that is, as an asset. This asset could then be

36 Some video games will involve the insertion of assets, such as additional weapons chosen from a library of military equipment, as part of the game play.

integrated, according to the interactive options available, into the game engine software. Introducing an asset into a CGI landscape is like moving a POV in that its position is set according to the XYZ co-ordinates of the 3D CGI space. However, unlike a POV, which is a component of the 'rules of play' and as such can be moved as part of the game, inserting an asset that documents a gate stop, for example, as discussed in Chapter 3, was part of the production of the RIYT 'game'. Each time new assets were introduced into the game engine; it effectively produced an updated version of the game (known as a 'new build'). Within these new builds, different assets were grouped together according to content and then categorised as different scenes playing out in the landscape. The option to turn these scenes on or off was programmed into the game play. Thus, once the new build had been exported by the digital scribes and made available to 'play', residents could move the POV and select which scenes or configurations of assets they wished to visibly populate the mesh. These could be viewed individually or as a combination of scenes.

The only contribution a resident could make independently of the digital scribes was to place a comment at whatever point they selected in the landscape. By pressing a button on the game controller, they could select whether their comment was related to the past, present or future, inform the production team if they had any audio-visual material they wished to convert into an asset in the landscape, and provide their contact details. This information, which the resident entered via a keyboard, materialised as flags on the landscape with the comments appearing as text. The production team was also able to collate the comments on a spreadsheet, which could be shared with interested parties. The option of leaving comments is now a normal consultative method, as seen in Google Maps ('Contribute to Google Maps & earn points,' 2023), but at the time the game engine was not designed for data gathering. Hence, a programmer

had to be hired to develop this additional 'interactive asset'.[37] This was the single most expensive aspect of production, and in retrospect – putting ethics aside – provided a potential method of revenue for the project, due to the value of the data. The role of the comment boxes was to facilitate the direct participation of Penryn residents once the work-in-progress was exhibited to the public. This would be either an intermediate stage of participation, prior to the digital scribes converting residents' audio-visual contributions, or if the participation of individual residents went no further, a way of capturing whatever data they had shared.

Alongside the public exhibition of the CGI representation, local artists led content-creation workshops relating to the diverse ways of engaging with the landscape. This aligns with the practice of creative geography, where geographers work 'in collaboration with a range of arts practitioners' (Hawkins, 2015). The workshops included a number of art workshops that ranged across the different disciplines, guided or 'misguided' tours, and invitations to community groups to make contributions to the CGI representation of Penryn that could be inserted into updated versions. Examples of these, which can be seen in appendix 1, included 3D CGI models inspired by collages made by residents, archived black-and-white photographs of the town, drawings on scraps of paper found in the street, audio recordings of now-deceased residents, and video clips documenting aspects of the landscape. An example of the latter is provided in Chapter 3 where a resident, JT, appears in a smart-phone video describing a gate stop at the corner of a building in Penryn.

37 It is noteworthy that the programmer's fees were higher than those of any of the other professionals involved in the production, including the artists.

Conclusion

The interdisciplinary nature of the research described in this chapter introduced Bergson's philosophy of perception to an applied socio-political context; participatory arts practice grounded in the landscape of the town of Penryn. Critical analysis of the mapping of the landscape with CGI, which included harnessing Bergson's concept of durée, highlighted the role of subjective qualitative experience within a framework of realism more often associated with objectivity and quantitative data.

The technological framework described-became part of the politics of participation in RIYT in so far as it influenced how residents could participate in the production of the representation of the landscape. As mentioned in the previous section, participants needed not only to access the tools of production and possess the skills needed to insert their piece into the representation, but whatever they wished to introduce also had to be in a compatible format or able to undergo a conversion. This effectively consisted of transforming the qualities of the original idea into a format that could exist within a framework of quantitative data; anything not compatible with this format or framework would be excluded. Thus, a technology that appeared to offer so much versatility in the production of representations of landscapes, unconstrained by realism, was nonetheless constrained by the technological framework in which the CGI representations existed. It was to try to get around this point of exclusion and widen access to the technology that RIYT developed the role of digital scribe.

The description of the technological process of producing a representation of the landscape of Penryn at a level of resolution, that could have been finer, has nonetheless been sufficient to show how the embeddedness of the technology worked against the desire to reveal the residents' subjective responses to the landscape. Without the digital scribes' input, and the hiring of a programmer, participants were unable to interact with the gamified map.

More significantly, the inferred realism of the CGI representation and its relationship with the lived experience of the landscape has been critically examined, utilising Bergson's theory of perception as a lens through which to examine the divide between realism and idealism, a method that will be developed throughout the thesis. In addition, the qualities of data have been questioned, considering notions of subjectivity and objectivity; one strategy employed was close description of a technology that is often so familiar that it becomes almost intuitive, a method which is applied in greater detail in the chapters concerned with GPS and GIS (Chapters 5 and 6).

This critical reflection on the use of CGI technology for community arts projects led to research findings which throw light on a conflation of qualities attributed to a CGI representation of landscape and open up a critique of the association of quantitative data, such as LIDAR, used in the construction of the 3D CGI mesh of Penryn, with a realist perception of landscape.

The research question formulated here, developed from a politics of participation perspective, concerning the relationship between a CGI representation of a landscape (in this case of Penryn), and the lived experience of the landscape itself, is developed throughout the rest of this thesis.

Whereas the outcome of the research described in this chapter introduces questions that critique the notion that a 3D CGI construction can be aligned with a lived experience of landscape, the research described in the next chapter examines how and why a 3D CGI representation of a landscape can have resonance with the lived experience of the same landscape.

Chapter 2: The Interface and Space

A key question raised in chapter 1 was how a 3D CGI representation of landscape relates to the reality of lived experience. In this chapter the enquiry continues, using a literature review and comparative analysis as methods. As this research frequently uses terms that have general currency, but necessarily defines them quite precisely and contextualises them within a broader range of uses, the technical details are disentangled here. In addition, with the help of examples of research by authors who encountered similar issues, it will be demonstrated how, within the context of a landscape, there can be a relationship between a 3D digital construction representing a space and the lived experience of that space.

Research from two different disciplines are examined and compared to the research in this thesis; the practice-based research Alex Jukes conducted in the field of animation (2017) and the academic research into digital games carried out by Denham and Spokes in 2021. Both turn to philosophy to help disentangle the digital creation of a 3D surface as a representation of a landscape from the lived experience of spatial relationships, just as in this research Bergson theories of perception have been employed as a method to compare the lived experience of landscape to the representation constructed for the RIYT project.

Jukes' three aims and subsequent findings, concerned with the *process* of making, are examined in sections 2.1 to 2.3. The comparative analysis begins with Jukes' close study of the process of digitally constructing, and subsequently texture mapping (2.2), of a 3D form and the notion of how engaging with a digital representation can create a 'blurring' (2017) between illusion and reality. Jukes' consideration of the qualities introduced then instigates critical reflection on what qualities of data informed the 3D plane created for RIYT's CGI representation of landscape (prior to the participants' input). This reflection raises the question of the

relationship between lived experience and the experience of the digital representation, as well as the actual qualities of the data.

In section 2.4 a discussion of Denham and Spokes' application of Lefebvre's concept of the 'spatial triad' (Lefebvre, 1991; Shields, 1999) to players' experience of *Red Dead Redemption*, an open world game played within a 3D CGI landscape, is followed by critical reflection not only on the intersection between spatial relationships in reality and in CGI representations of landscape, but also on the role of assets within the RIYT CGI landscape.

The research analysed in this chapter serves to draw out some of the important considerations revealed by a close study of the process of constructing and engaging with representations of material objects, issues that are otherwise concealed by familiarity with the technology and its ease of use. .

2.1 'Internal' and 'External' Space

Jukes' practical research uses a philosophical understanding of space to raise questions about the qualities of representation, including discussions on 'the distinctiveness and materiality of 3-D CGI' (2017, p.116)[38] He also supports his research methodology referencing Structural/Materialist filmmakers like Le Grice to support his research method, describing their 'ambition' as establishing *'a connection between process and material by demystifying the processes of making*' (2017, p.48). He then concludes his research by taking a phenomenological approach informed by the philosophy of Heidegger. This trajectory has a certain resonance with the way this thesis uses nineteenth-century French philosopher Henri Bergson's philosophical

38 The point in a digital game where the narrative involves representations of landscape is discussed later on in the chapter (Denham and Spokes, 2021) – using Lefebvre's theories on the production of 'social space' Lefebvre, H. (1991) *The production of space.* ed. Smith, D.N., Blackwell.

theories to interrogate the concept of perception in relation to the use of technologies and in conjunction with an overview of the method of constructing the representations.

Jukes describes the first two aims of his research project as (1) 'imitation and construction', replicating a CGI pyramid in physical form, and (2) the 'revealing of material through process', focusing on texture-mapping the CGI pyramid (Jukes, 2017, p. 117). This reflects the previous chapter's technical description of texture mapping a representation of a landscape in a video game. Jukes begins by prioritising spatial concerns, in contrast to this thesis which examines data through the concept of durée, which is considered by some Marxist critiques (Soja, 1989, p. 123) to prioritise time over space[39]. Nevertheless, Jukes' (2017) presentation of the outcomes of his experiments opens up 'an important dialogue about the spectator's visual encounter and the experience of the viewer' which is pertinent to the participatory relationship documented in this thesis between the lived experience of residents of Penryn, and the CGI representation of their landscape.

Another distinct difference between the research presented in this thesis and Jukes' research is the former's complexity. The CGI representation of Penryn, which started out as a multitude of planes, was conceived as a participatory arts project prior to the academic research whereas Jukes' research was informed from the start by the rigors of academic inquiry and had no immediate application to socially engaged arts practice. For this reason, he sensibly created the simpler form of a pyramid consisting of four planes. However, putting aside differences between space and time and the complexity of planes, Jukes' academic research enabled the reproduction of objective spatial qualities and questioned relationships between the digital representation and its projection into 'material reality'. Crucially, we can draw points of comparison and raise questions juxtaposing Jukes' research experiments with this thesis's analysis of RIYT's

39 See pages 35 for summary of how durée is used to consider qualities of data in the form of an asset.

representation of the Penryn landscape, in terms of the perceived relationship between a representation and reality.

From the point of view of practice-based research, it is interesting to note that Jukes, like myself, has been trained in the discipline of animation.[40] The etymological origin of 'animation' is the Latin word *anima*, meaning 'breath, soul' (Animate, 2023).[41] When studying the craft or art of animation, it is quite often the case that students are introduced to the word as a verb, 'to animate', deriving from the Latin *animare,* meaning 'to give life to' (Animare, 2023). As such, animators are often connected to the idea that they metaphorically 'breathe life' into otherwise inanimate objects. Jukes' first two research aims help us to understand which qualities are being 'breathed' into a 3D representation of a landscape. His first aim of 'imitation and construction' could be seen as an inverse of RIYT's representation in that the CGI pyramid existed first and the task was to 'imitate it' in physical form. In this description, he aligns the 'real world' with 'external space' and the CGI representation with 'internal space' (Jukes, 2017, p.117). While this thesis would not concur with the idea that 'the mathematically generated space created within the computer, and its visual representation, can be considered as space',[42] the conception of CGI as an internal concern aligns with the participatory aims of RIYT, since the CGI representation was intended to trigger residents' imagination or encourage reflection, actions that are necessarily an 'internal affair' associated with the subjectivity of the individual.

However, an obvious difference between Jukes' research and the RIYT participatory project is the subject. A CGI pyramid was a realistic proposal within the time frame of Juke's doctoral research experiment, particularly as it was to be constructed or indeed performed on the stage of 'external space'. In contrast, the

40 Both of us studied animation at the RCA, Jukes in 2010 and myself in 2001. We both also studied fine art at undergraduate level.

41 The word animation is also related to Aristotle's 'De Anima' ('On the Soul') and Jung's 'anima' and 'animus', the unconscious feminine and masculine sides of men and women.

42 Jukes (2017, p. 864) does preface his use of the word 'space' with the qualification that he is referring to CGI.

complexity and scale of RIYT's objectives made the reversing of 'the internal and external conceptual paradigm' an impossible proposition.[43] Nevertheless, this impossibility was a motivating factor behind the RIYT project and, however unrealistic, it appeared to encourage residents to participate. Jukes' analogy of 'external space' as a stage provides a useful metaphor for understanding the intentions of RIYT as the performance of a speculative design. As such, the complexity of the production could be divided into two parts (or objectives): the first was a 'performance', using a representation of the landscape of Penryn to invite residents to participate, while in the second, residents took up the invitation by placing assets into the CGI 'internal space' according to their relationship with the 'external space' of Penryn. Once residents participated in the 'internal space' of CGI, and in so doing confirmed the existence of a 3D form, they were then implicated in a speculation, no matter how absurd, about what could be performed on the 'stage' of the 'external space'. This speculative aspect of the RIYT project aligns, on a conceptual level, with Jukes' first aim of 'imitating' the internal CGI representation of a pyramid on the 'stage' of the external world.

However, while Jukes' aims were achievable, RIYT's idealistic motivation meant that its aims could not be realised, leaving it open to critique on several levels. Firstly, from a political perspective, RIYT did not have the agency to affect the town planning proposal, and this raises ethical questions about the inference that residents could influence the external environment by participating in the project. This is often the case with community arts projects and consultative practices. Another criticism concerns the way the representation was often referred to by the production team and residents as the 'landscape of Penryn' – the conflation of CGI representations with reality is a common problem in the CGI industry. This association relates to the main focus of this research, the question of qualities. Indeed, any analysis of the qualities of

43 The proposition was impossible because the RIYT representation of the Penryn landscape was an extraordinarily complex, even utopian, design.

the RIYT representation would predictably conclude that, beyond replicating a surveyor's report of elevation, it was lacking the qualities inherent in a lived experience of the 'external space' of the Penryn landscape. That being said, the mere association of the representation, the 'internal space ' with the 'external' qualities of lived experience – albeit an illusion – suggested that, as a method of expressing subjective relationships to a landscape, it was enough to engage residents in this participatory arts project.

2.2 Texture Mapping: Conflating the Quantitative and the Qualitative

An analysis of these qualities requires us to return to the construction of the project which touches upon Jukes' second aim of 'revealing [the] material through process' (2017, p.73). While the context of Jukes' objectives is unrelated to the RIYT experiment, his application of the artist Kandinsky's concept of abstraction[44] to a technical method of producing a CGI surface is a useful device for engaging with the qualities represented in the CGI representation of Penryn. Analysing the construction of the mesh (a network of nodes), Jukes describes the visual connection between three nodes as a polygonal triangle, which in geometric terms is a closed figure situated on a plane. It represents a 'primary state, the most basic perceivable and renderable form' (Jukes, 2017, p.113). Jukes uses the term 'renderable' to show that the points of a triangle can be considered as describing a form rather than just three lines. The significance of this to the RIYT mesh is that the three files of LIDAR data can, through their connection, come to be perceived as a plane. Jukes makes an analogy between the CGI plane and Kandinsky's description of 'the material plane, [a] concept [which] is called upon to receive the content of the work of art' (p. 113). In relation to Jukes' process, this 'work of art' is the projection of the polygon onto the material plane. Jukes

44 Kandinsky stated that abstract art is art that does not attempt to show things realistically, but uses lines, shapes, colours and textures to show emotions and meaning.

describes the two positions of spatial theory as ‘objective (Euclidean) and subjective’ (2017, p. 161), the difference being that the former can be represented as a series of measurements (the RIYT mesh could be seen as an example of this because it is based on the objectivity of thousands of points of LIDAR data) whereas the latter relates to a perception of qualities. Returning to Kandinsky’s description of the material plane as existing to receive the work of art, the texture mapping could be described as the beginning of a ‘subjective projection’ onto the 'objective' representation of landscape[45].

In the case of the RIYT project, the idea was for the ‘work of art’ to evolve through a participatory practice involving Penryn residents, who would populate this ‘material plane’ – defined by lines between vertices – with assets representing their subjective perceptions of the landscape they live in. This included ideas, real or imagined, relating to the past, present or future of the town. However, in order to encourage residents to engage with the CGI ‘material plane’, the representation needed to first capture their interest. Thus, the process began by texture mapping the material plane with qualities associated with a homogenised notion of landscape informed by the perceptions and aesthetic choices of game developers. It is necessary to pause here to note that if the subjective qualities of landscape are part of the texturing of the mesh, the language conflates the stages of construction. For example, the term ‘texture mapping’ implies a physical, felt quality, whereas it is in fact purely a representation associated with texture. In his experiment, Jukes is careful to clarify that the illusion of ‘the projection of a wood texture’ refers to ‘the (visual) material properties’.

Nevertheless, it is at this stage that the concept applied to the material plane is no longer dictated by a system of measurements: it remains quantitative data, but it involves subjective aesthetic choices concerning the tones and colours applied to certain coordinates of the polygon. In the case of RIYT, the effect of adding qualitative data to

45 A description which, from the point of view of this thesis is highly problematic. This research proceeds to unpack these descriptions and resulting conflation of subjectivity with objectivity further demonstrated in chapters 5 and 6.

the mesh changed the representation from a surveyor's report to one strongly suggesting a landscape's visual material properties. This could be one of the primary reasons why the production team, facilitators and residents came to refer to this representation as a 'landscape'. However, the textural qualities mapped onto the mesh were chosen from the game engine's landscape system library, which (as mentioned earlier) provided a generic 'moorland aesthetic' with very little direct relationship to the material qualities observable in the landscape of Penryn.

However, even if the texture mapping could be labelled as an idealist representation of moorland, the plane of elevation provided POV, creating associations between the CGI representation and the landscape of Penryn, and this influenced both the production team and participating residents who began to regard the mesh as a realistic representation. Take, for example, the elevation data from the estuary that runs into Penryn. The game engine's landscape system provided water textures that could be mapped onto this winding plane, with animated tones of blue and green creating an edge or 'water line', differentiating the data taken to represent dry land and the data representing the estuary. This 'water line' became a point of reference by which residents could locate further associations with their experience of Penryn, although these subjective qualities in fact bore no direct relation to their perceptions. Bearing in mind that the representation at this stage featured no human architecture, the 'concept' presented the way the landscape might appear without houses.

The decision to begin with a representation of the landscape of Penryn that was void of any recognisable manufactured features such as roads and buildings was made in order to suggest the quality of a blank canvas – a notion discussed later in the chapter and at other points throughout this thesis. A blank canvas is unhindered by content that already exists (for example, aspects of the built environment that exist in the landscape of Penryn) and thus would not hamper the participation of residents in terms of the

qualities (in the form of assets) they chose to insert into the representation. However, the exclusion of the majority of existing landmarks meant that if residents were to place assets in the internal landscape at locations relating to the external landscape, they would need spatial reference points. As such, in addition to the quality of 'textures' associated with landscape, another concept, that of the map, had to be placed on the material plane. The question of what a map is (Vasiliev et al., 1990) was avoided, as it was by Crampton (2011) in his book *Mapping: Critical Cartography and GIS*, in which he suggests that it is best to define the context and to acknowledge that it is culturally learned knowledge. The map used by RIYT to take the place of texture was provided by Cornwall Council, which considers it to be an accurate graphic representation of a spatial relationship between the roads and buildings that existed in Penryn at the time of its making. If residents selected this map as a texture to be applied onto the mesh, they could pinpoint a memory of lived experience in relation to a specific location. Once they had acquainted themselves with adjusting their POV and understood its association with movement across a landscape, residents could proceed by toggling between the map and the terrain texture. In this respect, the use of the council map is similar to other mapping interfaces like Google Maps or Google Earth which enable toggling between a map and different representations of a landscape – for example, Google Street View (GSV) provides a timeline in which to observe historical or contemporary photographs. Yet Google's representation differs from the RIYT project in that the latter invited residents to insert whatever memories or imaginings were invoked by their participation rather than being limited to what could be described as an objective reality evidenced by photographs taken by a Google streetcar or aerial technologies.

One example of the effect of the interactive options between the landscape systems and the council's map is when Penryn resident CY, then in her late 80s, selected the map-texture option and using the game controller placed her POV at the

point where the map was located the approximate position of the house she had lived in as a child – although, to be precise, the POV was not her POV but her interaction with the computer interface. Once at this location, CY then switched the texture back to the terrain textures associated with landscape and moved the POV displayed on the computer monitor towards the CGI topography of an adjacent hill. As the 'material plane' was devoid of all buildings and the textures of the terrain represented the qualities of an untouched hillside, she recalled that this was 'what it was like that when there were no buildings on the hill'. In this example, the relationship between the material of the CGI surface and CY's actions summoned up her memories. This is akin to Bergson's theories on perception, where an action taken in relation to matter draws into the present moment memories of the past. This in turn creates a perception. At this point, CY's perception was that this CGI representation of landscape was a representation of Penryn as it was in (her perception of) the past.

However, although CY found the location of her house by using the council map, it could be argued that it was not the map that evoked the memory but rather the action (once she had switched back to the moorland texture), which was akin to the action of looking across a landscape. This action, combined with the 3D model and the texture, triggered memories of the time when she had looked across the Penryn countryside from her bedroom window as a child. At this point, applying Jukes' use of Kandinsky's concept, the act of participatory arts practice 'call[s] upon [the material plane] to receive the content of the work of art' (Kandinsky, 2011, p.115). In the context of RIYT, the 'content' was a 'performance' between the CGI material plane and residents' lived or imagined experiences. Hence, the next stage of participation was to add assets to the material plane, documenting these real or imagined relationships.

2.3 The Interface Effect: The Image as a Process

Having described the qualities of the material plane and touched upon its effect, Jukes' third aim, the 'existential application of 3-D CGI spatial properties' (Jukes, 2017, p.118), involved first projecting the 'textural/material qualities of the internal object' onto the geometry of the external physical object of the pyramid and then exhibiting this to an audience in order to elicit discussion. This relates to the point in RIYT at which residents were introduced to the representation of the landscape and, due to the invitation to participate in its development, began to discuss its relationship to their lived experience of Penryn.

Jukes (2017) describes one outcome of his exhibition as uncertainty among members of the audience as to where to locate a clear point of separation between the internal representation and the external (a 'supposed 3-D object theoretically manifest[ing] as a potentially physical real world 3-D object' (p. 118). He relates this to Galloway's work on 'the interface effect', in which he warns that 'one must always think about the image as a process rather than a set of discrete, immutable items' (Galloway, 2012, p.37). It is useful to apply this insight to RIYT's aims because it defines the relationship between the representation of the landscape and reality as a process, rather than considering the representation independently of residents' participation and their own relationship with the landscape. Jukes, citing Gidal (1976), links this relationship to 'a Structural/Materialist concern, i.e., the dialectic between illusion and the viewer's experience' (Jukes, 2017, p.126) that is associated with a certain method of filmmaking.

At the time of producing RIYT, I was aware of some of the works made by the artists Jukes cites as associated with a 'Structural/Materialist concern', such as Paul Sharitz (1943-1993), but it was not – at least not directly – a theoretical model that

informed the project.[46] Before the academic research brought a more critical light to bear on the project, artists had encouraged residents to participate in the 'illusion' by referring to the representation as 'the landscape of Penryn' without questioning this premise. However, when a 'video walk through'[47] of the RIYT fully textured, 3D CGI model was presented to an audience of researchers during seminars on Transtechnology, my description of it as a landscape met justifiable criticism. I was asked to define what I meant by 'landscape'. This critique became a useful entry point for this research.

As the Transtechnology researchers were not residents of Penryn and were engaged with the representation simply as passive observers, there was a distinct difference between this audience and the residents who had participated in the project. Not only did the latter interact with the representation by using the POV and placing assets on the mesh, but their interactions related to their lived experience within the landscape. Nevertheless, the straightforward question of 'why is this (the CGI representation) a landscape?' prompted a critical analysis of the related technologies and the qualities of the illusion and expanded the research from a reflection on the RIYT project to a focus on the conflation between the quantitative data of the representation and the qualitative data associated with experiences in a landscape, a topic that will be discussed in greater detail in subsequent chapters.

The technical overview in section 2.2 outlined how RIYT's representation of landscape merged objective quantitative and subjective qualitative qualities associated with the landscape. Comparisons with the concepts included in Jukes' research and with its outcomes have been useful in understanding the basis of the objectives motivating the RIYT project. For example, Jukes writes that after presenting his work 'it was conceded that the experiment blurred the moment' (2017 p.126) – the moment being the

46 This point may be considered more relevant to a footnote. However, the reason for including it is to point out how the practice informed an approach associated with more conceptually informed models.

47 A term used for video screen grabs of players interacting with a video game.

point at which the illusion of CGI and projection blurs with reality. Although Jukes' research, drawing on the audience response, uses different techniques and methods of encounter to those of RIYT, what is of interest to this thesis is the way in which a 'blurring' between the illusion and the reality promotes dialogue. In terms of the outcome of RIYT, this 'blurring' was in effect an objective of the project because it was used to encourage participation and point towards the potential application to "re-imaging a town.

As with Jukes' performance, the public presentation of the CGI representation of Penryn was meant to open a dialogue, but it also served as an invitation to create and add assets to the presentation. In this sense, it could be described as the inverse of Jukes' projection of texture from the CGI onto the external pyramid. In RIYT, by contrast, the illusion was not projected onto reality; rather, the qualities of what residents perceived in the reality of Penryn were 'projected' into the CGI illusion that was the representation of its landscape. Thus, the assets took the place of the projection, and the process was 'reversed'. Residents were participating in the blurring of the moment when locating their own perceptions, as experienced in the real landscape, in the CGI representation, in order to enrich its subjective texture. This moves the analysis of the qualities of representation away from Galloway's set of 'discrete, immutable items' to those of a process; in the context of RIYT, the process was the mode of participation.

2.4 Representation of (Conceived) Space

Another perspective on the relationship between an audience and a CGI landscape can be found in a joint paper by gaming scholars Denham and Spokes (2021), which applies a reading of Lefebvre's theories of space to an empirical study of players

playing *Red Dead Redemption* (RDR). This game, described as an 'open world game' because the '[p]layers control a cowboy-avatar … through sprawling countryside vistas [and] barely trodden trails' (2021, p.1568) has similarities to the RIYT project in that residents participate by moving a POV around a 'landscape', even if the 'rules of play' are distinctly different.[48] Although this thesis is not a study of spatial theory, Denham and Spokes' application of Lefebvre's 'production of social space' (Lefebvre, 1991) to players' interactions with a representation of a landscape is a useful device for understanding the intentions behind RIYT's participatory arts practice.[49]

Given that the technical overview in section 2.2 illustrates the (quantitative and qualitative) differences between the representation and what is represented, it would be easy to draw the conclusion that the representation and the landscape are different spaces. Denham and Spokes (2021), however, argue against considering interactions with a representation of a landscape 'as a separate and distinct area of escape from everyday life', and apply Lefebvre's 'spatial triad', more precisely referred to as the threefold dialectic within spatialisation (Shields, 1999) to the representation. The 'spatial triad' consists of 'three interrelated aspects of space: representation of space (conceived space), spatial practices (perceived space) and spaces of representation (lived space)' (Watkins, 2005, p.210). Denham and Spokes clarify that the tri-dialectic is not a set of categories of space but a method through which to 'decode social spaces' (2021, p.1568).[50]

'Social space' is described by Lefebvre (1991, p. 266) as 'multifaceted: abstract and practical, immediate and mediated'. The contradictory or opposing factors mentioned in this description allude to Lefebvre's dialectical method of decoding social space. Failing to consider it as such ignores the complexity of its production and can

48 It could be said that the violence in RDR, performed when 'killing' representations of wildlife or people, is apparent in the symbolism of its blank landscape, as it is in the colonial act of placing assets in an area where things exist, but which is similarly represented as empty space.

49 Lefebvre's move from time to space was in part related to a critique of the way the established order maintains power through the abstraction of experience through time. Space can be directly linked to practice and thus Lefebvre translates 'Hegel's dialect into concrete social analysis' (Shields, 1999, p. 116).

50 The fact that a game is part of a lived experience means it is presented as a de-facto social space.

lead to the analysis of a single aspect of social space in isolation or from the narrow perspective of a single discipline. This undermines the richness and interdisciplinary potential of Lefebvre's approach. Thus, when applying the spatial triad to a social analysis, it is important to maintain the assignment of an aspect of social space to a dialectic[51] of overlapping aspects in which space and geography are integrated into an understanding of society (Shields, 1998). Denham and Spokes (2021) consider the players of RDR, the game itself, and the world the game and its players inhabit as all part of the social space. If Jukes' experiments demonstrate a 'blurring' between the 'internal and the external', the 'spatial triad' can be used to decode the 'blurring' in order to understand the interrelationship between the RIYT representation and the lived experience of its participants.

Although, as an instrument of analysis, the triad cannot be split into separate categories, the aspect of 'conceived space' could be described as the intention to create a system that can fix things into a 'production of space': a space produced by 'scientists, planners, urbanists, technocratic subdividers and social engineers' (Lefebvre, 1991, p.38) and 'software developers' (Denham & Spokes, 2021). 'This 'level' of the dialectic involves the abstract presentation of lived experience in space reduced to quantified movements along vectors between x-y coordinates. Examples of this are discussed further in Chapters 5 and 6 on GPS and GIS – technologies based on a coordinate system. As such, it could be argued that the basis on which the representation of landscape is produced is an aspect of conceived space. As Denham and Spokes point out, Lefebvre argues that this form of space is the type which reinforces 'hegemonic control through top-down, design-oriented expectations and rules' (2021, p.1571). Power is asserted through adhering to the supposed objective reality of this concept. It could be argued that the game engine, while supposedly offering freedom of production

51 'The dialectic is back on the agenda. But it is no longer Marx's dialectic, just as Marx's was no longer Hegel's' (Lefebvre, 1976, cited by Shields, 1998, p. 886).

and interactivity, remains part of this hegemonic system, controlling the methods of producing representations of space, breaking down the development of a game into its component parts, and consequently influencing the interface between the players or participants, the representation and the reality.

Lefebvre claimed that aspects of 'lived space' could be directly experienced 'through associated images and symbols, and hence this is the space of 'inhabitants' and 'users' (1991, p.37). Denham and Spokes' logic appears to be that this aspect of 'lived space' extends to consider RDR as a space integrated into the dialectic, not as a separate illusion of space but as part of 'social space'. The argument being that within the spatial triad the 'conceived space' of the 3D CGI Model is experienced in relation to the placed assets. These are not perceived in isolation but in relation to signs and symbols encountered, in the lived space, outside of the gaming interface. In the case of RDR, for example, players were getting 'their "symbolic cues" from a shared reference point of "Spaghetti Western" films' (Denham & Spokes, 2021, p.1574). In the case of RIYT, the cues were derived from the points of elevation and the assets placed in the landscape that referenced Penryn, or from toggling to the texture of the map supplied by Cornwall Council.

The aspect of perceived space is the practice of engaging with conceived space and lived space. In terms of an analysis of social space, 'the spatial practice of a society is revealed through the deciphering of its space' (Lefebvre, 1991, p.38). Denham and Spokes (2021) relate this to the moment when players engaged in the gameplay perceive that the implied freedom of the RDR 'open world' is in effect moving its players towards 'violent encounters', and they also note that, despite the game narrative, the players' 'overwhelming spatial practice was to explore the less populated areas'. This action can be related to the players' observation that 'cities dominate their non-virtual lives, and that rural spaces seem to be less designed, or have more "freedom"' (Denham

and Spokes, 2021, p.1577). The spatial practice also extends to the game's mode of production, as some players appear increasingly uncomfortable with the implications of the time-consuming creation of the aesthetic qualities of the game in relation to the questionable employment practices of the games industry.

Considering the 3D CGI interface as part of a Spatial Triad rather than an illusion there is the potential for resistance by reframing the relationship as a lived experience within the conceived space. Drawing on an example of arts practice, the approach of Surrealists, Dadaists and Situationists, 'expressed in aesthetic terms as symbolic resistance' (Shields, 1998, p.164) had the intention of having an effect on perceived space. For example, Guy Debord, once a close associate of Lefebvre, developed dérives (defined on p 28 in the Introduction)as a method of disrupting the conceived space, by approaching it differently and thus altering the possible perceptions. This symbolic resistance was evident in the participatory arts practice of RIYT, for example in the integration of outcomes of collage workshops (Christoforidou, 2016) into RIYT's 3D CGI representation of landscape (See figures 3 & 4).

Figure 3: Fish Cross by L. Menzies made at RIYT Workshops

Figure 4: Screen Grab of RIYT Interface with the Integration of Collage Workshops

Collage is an established surrealist method of disrupting normative perception by a distortion of the symbolism of lived space. This was adopted further by Guy Debord in his acts of *détournement*. Debord defined détournement as 'a method of propaganda, a method which reveals the wearing out and loss of importance of […] spheres' (Knabb, 2006, p. 52) where spheres referred to the conceived space of the dominant power. Détournement was used to challenge assumptions through surreal assemblages of the empirical foundation of the conceived realism of western governance.

Conclusion

In terms of the main preoccupation of this thesis – that is, the perception of qualities – the relationship between the asset, the player's action and their subsequent perception, gives rise to the following question: Does an asset only become part of the aspect of lived space when a player (or a participating resident) engages with it, however unconsciously? As Denham and Spokes state, the three aspects of Lefebvre's

spatial triad are not categories but simply a method of understanding social space. However, prior to the point of engagement, when an asset or texture informs ‘the decisions made by people who live in a space’ (Denham & Spokes, 2021, p.1573), the question is: does the asset inhabit conceived space rather than lived space, and at what point does perceived space inform the lived space? Although not directly informed by Lefebvre’s triad, it was this question of interrelationships that informed RIYT’s intention to invite participation in the representation by starting out with an ‘empty landscape’ rather than a conceived space. Yet, as can be seen from the technical overview in section 2.2, even the mesh, although composed of quantitative data prior to the subjective mapping of texture, is far from empty; rather, it is full of qualities derived from a preconceived framework. It was this observation, and the understanding of how much of the representation was part of the conceived aspect of space, that led to the research experiment described in the following chapter, that of mapping a symbol of a relationship to a place onto a blank 3D CGI canvas.

Chapter 3: The Gate Stop as an Asset

The purpose of this chapter, which includes an element of autoethnography, is to begin to engage with the question raised in chapter 2: does an asset in an 3D CGI representation of a landscape only become part of lived space when a player (or a participating resident) engages with it, however unconsciously?

Participation in RIYT by residents was evidenced by the assets placed in the CGI representation of Penryn. One example that holds particular significance for this research was the result of a meandering walk I took with JT, one of the residents. This chapter encompasses both a description of that walk and an analysis of its focus, the mapping of an object (a gate stop) in the landscape that holds particular meaning for him. This raises the question of whether the subject of this chapter is in fact a walk or the point on the walk where the gate stop was perceived.

Hence, the writing may at times exhibit a meandering quality, similar to the experience of taking a walk with someone who keeps turning aside to notice something, and then picks up the conversation where they left off. The intention behind using this style of writing is not to lead the reader off track but rather to illustrate the quality of durée (Bergson, 1991 p. 137), as defined in chapter 1, where Bergson's diagram of a cone (figure 1, p. 64), depicts how memories funnel down into the present moment according to what actions are taken in the present moment. It is not a linear process but one where different actions and the memories evoked come into connection with present matter. Here, by describing a walk, the documentation of describing the walk, the documentation of a moment on this walk, and the encounter with this documentation as an asset in the RIYT 3D model of the landscape, the chapter serves to provide a written sense of the quality of durée, which, once experienced, should enable the reader to understand why setting out clear, concise points would contradict the argument of this thesis, and why it is necessary to go back and forth.

The next section provides the context for the encounter with the physical gate stop, describes what the gate stop asset consisted of, and how it could be interacted with on the CGI map, whereas section 3.2 compares the RIYT CGI landscape to the way in which Google maps (Google Street View, hereafter GSV) represent assets, discussing matters of memory and perception; recognising durée as a concept that transcends time and space. In section 3.3, where the walk is described in some detail, the analysis continues, bringing in Ahmed's concepts of inhabitance and homing devices, and making visible my position as incomer and how that relates to the RIYT project and the notion of the blank canvas.

3.1 The Gate Stop: Data File, Video Clip and Material Object

The 'gate stop' was the name given to a data file consisting of a video clip in which a Penryn resident (henceforth identified as JT) appears, drawing attention to an object in the landscape that he remembers as a gate stop.[52] The video documents the moment when JT points out this object, which is of particular significance to him. (see appendix 1) The documentation then became part of the RIYT representation of Penryn's landscape.[53] However, having focused on a material object that was mapped onto the representation because a participant considered it of value, the framing of what relates to the gate stop begins to widen out from the physical object itself to an interrogation of its relationship with the landscape.

52 At the time of first documenting this gate stop, in 2015, the research for this thesis had not yet begun. Hence, the description of it was written eight years later, in 2023.

53 To locate the video asset within the CGI representation in relation to the location of the gate stop, the council-map texture (described in the previous chapter) was used to find a reference point. At the time of producing RIYT, the process of integrating GPS with game engines was not yet easily achievable without additional bespoke coding that was beyond the RIYT budget.

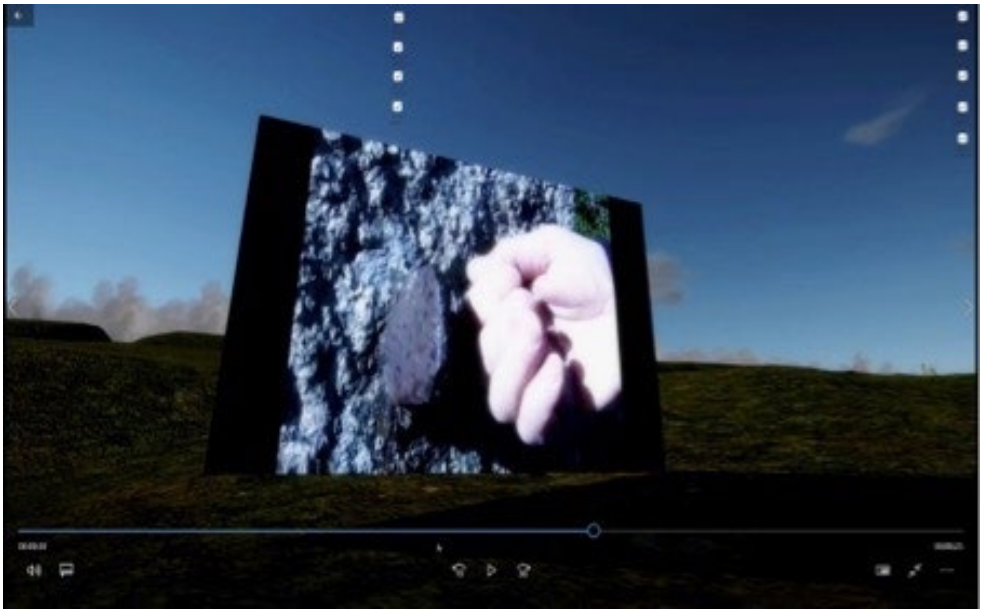

Figure 5: A Screen Grab of RIYT with the Asset of a Gate

To insert the gate stop into the representation of Penryn, it first had to be imported into the database of the game engine,[54] among all the other potential assets. Once inserted into the 3D CGI model, the asset appeared as a 2D plane, textured with the video footage. Thus, when other participants in RIYT explored the interface, they would potentially become aware of this gate stop and its approximate location in Penryn. If they then engaged with the interface and moved their POV somewhere in the proximity of the video asset, they could trigger it to play. The video clip was also accompanied by an audio recording, some of which captures references that not only relate to the gate stop but also expand to include a relationship to the landscape at a different time. In fact, the gate stop, placed in this wider context, is not always present within the video frame. The documentation zooms out to present the wider spatial and temporal context. This shift in the framing of the video raises the question: does the documentation concern the gate stop[55] or the wider context of the landscape, and if the latter, how is the gate stop related to this landscape?

54 In this case, the game engine was Unity.

55 This question is relevant to the thesis because it concerns context and what information, or qualities are considered of relevance to a subject. In terms of mapping, this leads to questions about the politics of participation.

This is in keeping with the aims of other participatory mapping projects, where the value of what is mapped is not inherent in the object mapped but in the relationship between the memory of the participant and the material. Indeed, in a participatory context, the point of documenting this relationship is so that it can be placed in a relational dynamic with other participants' lived experiences in this landscape.[56] The approximate position of the gate-stop asset in the CGI representation relates to its equivalent location in the real landscape, according to the CGI model when textured with the Cornwall Council map of Penryn. When the video clip is triggered to play, it is framed not only within the 2D plane that it textures but also within the wider context of the CGI 3D model.

This representation of Penryn's landscape was also viewed within a further frame: a computer screen, located in a vacant shop that boasted a large window looking out onto the high street. It was here that the RIYT participatory arts mapping project was held – this building, called the 'Yellow House', was also an asset placed into the 'empty' CGI representation of Penryn. JT walked into the RIYT pop-up gallery in this vacant shop in the real Penryn, drawn in by the display of a 3D printer producing a model of the town hall and its clock tower. The reason behind the display was precisely to attract the interest of those passers-by who may not have been immediately attracted by activities described as 'creative' or 'artistic' but who could be drawn in by the spectacle of what was at the time (2015) novel technology of 3D printing and the production of an iconic symbol of Penryn.

After introducing JT (who was in his 70s and had lived all his life in Penryn) to the CGI representation of Penryn and the aim of populating it with residents'

56 The risk in mapping this relationship is the potential for the information to be used for purposes other than those for which the participants gave their consent.

contributions, I invited him to take me on some walks around the locality so that I could document with an audio recorder and mobile phone camera whatever he chose to draw to my attention. I explained that following the walk, the documentation would be turned into digital files to be imported as assets into the representation of Penryn[57].

3.2 The Gate Stop: Bergson and Google Maps

The documentation of the gate stop was the outcome of one of these walks. However, this documentation not only refers to a material object found within the wider landscape of Penryn, but also to its significance to JT's memories and its relationship to his perception of this landscape. The combination of engaging with a critique of RIYT as a representation of Penryn and documenting JT's intimate relationship with an object that might otherwise have gone unnoticed exemplifies Bergson's contention that perception is the result of a complex relationship between matter and memory. According to his theory of the perception of matter, the relationship begins as one of potential actions. Prior to an action, there is a 'zone of indeterminacy' in which any number of possible actions can be taken. 'The more complex the sensory system of an organism, the greater the zone of indeterminacy that surrounds the incipient action' (Guerlac, 2006, p.108) As potential actions are considered, perception is formed. Only once an action has been determined does perception become fixed in relation to matter (Bergson, 1991, p.37-38).

If the gate stop had no personal significance (in the way that it had for JT and for myself as the researcher), one of the many potential actions could have been to take a grinder to what appears to be a bit of metal sticking out of a wall, representing a potential health-and-safety hazard. For JT, however, it was an object with a specific

57 Consent was given by JT for the use of media containing his voice or person for both RIYT and the future research relating to this thesis. Although he did not verbally express that he didn't want his face on camera his body language communicated so. Hence the camera angles for the majority of documentation.

purpose – that is, a piece of metal onto which a gate could be swung closed, causing a distinctive sound as the two pieces of metal collide. This potential action prompted a memory, and as it did so, drew other memories into the moment. In my case, for example, when I saw the gate stop, it prompted recollections of swinging on a gate as a kid, and also summoned up the romantic image of a kissing gate. However, another potential action could have been to pass it by, oblivious to its existence. An example of this is recorded on Google Street View (GSV.) In this shot, a man was captured walking past a gate stop at approximately the same location, and the image was placed on the Google mapping interface (figure 6, below).

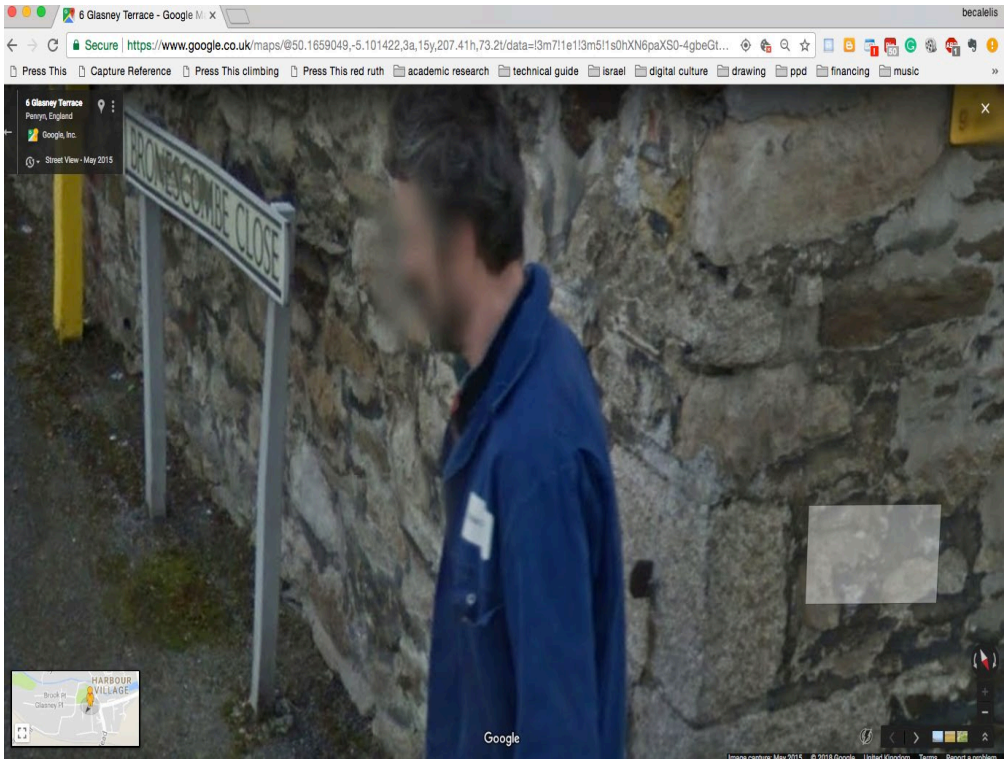

Figure 6: The Gate Stop on Google Street View (2015)

GSV uses photographs taken with a 360-degree camera to create what the company describes as 'a virtual representation of our surroundings on Google Maps'. When GSV was first launched in the UK in 2008, these images were captured by Google employees driving around the streets taking photographs at measured points in time and space (Hoelzl & Marie, 2014)). A detailed critique of Google's methods,

however, is beyond the scope of this thesis. The purpose of referencing this image – which was put online in 2015,[58] coincidentally the same year in which RIYT placed the documentation of the gate stop in its CGI model – is to support an analysis of the qualities of the documentation in terms of its representation of Penryn's landscape through a comparison with GSV.

The contrast between the GSV images and the RIYT documentation of the gate stop demonstrates how Google uses individuals' data, without their knowledge, to enrich the information of their maps, whereas a project such as RIYT incorporates a key principle of participatory mapping, that is to involve local people not only in providing data but in the design or adoption of methods used for mapping and in so doing 'challenge power dynamics in some fashion, whether it be through humor or provocation' (Kim, 2015, p.215). In GSV, the documentation is of a generalised character, and as such is an impersonal documentation of 'the world' – one that artist Jon Rafman (2009) has trawled through for his project *9 Eyes*. Rafman revisits photographs inserted into GSV (taken according to an automised relationship to time and space as the GSV car travels along the highway) in order to reveal moments of the personal and indiscreet.

58 It is interesting to note that if you now look at the GSV timeline at this location, the man is no longer visible in the shot.

13 years ago

Figure 7: J Rafman '9 eyes' taken from GSV 2010

In so doing, he draws attention to Google's voyeurism and at the same time to its homogenised view, one that appears uninterested in the individual. Although RIYT adopted a totally different approach to Rafman, and its work does not bear a direct relationship to GSV, its documentation of local individuals' connection to the matter-memory relationship represents a challenge to this impersonal view of the world.

Since the 2015 GSV image, Google has made it possible for users to 'contribute their own 360-degree images'. It describes the process in a similar way to a participatory mapping project, declaring '[t]hrough our collective efforts, we enable people everywhere to virtually explore the world' ('Explore Street View and add your own 360 images to Google Maps,' 2023*)*. Leaving aside the question of whether Google uses the language of participatory mapping appropriately when describing its intentions, it does mean that JT could now upload a detailed 360-degree photo of the gate stop to the Google database. However, this visual information would be simply a part of a plethora of other information captured and uploaded to the interface (by people unlikely to be residents of Penryn), not because the images carry a specific quality that is related to the local, but according to the agenda of a global corporation.

In the RIYT model, this item of documentation (the gate stop) was a prominent feature. This was because the 3D landscape had been erased of all detail, apart from that which was then documented by participants and placed on the map. In contrast, Google Street Map appears to document everything that is visually accessible within the 360-degree frame. However, if you were to trawl through the Google Street Map of Penryn, it is highly unlikely that you would notice the gate stop due to its size and its position in relation to everything else. By coincidence, it so happens that the GSV photograph, which includes the gate stop, shows a man wearing a boiler suit. He is possibly a local, in which case he is also likely to have passed that way many times without ever noticing this rusty piece of metal. The RIYT process of participatory mapping only included the objects individual residents considered significant to them in some way, whereas with GSV the documentation could be described as capturing all that is visually accessible within the frame at that moment in time; nothing is considered from the perspective of the local. Thus, although Google Map's language resonates with that of participatory mapping, in the case of the latter, the criteria of what needs to be documented is set by the participants while Google Maps stipulate that any content uploaded must not contravene their policy and 'should accurately represent the location in question. […] Where contributions distort truth, we'll remove content' (Google, 2023).

This raises two questions, how do we define 'accuracy', and closely related to this, how do we define 'truth' in this context? One answer might be that it is a matter of perception, in which case, a further question arises as to the definition of objective and subjective data. In relation to JT's gate stop, the presence of the gate stop itself would not be in question, but what it signifies and whether subjective perceptions of its significance should have a place on a map would depend on whether this was a map curated by Google or by RIYT's participatory arts mapping project. However, if description is considered a form of documentation, the question of whether to turn to

describing a more distant past arises, because memories of experiences in the past can influence an individual's perception of an event or object in the present moment. Hence, if this chapter is to communicate the quality of durée in relation to the mapping of a specific item (the gate stop), it will need to both describe aspects of the walk we took, the point on the walk where the gate stop was located, and the documentation of associated points along the way. If we consider Bergson's diagram of the cone (see figure 1, Chapter 1, p. 64), all these events could be considered to be part of a quality of durée, as memories are funnelled down through to the tip of the cone and inscribed by action into the plane of the present moment.

As was noted in chapter 2, Bergson's theories are often described as relating to time rather than space. However, if potential action in relation to matter forms perception, it is not really possible to separate space, be it material or abstract, from a lived experience of time. As seen through the concept of durée, where action draws memories into the present moment, this lived experience is neither a linear sequence of independent moments nor is it space as understood as a container for time.

3.3 The Walk with JT

My memories of the walk I took with JT (who had lived his whole life in Penryn) and how they relate to the gate stop and its documentation should be seen in the context of Bergson's theories of the relationship between memory and matter. The walk took us along Commercial Road, which runs beside an estuary. It was hard to hear JT's soft voice against the din of the traffic as he described how there were once gardens, orchards and grass verges where now there was tarmac and concrete. Some of the original granite warehouses still stood on the other side of the road, although now occupied by different businesses and a new development. JT described the different

trades that once occupied the estuary front, supplying farm machinery, coal, copper and food stores for the military, and the tall industrial stacks that belched smoke into the sky. It was from this estuary that granite, having been wheeled down the high street, was shipped to London (where I was born) to become part of the cityscape, including iconic constructions such as London Bridge (Enys, 1833, p.323).

As we were winding our way back through the town, JT suddenly paused and produced a photograph that was taken some time before he was born (figure 8). It depicts two men – whom JT identified on a video file as his father and uncle – proudly standing before their horse and milk cart, near the point where we were now standing, shortly after winning first prize at the town fair. JT described how his father was related to a family in Penryn that had owned a considerable amount of land and a number of houses in the area, but as he was on the poorer side of the family, he had run the Penryn milk round.

Figure 8: JT's Father with his Milk Cart

JT handed me the photograph and a digital copy was inserted into the RIYT representation. A few minutes and a few roads later, JT pointed out a piece of metal (the

gate stop) set in the granite cornerstone of a house. This moment is documented on the video file (Appendix 1).

GPS traces[59] are now a common method of representing walks in a landscape. They are formed like dot-to-dot drawings. Other data, including photographs documenting certain significant points, such as the location of the gate stop, can be placed along these lines. However, as this chapter will describe, although the gate stop may be located at a particular coordinate representing a space in a landscape, the experience of the gate post relates to times and experiences before and after both the point in time and the point in space.

The video clip opens with a shot of a street sign – Bronscombe Close – on the wall of a house. The camera then pans across and up to a wide shot of a street with houses on either side and cars parked alongside the pavement. The sun is shining, over-saturating much of the image. JT's voice can be heard describing how this area used to be his father's land. Then the camera pans back past the road sign and across the wall of a stone building. JT's hand comes into shot as he describes a gate that used to stand in this location and touches an object embedded in the granite of a wall that he identifies as a former gate stop. As the camera continues to pan over the scene, it is apparent that the granite is a cornerstone of a building on the corner of a junction with what appears to be, due to the noise, a busier road.[60] The road documented in the video is also present within the GSV 360-degree photographic documentation (fig. 6) but in the RIYT interface the video is framed by the textured 3D elevation that is devoid of assets such as houses or cars. As such, the visual details presented within the frame of the video clip appear to be unrelated to the context of its framing.

59 These will be discussed more fully in Chapters 4, 5 and 6.

60 Scrolling back through the video clip, we can add further details. For example, the kind of cars parked on the road give an approximation of the era, and the background sounds and the quality of the light indicate the time of day.

Juxtaposed with this contradiction, however, JT's dialogue refers to a memory that is perhaps better illustrated by the RIYT representation. The audio recording – 'this here land there, that used to be my father's nurseries […] he used to rent the fields up there' (see appendix 2) – refers to a memory of the landscape prior to the construction of the houses. This memory is drawn into the present moment when JT engages with the matter of the gate stop. From among all the potential actions that exist at the moment of 'indeterminacy' he becomes aware of this object, memories surge into the moment that are associated with the action of closing a gate, informing a perception of it as having a connection with a gate. This is expressed in the dialogue. The perception is not an illusion that there are no houses, only fields, as in the RIYT representation, but of the landscape as imbued with a deeply localised association with a gate opening into JT's father's land.[61] At that moment, JT's familiarity with a material object in the landscape also establishes his credentials as a local resident, 'The familiar is an effect of inhabitance' (Ahmed, 2006, p.9) which JT has through a long-standing connection to Penryn.

In contrast to JT, I (in the role of the producer of RIYT) was born in a different place and have no ancestral connection, no claim of heritage to this land. This has an effect and influences the way JT and myself orientate ourselves differently with in the landscape of Penryn. 'If orientations are as much about feeling at home as they are about finding our way, then it becomes important to consider how "finding our way" involves what we could call "homing devices." (Ahmed, 2006, p.9). This is relevant to the motivation behind my research. I am Jewish, and as the research method is autoethnographic, it may be relevant to raise here the relationship of the Jewish diaspora to ancestral land rights in Israel and the problematic questions that this relationship poses in terms of the displacement of the Palestinians. Thus, I do not live in Israel, but

61 In that moment, it would be reasonable to propose that the Google Street View is no more real to JT than the RIYT representation, devoid of any houses.

neither do I feel I have a place in the landscape of Penryn. There is a possibility that my position as an 'incomer' with no direct ancestral relationship to the landscape of Penryn, enabled me to conceive of initiating the 're imagining' of this landscape, as CGI representation of Penryn devoid of the signs and symbols of everyday life. Without the substantial memories of JT associated with the matter of the landscape, the action of creating a representation of Penryn that negated its history appeared permissible. Although this act of negation appears to have uncomfortable associations with colonial relationships to landscapes, unlike the 360-degree panoramic GSV, which is likened to diving into a street scene (Hoelzl & Marie, 2014), where the rusty piece of metal could be ignored as a minor detail, RIYT's interface, almost completely devoid of all the signs and symbols present in Penryn, was able to emphasise this detail.

When I showed JT the documentation of the gate stop within the 3D landscape, he appeared uninterested and chose instead to take a pencil and a scrap of paper in order to explain the location of other artefacts on the land. In terms of the premise of RIYT's original use of technologies of Games engines for participatory mapping, JT's choice of wood and lead was challenging. It brings to mind Punt's *Early Cinema and the Technological Imaginary* (2000) that establishes the development of the apparatus in a context beyond the 'artisans' who invented it, bringing in both social and economic factors considered by 'entertainers' (2000 p.71). In this case, the producers of RIYT were not the 'artisans' developing game engines but, in the context of a community arts practice, 'entertainers' exploring the technologies potential to engage audiences in an arts practice of mapping and thus meet criteria of arts funding in 2015 (Work of Arts Council 2014). This sought to use art practice to encourage local participation and the incorporation of digital technologies. JT's interests in the landscape were less abstract, closer to that of the farmer inserting into or extracting from the land, with no need to engage with a representation of the landscape he lives in.

Whilst the choice of technologies, pencil or game engine, was not in accord, the documentation of local participation, staking a claim through past ownership of and heritage to the land, struck a chord with this researcher (then Producer), whose lack of ancestorial connection to Penryn and sense of not belonging perhaps precipitated the action of focusing on this data.

3.4 Conclusions: Seven Years Later

Seven years after I first documented JT pointing out the gate stop I once again turned my attention to this object. I felt the sensation of remembering the moment, and yet immediately a question arose as to how much my perception was informed by the matter of the gate stop and how much by the video clip documenting the moment.[62] This took place after my critical engagement with a different representation of experience (a letterbox) in a different landscape, undertaken as part of the 'Matter and Memory in Lisbon' project, the results of which are discussed in Part 3 of this thesis.

If both that letterbox and the gate stop are regarded as points on the surface of the Earth, a line could be drawn between them, and by measuring this line across the curvature of the earth, avoiding the details of mountains or indeed ant nests, it would be possible to arrive at the approximate number of kilometres – 1,310 – between Lisbon and Penryn.[63] A line could also be drawn between the point in time at which JT introduced me to the gate stop and my return to this moment approximately seven years later. Some in-between points on this line could indicate when the documentation of the letterbox took place and where, in Lisbon, a shed in Penryn, and all the points in-between. Would this line begin, in terms of linear time, with JT introducing the gate stop or further back, when it was located on his father's land? And what, if anything,

62 It must be stressed that the video clip is not remembered in isolation but in the context of the RIYT representation of Penryn.

63 See: http://www.britishdistance.com/pwp/3570779-3837007

has the letterbox in Lisbon got to do with it? The subject of perception and representation that these questions raise will be analysed in the following chapters, within the context of an analysis of the metaphor of a line.

In section 3.3 of this chapter, the process of examining the asset of the gate stop using a phenomenological approach, writing in a form that drew on Bergson's concept of durée, led to the analysis of data that might otherwise not have been considered. The autoethnographical material that engaging with JT's asset provoked, prompted me to disclose my background and bias as an incomer, a position which had perhaps contributed to the notion of creating a landscape that negated almost all other lived experience. Interestingly, the resulting finding was that the blank canvas created for RIYT did in fact enable assets placed by participants on the CGI representation of the map of Penryn to retain meaningful subjective value in contrast to the impersonality of assets placed on GSV.

It became clear that, depending on what actions are taken, multifaceted memories from times and experiences, which relate to before and after the current point of time and space, are drawn down in relation to an object or element of matter (the gate stop in this case) represented by an asset, integrating qualitative data of a video recording, with in a community mapping project. This finding influenced the direction of the research project that is developed in Part 2.

Part 2

In this part of the thesis three chapters explore the technology and application of the GPS trace, beginning with the analysis of a line, using an unconventional approach to structure which is once again informed by Bergson's concept of the durée, where perception and process are the object of focus.

This shift in approach signals the introduction of the autoethnographic data which forms the basis of the close analysis of digital mapping technologies and subsequent experiments described in the remaining chapters of this thesis. The data was collected during a dérive [64]inspired project in Lisbon where perceived relationships between memory and matter were documented on a smartphone. The Dubord informed method of walking was inspired both by the need to map a sense of place within the unfamiliar city in which I found myself on a research trip, and to further explore Bergson's model of perception.

Chapter 4 explores the absence of qualities within the representation of quantitative GPS data documenting the path of the walk and introduces the use of the word 'virtual' in relation to forms of perceptions. Chapters 5 and 6 then go on to closely describe aspects of the technology and data of GPS and its representation, using GIS applications; the integration of quantitative and qualitative data which created the traces that documented the dérive in Lisbon. Part 3 of this thesis then hones in on an aspect of that dérive, quantitive data documenting of the letterbox in Lisbon, mentioned in chapter 4.

64 See page 28

Chapter 4: Untitled 01

The structure of this chapter does not follow the pattern of previous chapters but rather adopts a form that is unusual as it is modelled on Bergson's concept of durée and as such does not make the subject under examination immediately explicit. Although the chapter draws on a reading of Bergson's work it is in no way intended to be a philosophical intervention but rather, informed by arts practice, a way of considering data and its representation applied to the practice of mapping in order to both represent lived experience of landscape and also, due to the influence of, and our engagement with this method of mapping, our lived experience of place within a landscape.

The sections take the reader through an experience of durée in stages whilst exploring , through a method of description, the figure entitled 'Untitled 01' (p. 126). The premise is that exploring 'Untitled 01' without clues to its provenance facilitates an objective perception of what qualities are represented and which are not. It draws on Ingold's research on lines (2007) to critique the representation of quantitative data, a GPS trace , that measures points in time and space as an objective representation of qualities of lived experience within a landscape.

In section 4.1 an experiment, using mapping technologies such as GPS to document relationships between memory and matter, is described using Bergson's theory of perception. The concept of the GPS trace is introduced, and 'Untitled 01' is considered as an interpretation of data, a representation rather than a measurement, since it has been manipulated by the use of different software . As such it can be considered to have conflated certain qualities with qualitative data that were not originally present.

The adaptation of Debord's dérive, urban wandering with the intention of mapping alternative perceptions of a city scape, as inspiration for engaging with Bergson's theories of perception, is explained in section 4.2 as a method of exploring *la*

memoire qui revoir in relation to material objects in the landscape. Here, as in other sections of this chapter, autoethnographical elements are necessarily introduced since an experience of a dérive and its analysis is intrinsic to the experiment. This change in voice is signalled throughout by the use of the first person narrator in the text.

The remaining sections discuss, align and critique Ingold's research which deconstructs and reconstructs lines made up of joined up dots, GPS nodes, in order to consider the quality of experience that exists between the dots. This leads the discussion on to the significance of inhabiting the space between matter and memory.

Hence, this chapter introduces a discussion about a line and its technological construction – a discussion that pivots around the way in which a line is both a quantitative and a qualitative representation that could be subject to both realist and idealist interpretations. It expands on earlier chapters' engagement with digital tools of representation and documentation by using a thought experiment, described by anthropologist Tim Ingold (Ingold, 2007, p.73) to critique the method of the technological construction of this line.

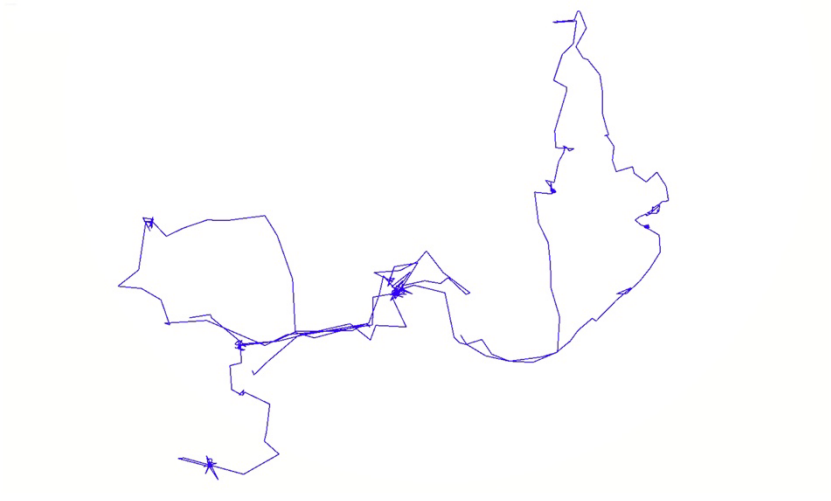

Figure 9: Untitled 01 (a)

The term 'Untitled 01', in the context of this chapter, is a placeholder for the name of the illustration (figure 9, above). As such, it remains there with the intention of minimising[65] the influence of a term or name on how the reader perceives the illustration. The purpose of using what could be defined as a non-descriptive placeholder is to begin the chapter by acknowledging that there might be quite different perceptions of what 'Untitled 01' is. Indeed, there are potentially an infinite number of ways in which 'Untitled 01' can be considered. To perceive all of them would, according to Bergson (1991), require 'pure perception', a quality of perception that 'exists in theory rather than in fact' (p.33). Generally, the way we perceive an object often relies on a singular perception, which involves negating other ways of perceiving; certainly, it will involve the negation of all the other possible perceptions encompassed by the term 'pure perception'. For example, 'Untitled 01' could be considered as a form or a line, or a line describing the edges of a form, or the edge of the form could be said

65 The word 'minimising' has been used to acknowledge that 'Untitled 01' has its own connotations – with the modernist titles of artworks, for example. Nevertheless, it remains less descriptive than the other options and helps make the intended points.

to describe a line. It could be one line, one form, or multiple lines and forms. But for the purposes of this analysis, let us consider 'Untitled 01' as a line.

I now know this line intimately. When I say I 'know' this line what I am actually saying is that I am projecting or, as Bergson would say, 'launching' my memories onto this line. I recollect that this line, 'Untitled 01', is the outcome of using technologies to document my relationship with a particular space over a period of time. This chapter therefore is concerned with subjects connected to this line and the points that bought it into being.

4.1 Different Interfaces – Different Perspectives

In October 2018 I spent a week wandering around Lisbon, a city I had not visited before. If we pause here to analyse this first sentence, we can see that it frames a relationship to the space of a city using a quality of time (a week) and a quality of movement (wandering) as part of the description. If analysed from a social science perspective, the words 'wandering' and 'week' could be separated into two types of data, qualitative and quantitative, but with the caveat that qualities are not always so distinct and that a 'forced' analytical division between the two could result in a 'trained incapacity'[66] (Bernard, 2017, p.354). Nevertheless, a simple distinction, often used by cultural anthropologists when analysing data, is that quantitative data can be measured while qualitative data is interpretative (p.354). According to this definition, the word 'week' would be quantitative and the word 'wandering', qualitative. There is a further distinction in that a quantitative description can be objectively measured whereas a qualitative description is an interpretation and thus a subjective quality. Hence, if we revisit the introductory sentence to this section we could now describe it as a narrative

66 The term "trained incapacity' in this context, means when a certain training where researchers need to choose between quantitative or qualitative data blinds the researcher due to their focus on the one to the detriment of the other or to their ability to look beyond the category.

that contextualises the subject within the measurable, objective quality of a week and the subjective quality of wandering.

In addition to a combination of the above two qualities, another factor was my intention to document the experiences I encountered while wandering in Lisbon over a certain period of time using the hybrid technologies incorporated into the casing of my smart phone. One of these was a receiver for a Global Positioning System (GPS). GPS will be discussed in greater detail later in this chapter but, at its most basic, it is a method of locating points on Earth by using a system of 'trilateration' (Wilmott, 2020, p.167;'How GPS Receivers Work – Trilateration vs Triangulation – GIS Geography,' 2018) to cross reference information from radio waves beamed down by satellites orbiting the planet. The technological device that receives and interprets this information is called a GPS receiver, and this can be integrated into any device. Unless the GPS receiver is switched off manually, most smart phones can be located at any given time using GPS. The visual representation of this data, a set of numbers and letters called a 'track log', is made possible by using a geographic information system (GIS), software developed primarily for projects related to mapping. Taking this track log, the GIS interface represents a connection between two consecutive GPS points in time, A and B, by connecting them with a line. The connection of all consecutive GPS points becomes the visual representation of movement, known as a 'GPS trace'.

From a certain perspective, 'Untitled 01' could be considered a GPS trace. However, between the time I documented my movement in Lisbon to the time of inserting 'Untitled 01' into this thesis, a number of different software packages had been used, each one transforming the information from one data type into another, from numbers into a visual representation. Hence, by the time 'Untitled 01' was created, the information represented visually was no longer the information I first documented. I looked at, analysed and described 'Untitled 01' using various different interfaces. For

example, I was able to look at it on my smart phone and on a computer screen using different software: on the mobile I used one type of GIS software, on the laptop I used another. Then I took a screen grab in order to look at 'Untitled 01' in Adobe Photoshop and inserted it into a Word document. Following this, I printed the document out on a sheet of paper and on a sheet of clear acetate. I was then able to use the acetate to project 'Untitled 01' using an overhead projector onto a screen in front of an audience, while I kept the sheet of paper on my desk and pinned it to the pinboard in my shed. Thus, each interface both facilitated and prohibited a different set of relationships. Between these different interfaces, it became evident that the line was not a measurement but an interpretation of data.

The analysis described here used these different interfaces of representation, from digital data to printed paper on a pinboard, to examine the qualities of 'Untitled 01'. This involved considering which qualities of my experience in Lisbon were captured by the GPS technology, how a GIS representation of this experience resulted in 'Untitled 01', and what the different interfaces were able to bring to the reframing of the documentation. The qualities of the GPS data and its representation were then compared to the experience being documented. In essence, this represented an experiment using mapping technologies (GPS and GIS) to document the perceived relationships between matter and memory within a particular landscape – the landscape being parts of a city, Lisbon, which I was visiting for the first time. My interest in this relationship derived from Bergson's theories on perception which see matter and memory as key components – with the addition of action – in the way in which we perceive an 'image'.

4.2 Autoethnographic Research Equipment

In the context of my wandering in Lisbon, the objective (beyond the mechanics of walking) was to break with the habitual and engage with the 'image' embedded in an experience of time and space as durée. As described in the introduction Bergson's concept of 'image' encourages us to break from our habitual ways of thinking and consider new perspectives (Guerlac, 2006, p.13).

An objective in Debord's dérive as defined in the Introduction, was to achieve some measure of objectivity whilst opening new corridors that are closed to perspectives bound by realism . Although my wandering shared many of the qualities of the dérive, the psychogeography[67] I was creating would not be considered an objective observation but a subjective interpretation. It was in fact a research experiment that started out with a number of objectives. One was to explore a method of documenting the perceptions of an experience using the different technologies available on a smart phone. This involved walking with no predetermined destination but with the instruction that whenever a significant memory arose – '*la memoire qui revoi*' – or I felt drawn to a material element in the landscape, I should document it, and then notice how either occurrence may have triggered interest in other material elements (other than the 'image' of my own body, including thoughts or feelings) that I came across in the landscape. In this scenario, I use the term 'matter' or 'material elements' to include both the organic and the man-made, from landmarks through to objects, down to the smallest detail, including sounds and smells, but in their original form and not how I perceived them.

I considered this process part of an auto-ethnographic research practice that related to my previous experience of production of autobiographical documentaries.

67 Debord, who coined the term, may well have objected to the subjective nature of my research experiment.

These films were made without a script, guided instead by an interest in a specific subject and the intention to document synchronicities[68].

The next stage of the research was a comparative analysis of the documentation with the experience I sought to document. I used Bergson's theories on perception as a way of categorising the qualities of the experience. I began to see the comparative analysis itself as an action, the documentation being the material (or matter) and the past experience my memories. This method continued during the written descriptions of the different stages, which thus became a dialectical experience and part of the research. However, this time, rather than creating a film to document an autobiographical process, I would be creating a document that related to the field of mapping. Subsequent chapters will discuss documentation in the form of audio and photographic material which, in the related field of GIS, are considered qualitative data. This chapter describes the different stages of a dialectical experience in relation to 'Untitled 01'. In GIS mapping, 'Untitled 01' would have the familiar characteristics of a line representing the objective qualities of GPS data.

4.3 Embodied Experience

The documentation created by the technology could be considered as representing a certain aspect of the actions of my body within a certain space (the mechanics of how it does so is described later in this chapter). This documentation was then compared with the memories of my body, encapsulating both my action and my memory, in that particular space. For the purposes of this thesis, the outcomes of the comparison needed to be described. The act of writing this description represented both a challenge in terms of clear communication and a further stage in the analytical process

68 An example of this way of working can be seen in the film, *The Letters Unwritten* (Brodskis, 2007) https://vimeo.com/35982343?share=copy

because description is itself a method of documentation that requires both the deconstruction of a subject by the writer and its subsequent reconstruction by the reader. In the positions of both the writer and the reader there is a relationship between action and memory involved in the acts of deconstruction and reconstruction.

Through each stage of the research process, including the analysis, reflection and the writing of a description of the analytical experience, further relationships were formed between my body, actions and memories and the materiality of the documentation. From this combined experience, a hypothesis began to evolve as to how technology could be used to create a virtual experience.

The digital simulation is thus an experience of a space that alludes to a reality but is not itself considered real, whereas the Bergsonian use of the term virtual refers to a real experience but one that cannot be contained in a singular perception. In short, 'virtual' is not used to describe an illusory simulation but a real experience, albeit one that cannot be represented in its totality.

While 'Untitled 01' is not a virtual experience, it arguably, shares a problem with perceptions of the virtual in that an individual's perception of 'Untitled 01', in its totality, cannot be communicated through description. Furthermore, due to the relationship of our individual memories and actions to perception it would follow that no two people would have exactly the same perception of 'Untitled 01' since no two people would have exactly the same memory or decide on or take exactly the same action. At the same time, we do share experiences, although not entirely the same perceptions. It was in order to explore the spread of potential perceptions of 'Untitled 01' that a placeholder name was used, even if almost immediately the descriptions began to narrow the scope of the readers' possible associated memories.

4.4 Ingold's Analysis of a Line

So, what of the documentation contained in 'Untitled 01'? To begin with, let us consider 'Untitled 01' as a line and, in the process of analysis, begin to deconstruct it. To do so, I suggest the use of an experiment, described by Ingold in *Lines: A Brief History* (2007), to critique the method of its technological construction. This experiment first involves the deconstruction of a line, a drawn illustration of a path of movement, followed by its reconstruction. (see Appendix 4 for link to experiment) Both the deconstruction and reconstruction relate to the wider concerns of this thesis.

Ingold's suggested method of deconstructing the line is an extremely useful intervention, in which he endeavours to deal with the problem, pertinent to this chapter, of the gap between the qualities of experience and the qualities of representation. However, when I undertook his suggested experiment, discrepancies arose between Ingold's description of the experiment and my experience, despite following his instructions very closely. This provoked a correspondence between Ingold and myself, included in Appendix 3, that further demonstrates the gulf between idealist and realist versions of events. In this context, the idealist version is the imagined deconstruction of a line as described by Ingold, which contrasted with the realist version in which I undertook the actions he describes. The correspondence and the description of the discrepancies outlined below confirms how even a dedicated and fastidious scholar such as Ingold, who criticises the fallacy of certain methods of representation, can yet be caught up in the illusion, disavowing the gulf between description and experience.

In *Lines: A Brief History* (2007), Ingold critiques the reduction of a path to a series of points by taking the reader through an imagined process of deconstructing and reconstructing a line drawn between these points. He describes this as similar to a child creating a dot-to-dot drawing, and his description of this process demonstrates how reducing the line to a series of points negates the qualities of the experience between

each of these points when drawing the original line. What is most relevant to this thesis is Ingold's argument in which he draws parallels between the

> *'fragmented' nature of the dot-to-dot line and 'the related fields of travel, where wayfaring is replaced by destination, oriented transport, mapping, where the drawn sketch is replaced by the route plan, and textuality, where storytelling is replaced by the precomposed plot'* (Ingold, 2007, p.75).

This association directly relates to this chapter's analysis of the GPS trace in relation to an understanding of experience through Bergson's concept of durée.

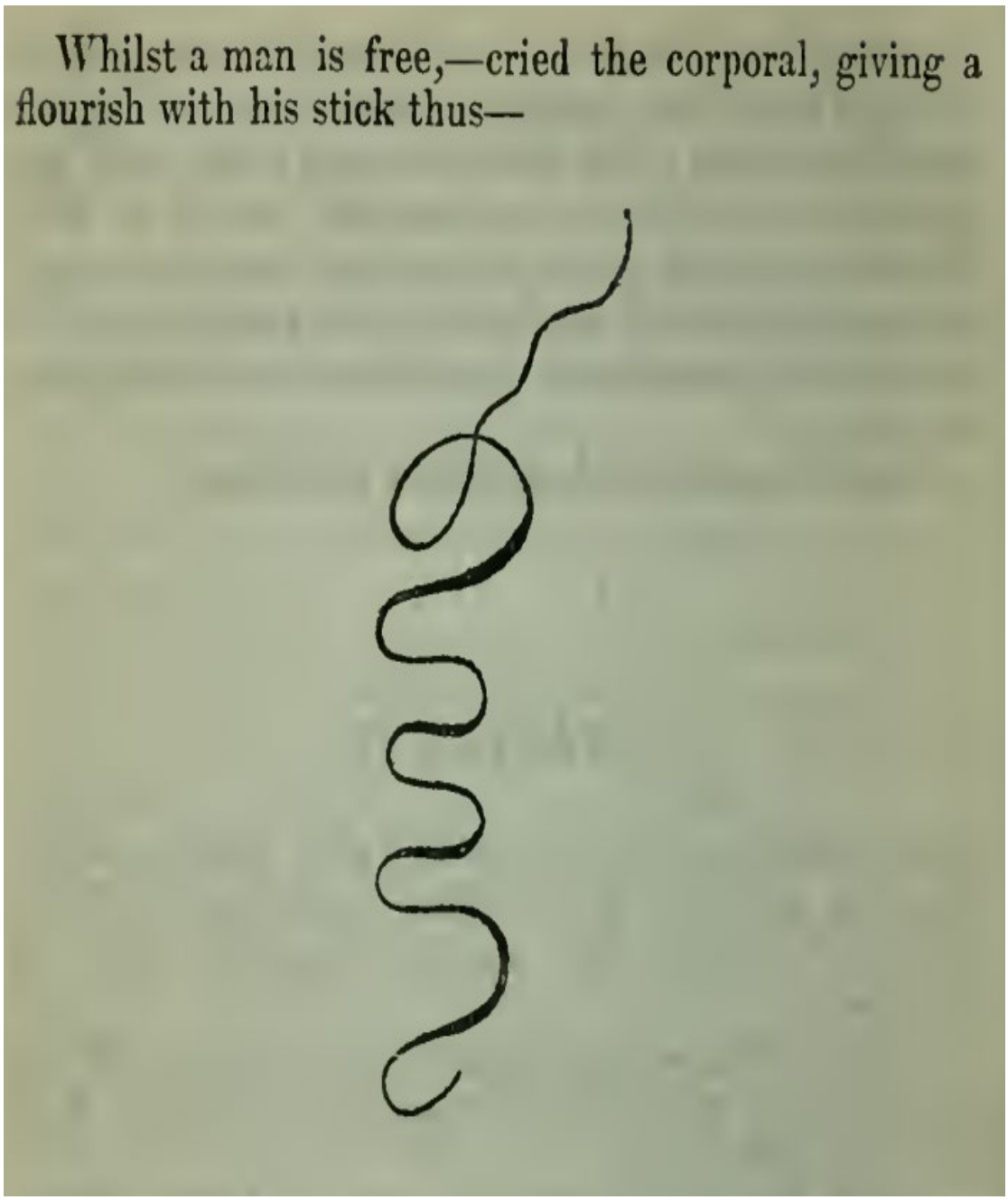

Figure 10: A line Drawn as a Fluid Gesture. ***From The Life and Opinions of Tristram Shandy, Gentleman*** *(Stern, 1762.)*

The line described by Ingold (figure 10, above) is an illustration of a fluid gesture. He invites the reader to imagine cutting this line into sections, rolling each section up into a series of tight coils or scrolls, then placing these coils upright so that, seen from above, they appear as a series of points. However, instead of each point only relating to the location on which it stands, it contains (wrapped up in the scroll) parts of the line before and after that point. Much like Bergson's cone diagram (figure 1, Chapter 1), in which the tip of the cone is seen to act on the present moment, in Ingold's

experiment what is experienced is not reduced to the point, the destination, but the journey before the present action and the present in relation to the future. This is reminiscent of those qualities of immanence described by Massumi, that are 'not the elements in mixture. It is their becoming. In becoming is belonging' (Massumi, 2002, p.76). The question is how a moment that encapsulates both present actions and the effect of past experiences can be represented as an isolated point. Ingold uses his thought experiment, transforming a line into a series of points, to demonstrate that while a point in time and space may appear to be isolated, the actual lived experience can be better apprehended in the image of a coiled-up line.

Ingold describes how an approximation of a line could be recreated as in a child's dot to dot puzzle' (2007, p.74) by drawing it from one point to another 'predetermined point', but that this 'assembly' would not capture the qualities experienced in the line as traced in a continuous gesture or wrapped up into coils that we see as dots. He draws parallels between such a method and a cultural shift in perceptions of place: 'once a knot tied from multiple and interlaced strands of movement and growth, it now figures as a node in a static network of connectors' (p75).

In distinction to reductionist representations, Ingold (2007, p.75) uses the term 'inhabit' as opposed to 'occupy' to describe the relationship between people and 'the environments in which they dwell'. The word 'occupy' could be related to the colonial attitudes that Ahmed (2006) and (Philipose, 2007) associate with the representation of the world as a grid, divided by the cartographic coordinates of longitude and latitude, that underpin GPS technology.[69] Such a representation is only possible if it excludes the experience of what it is to inhabit any of the coordinates in the 'assembly'. This distancing from the qualitative qualities of a place (experienced, for example, through a walk) is achieved by replacing it with a co-ordinate point that can be made without

69 This will be discussed further in Chapter 5, which gives a more detailed description of how GPS and GIS divide up the surface of the Earth.

having ever inhabited the space in question. Ingold (2007, p.75) suggests that 'we might do better to revert from the paradigm of the assembly to that of the walk'.

Ingold's idea of deconstructing a line begins with the suggestion of 'a simple experiment' involving an illustration of a drawn line. He follows this with the instruction: 'Take this line and cut it up into short segments of roughly equal lengths' (2007, p.73) I decided[70] to take Ingold's text literally[71] in order to build on his critique of how methods of deconstruction and subsequent assembly deny certain qualities of experience. In doing so, however, I encountered several problems. Describing these problems, and the suppositions I drew from them, helped me develop an understanding of the differences between the imagined and the enacted, while exemplifying Bergson's theory of the influence of action[72] on perception.

After recreating the action laid out in Ingold's text, precisely following his instructions (a link to related video documentation is available in Appendix 4), I learned,, or at least I formed the hypothesis that:

1) Ingold did not undertake the experiment with the line represented in the text. This supposition was later confirmed in my correspondence with him (see Appendix 3). He did undertake the physical cutting of a line, but it did not have a loop, which creates the point of intersection. In his written answer, Ingold agreed that doing so would lead to interesting questions.

2) His text, instructing the reader to 'take this line', was not meant to be taken literally.[73]

70 The reason I did so relates to the act of participation and analysis, which involves experiencing for oneself rather than accepting something as a given. Arts practice could often be defined as bringing the imagined into the real.

71 It is interesting that the word 'literally' is used to describe doing something in reality although it derives from 'literature' – that is, from a written text. So, in this sense, the experiment was undertaken as a literal, textual exercise, not a physical one. 'Literally' is defined as taking the word out of its context. The context in this case is a text, where you read something and imagine it rather than actually doing it.

72 The question raised here relates to the effect of virtual action on our perception.

73 This supposition has not been confirmed.

4.5 The Outcome of the Experiment

What we understand through the process of abstraction differs from what we learn through embodied practice, as seen in the following conclusions I drew from my experiment:

- Two intersecting lines cannot co-exist: when one line overlaps another, it will cancel out the line it overlaps.
- Two points can infer a line and two points either side of this inferred line can infer an intersection of lines; however, without knowing the direction of travel, these four points could infer many other possibilities (a subject that was raised in Ingold's correspondence).
- A diagram of intersecting points can exist without cancelling out other spatial considerations of the relationships between points.
- If a point could express the coiled, durational experience that it contains, then it would be a document of that experience. Ingold demonstrates this by showing how the gesture represented by a drawn line is lost once the line is fragmented by a coordinate. The extension of his suggested experiment from the imagined to the enacted reflects the way in which the relationship between matter and memory is materialised through action.

Ingold associates these differences between the suggested and the real with our relationships with landscape. My intention was to use the problems his thought experiment manifest once it was translated into a practical experiment to further inform the research in this thesis, employing them as a method of analysing the relationship between the memory of a landscape and the action of documenting and representing it.

The pedantic nature of my practical experiment and critique had a purpose: the intention was not to undermine Ingold's thought experiments but to begin to understand the components of a problem that relates to the description of experience and its

representation. The analysis engages with the differences between the qualities of imagined action and the physically enacted, and what effect this has on how we experience reality. My goal was to isolate a quality of the virtual experience of inhabiting that I would argue occurs through a relationship between matter and memory, using GPS data as a connection point.

I was interested that the dissection of the line was only imagined in terms of the relationship between the imagined action and the actual action: that is, how the imagined can be used to understand a certain quality, but how it is also false in terms of the actual reality. This relates to Ingold's discussion on the difference between inhabiting a place and its reduction to a node. By cutting the line, I am inhabiting an action; I am no longer distanced from the imagined experiment, but by undertaking it in practice, I can understand its relationship to its intersection. However, my relationship to Lisbon is no longer a physical one. You could say I am only inhabiting it through my imagination by connecting the nodes. Each node, however, is not a point in space but a point in a diagram relating to both matter and memory and, as such, to both time and space. In itself it is not reproducible – it does not communicate meaning to anyone else. Like Ingold's description of a rolled-up coil, it is an experience of durée between matter and memory.

'Most realist theories about boundaries, construed as lower-dimensional entities, share the view that such entities are ontological parasites: points, lines, and surfaces cannot be separated and cannot exist in isolation from the entities they bound' (Achille, 2023). The suppositions I made in relation to Ingold's thought experiment may of course be wrong. In any case, they were not intended to undermine the experiment suggested in the text but to demonstrate, with its application, the difference between

what is perceived when an action – in this case dissecting a drawn line – is imagined and when it is physically undertaken.

Indeed, when I wrote to Ingold (see Appendix 3) to enquire [74]if he had undertaken the experiment himself and whether he had encountered the problems I outline in the following paragraphs, he replied that he had undertaken the experiment but not on a line that overlapped itself.

The first problem arises when following Ingold's instruction on how to begin. He writes: 'Take this line' (Ingold, 2007, p.72). In this case, the line is a drawing of a gesture, reproduced – through the technology of printing – in a book. When reading this instruction, the reader will either be looking at it on printed paper or on the interface of a computer screen. If we follow the instruction to 'take this line', the question arises of how? If the reader was reading a book the instruction would involve the deconstruction of part of that book.[75] In my case, I was reading a PDF on a computer screen linked to a printer, so I began the experiment by printing[76] the illustration of a line (that is, a drawing that traces a gesture) onto a sheet of paper. I could now physically take the sheet of paper in my hand. However, the instruction was to 'take this line' rather than the paper, so a further action of extracting the line from the paper was required. This involved cutting along the edge of the line. There is a certain level of skill and precision required in such an action, neither cutting into the line nor leaving portions of paper attached that are not the line, and this raises questions of where the actual edge of the line begins and ends. This decision in turn raises further questions concerning

74 I wanted to write to Ingold in order to make contact with an author whose ideas I found helpful, and to introduce myself as someone who has engaged with his work. I also needed to know if my suppositions were correct. Aside from being interested in whether my analysis led to the correct conclusions, I was also interested in the fact that the next suggestion does use the word 'imagine'. This would infer not only that my supposition was wrong, but that Ingold's writing is confusing if taken literally.

75 As the design of Ingold's experiment does not propose the deconstruction of the book itself, this further supports the supposition that the intention is for the instruction to be imagined rather than acted on.

76 An allusion to the act of printing occurred in an earlier discussion, which showed how whether we see the image of a GPS line on a computer screen or on a sheet of paper changes how we relate to it.

boundaries, qualities of immanence, the liminal spaces between edges and indeed the problem, a single node, defining a point in time or space.

The second problem arose when the action of cutting along the edge came to where the line crossed over itself, creating a closed loop – this can be best envisaged by imagining the way the bow of a shoelace is formed. The problem was how to proceed at this point of overlap. Two options presented themselves: the first was to honour the trajectory of the line in the order that the original gesture drew it. However, the section being cut along would sever the line[77] from its future self and, in so doing, would create three sections of line, each one separated from the other at the edge of the point of overlap. Within this severance, between the past, present and future action there are parallels with what experience would be if qualities of durée were severed from perception.

The other option was to divert the cut from proceeding along the path followed by the original illustration and instead begin to cut along the line that overlapped it. As there is no requirement that the extraction of the line should follow an identical path to the drawing of the line, I took the second option. It is worth noting that cutting out the line required more movement than the original creation of the drawn line. It required cutting twice the length of line since, in order to extract the line from the paper, both edges of the single line needed to be cut. One part of this also involved extracting the oval created by the overlapping section of line.

Although a solution to the problem of extracting the line from the paper was found, the problem of the intersection returned with the instruction to cut the line into sections. Where the line did not overlap it was possible to do so. However, at the point of overlap, there are in effect two moments of the drawn gesture. At this point, to cut

77 Whichever side you begin to cut it and from whatever direction, the line is severed. However, the loop described by the line remains intact.

the line into sections would require alienating either the line drawn first, or the line drawn across it afterwards.

If the supposition raised by the problems incurred in releasing the line from the page support the probability that Ingold did not intend the reader to destroy a page in his book, it follows that he was using the text to engage the reader in imagining the dissection of a line, thus creating a perception. According to Bergson, it is action that inscribes into the present moment the memories that inform perception. In the case of Ingold's text, the matter is the text, and the action is the reading of the text. This then draws in memories of cutting something up. However, it would be fair to further conclude that not many of those reading the book would have a memory of cutting the drawing of a line that loops over itself out of a sheet of paper and therefore would be unlikely to encounter the problems I did when performing this action.

A reason to question whether Ingold intended the reader to take his text literally is the fact that later on the instructions for the next stage of the experiment use the word 'imagine': 'Now imagine that every segment could be wound up like a thread and packed into the confines of a spot located around the midpoint of the original segment' (Ingold, 2007, p.73). This clear change in the instructions, from 'take' (a physical act) to 'imagine', would support my literal reading of the text. The only counter to this would be an argument that the terminology Ingold uses in his description fails to differentiate between acting and imagining.

The second supposition is that Ingold never undertook the experimental actions he describes. This is supported by the premise that if he had, why would he not have described them? This supposition may be considered less watertight because Ingold may have simply decided that these details are not relevant and only serve to distract from the clarity of his thesis. However, since his purpose of deconstructing and reconstructing the line is to illustrate the difference between a lived experience and a

method of its representation, it would be highly questionable to then omit the description of a lived experience. As Ingold's whole book represents his engagement with the subject of the line, the likelihood is that he did not undertake the experiment and thus did not encounter the problems I discovered. If this is correct, and Ingold did not undertake the experiments, it would suggest that his opinion is that, in the context of his book, to imagine an action is as valuable as undertaking it.

From a certain perspective, whether the supposition is right or wrong is not important. The dialogue above, relating to the likelihood of the supposition, is part of a process of analysis of relationships between description and experience. However, Ingold's reply to my question (see Appendix 3), confirming that he did undertake the experiment, demonstrates the way in which different perceptions create different narratives. While he confirms that he had conducted the experiment, he also acknowledges that he used a different line and that this avoided the problems I encountered at the point of intersection. Hence, Ingold confirms my supposition that he did not undertake the specific experiment in question but drew conclusions from a projected version of his own experience. At the same time, the fact that he did undertake an experiment, not on the same line but in accordance with his objectives, also points towards a position that –depending on the context – we could consider that he both did and did not undertake the experiment.

Conclusion

This chapter has examined a line, 'Untitled 01', in the manner of a durée. The chapter's findings are related to the analysis of the GPS trace of a dérive in Lisbon explored through the experience of durée. The trace was examined as a line without discernible qualities with the aim of isolating a quality of inhabiting, within the *virtual*

experience, i.e. that which pertains to perception, and which this thesis proposes exists in the relationship between memory and matter.

Ingold's deconstruction of a line was used as a device to introduce a discussion, inspired by Bergson's theories of perception, particularly his concept of durée, on how both quantitative and qualitative representations can be subject to both realist and idealist interpretations. The critique that Ingold applies to methods of reconstructing the line as a 'network of nodes' is clearly aimed at the GPS tracking and tracing methods used by geographers. The next chapter will describe how the data of GPS, described as quantitative data, is transformed into a line that is qualitative in nature.

Chapter 5: GPS and its Implication

Continuing from the previous chapter's framing of Untitled 01 as a GPS trace, and the use of Tim Ingold's critique of the reconstruction of a line from 'a static network of connectors' (Ingold, 2007, p. 73) this chapter will focus on an individual node. Having already described Untitled 01 as representing a connection between consecutive GPS points in time it follows that the node will be described as a GPS data point.

The aim of the chapter is to discuss what this GPS data point is and how it is produced, demonstrating how a method of marking a point using GPS has implications beyond representing a location in the landscape, by considering its historical context. In doing this, the chapter identifies with the call for a 'Critical GPS' (Propen, 2015) as an extension of 'Critical GIS' (Crampton, 2011; Kwan, 2002).

In section 5.1 the use of GPS in this thesis is defined, within the GNSS context, and its development by the US military. The next section summarises that military history, discussing the three component parts of GPS; space and satellites, control and ground stations, and user and receiver roles. It describes how they are connected and the implications. Section 5.3 is concerned with the quality of GPS and why it was developed. It introduces the Doppler shift and navigational choices moving away from stars and towards satellites. This shift is examined through the lens of Bergson's concept of indeterminacy, which posits that any choices made inform perception, and the notion of 'image' as the representation of perceived qualities. Blassnigg's work on the role of spectatorship (2009), Bogue (2013), and Bamber (2020) are cited to support the use of Bergson's theories to examine the socio-political intent behind the development of GPS, rather than within the context in which Bergson had originally conceived them.

The source of GPS data is reviewed in section 5.4; the Doppler shift and the use of radio waves are considered through the concept of durée and the relationship between

space and time. A review of the development process leads to a summary of the advantages of GPS to its designers. It is accurate, light and cheap and designed for dual use. i.e. controlled participation; where the commercial use of GPS is controlled by its developers, the US military. The next section considers Georeferencing, where absolute points of time and location are cross referenced, as the reason why GPS has been adopted; it provides a 'good enough' level of accuracy.

The chapter concludes with a fundamental question. Is GPS the right tool for community mapping projects in terms of how it defines relationship to landscape? Looking closely at GPS and the associated qualities then raises an inquiry into what qualities are framing a certain perception of a relationship to landscape. The research concurs with the findings of Ingold (see Ch. 4). As it is the data logs of atomic clocks that govern GPS, rather than durée, adding qualitative documentation such as an audio file to a journey trace renders that file part of the absolute data of GPS, where it can be analysed, but is no longer subjective.

5.1 A Network of Nodes

The illustration in figure 11 (below) of a 'network of nodes' is a representation of the GPS data points that informed the construction of Untitled 01 line. In this context, 'the scatter of dots' (Ingold, 2007) represents the documentation of GPS data. Each single dot represents a GPS data point.

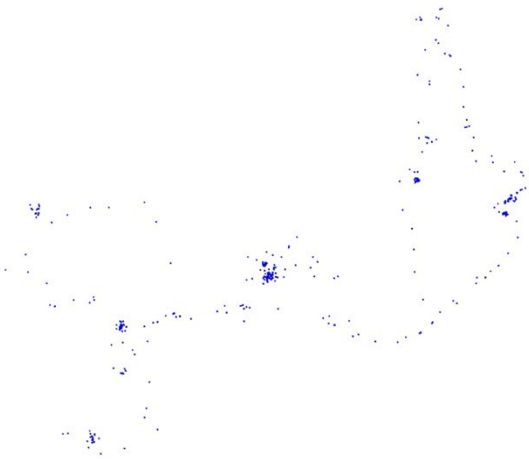

Figure 11: A Network of Nodes (a)

Although each data point is referred to as a GPS (an acronym for Global Positioning System), it would be possible to produce a similar network of nodes using any one of the many global navigation satellite systems (GNSS). A key component of such a navigation system, as the name infers, involves using data beamed from orbiting satellites to identify locations on Earth. Thus, each point in figure 11 represents a particular point on Earth at a particular time. There are currently several GNSS orbiting the earth, developed and owned by different countries or corporations. For example, Russia controls GLONNASS, the European Union, Galileo, and China operates BeiDou ('Global Navigation Satellite Systems,' 2023) Leaving aside discussions as to which GNSS system is better, GPS is simply the acronym for the system developed and controlled by the US. All GNSS systems share the objective of the GPS system: to accurately locate points on Earth and, less widely discussed but equally – if not more – important in today's digitally networked culture, to enable synchronisation to a common factor of time.

There are two reasons why the term GPS is used in this thesis to discuss the data points represented by dots in figure 11. The first is that I used a device, a GPS receiver, integrated into my smart phone and configured to interpret data sent from the GPS system as I wandered around Lisbon, in order to create the data represented in the network of nodes. The second reason is that GPS has become a term that is used more generally by non-specialists to refer to any kind of GNSS data. As such, the acronym has also been adopted in this thesis as a generic term for the data produced by any of the satellite navigation systems. Thus, the next section directly engages with a history of the development of the GPS technology to meet the specific military and commercial concerns of the US government. The military continue to maintain control of GPS satellites and the quality of the data transmitted to GPS receivers.

The way in which this data is produced is informed by the history of the technology, a review of which may give an insight into the perspectives and interests of the people who developed it. It will be argued that these perspectives were influenced by the politics of the Cold War (Guier & Weiffenbach, 1997) and sustained by commercial interests relating back to colonial times. Thus, the history of this technology perhaps gives an indication as to why a certain kind of data is considered to be a useful and objective quantitative measurement, representative of a point in the landscape. The proposition as to why GPS is used informs the subsequent chapter's critique of how a database of GPS data is converted into a representation of a line of movement in the landscape.

This chapter engages with an analysis, not of the movement represented by Untitled 01, but of a position taken in time, represented by a single GPS point amongst a network of nodes. In aiming to demonstrate how a method of marking a point, using GPS, has implications beyond representing a point in the landscape, this chapter will touch on the ideas that underpinned the development of related technologies. It first

gives an overview of the apparatus of GPS and its relationship to the military concerns of the Cold War, and then it focuses on factors influencing how the GPS data point is produced and what it actually consists of. This introduces a wider historical context relating to navigation, including associations with mapping and orientation that relate to qualities of perception. The intention is to unpick or dissect the grip of the dominant narrative disseminated by proponents of GPS by considering the context of its development. Whereas GPS data is described as an absolute coordinate based on quantitative data to locate a position in space and time (Kennedy, 2002, p.3-4), an alternative hypothesis – presented in section 5.3 – suggests that it is, in fact, a method conceived to create points in space and time that support the subjective rather than objective aims of power. In this sense, GPS, as part of a networked society, is complicit in maintaining the military or commercial dominance of certain powerful interests.

However, in using GPS as a generic term in this thesis, even for the sake of brevity, there is the possibility that I could be open to the charge of indirectly sustaining a narrative that is congruent with the aims of US corporations. For example, the US, led by its military and commercial concerns, met considerable rivalry in the form of the Soviet system GLONASS (Bonnor, 2012) to become the world leader in GNSS technologies. Nevertheless, while there are rivalries between the governments controlling these systems, there is also a significant degree of collaboration in combining different countries' GNSS for civilian commercial use. Critical to the success of GPS and its domination of commercial markets has been its accuracy.

5.2 The Apparatus of GNSS and the Cold War

A GNSS system is often described in terms of three segments. According to a US military website ('GPS.gov: GPS Overview,' 2023) the names of the three segments are: Space, Control and User. The same website also describes them in terms of the technologies involved, substituting Space with 'satellites', Control with 'ground stations', and User with 'receiver'.[78] These areas will be discussed in turn.

According to the definition of a 'satellite', the space segment consists of 'a manufactured object or vehicle intended to orbit the earth, the moon, or another celestial body' (Satellite, 2023). In the context of this chapter, the orbit has to be around Earth for the GPS system to work as a global system:[79] any point of the Earth's visible surface needs to be under the radio waves transmitted from at least three satellites, preferably four, at any one time. In order to maintain the level of spread of the GPS system, a configuration of at least twenty-four satellites[80] orbiting the Earth is required.[81] As there are so many satellites in space, they are sometimes referred to, like stars, as a 'constellation'. At the time of writing, the GPS space segment has thirty-one satellites orbiting the Earth at a distance of approximately 20,200 km from its surface ('GPS.gov: Space Segment,' 2023).

The first satellite to successfully obtain an orbit round Earth in space was Sputnik-1, launched by the USSR in 1957 (Bignami, 2007). Detection of Sputnik-1's initial orbit was from radar systems placed around the world (Mellon *et al.*, 2020). In itself Sputnik was not a navigation system; however, as accounts of the history of GPS testify, the satellite's transmission of radio waves and their reception on Earth can be

78 The relationship between these terms and their interchangeability is of interest. The description and history of the technologies draws out the reason why these terms were chosen, and resonates with concerns over how technological language could be seen as part of a wider narrative of power.

79 Certain GNNS systems are in fact not global, as their signals cannot be received everywhere on Earth.

80 In 2020 there were 31 operational satellites in the GPS constellation https://www.gps.gov/support/faq/#sats

81 It is an obvious fact but one worth taking note of that this spatial relationship is reliant on not only the technology encased within the structure of the satellites but also the distance between the satellite and the receivers. This distance – 20,200 km in the case GPS satellites – provides the potential for more of the surface of the earth to be exposed to the range of its signal than if, for example, the technology was grounded. In this context, the distance required relates to the laws of perspective and lines of sight.

accredited as a key turning point in the research and development (R&D) of GPS. Without going into the technical detail here, suffice it to say that if a transmission can be received, the position of a satellite can be calculated. Reversing this theory enables the position of the receiver to also be located.

Any changes are in the orbit of a Satellite are 'carefully monitored by ground stations' (Kennedy, 2002, p.89). If it receives an incorrect signal from a satellite, the control centre can adjust the information broadcast by the satellites to GPS receivers located on Earth, as well as correcting any variance. A station in Colorado, supported by other US military secure ground stations around the world, makes up the control segment of the GPS system. It has two primary functions, one in relation to the orbit of satellites, the other to the quality of the data. Once in space, satellites circumnavigate the earth in a relatively predictable orbit, with degrees of fluctuation. The control station, as well as correcting any variations in the satellites' orbit, is also able to control the level of accuracy of the information received by the 'user segment' or, if required, completely cut off transmission. As such, the ground stations do not simply perform an administrative task but also carry out tactical decisions affecting who the 'user' segment is and how they can participate.

The user segment (Kennedy, 2002, p. 12), also known as the 'receiver',[82] is designed to receive and interpret the radio waves transmitted by the satellites under the control of the GPS system. This 'receiver segment', in terms of the apparatus, consists of a technology that can receive a transmitted radio wave from a GPS satellite and use the signal embedded in it to carry out calculations. Receivers can be integrated into other devices, such as vehicles, and today are small enough to be integrated into far smaller objects attached to animals or indeed plants. The fact that the terms 'user' and 'receiver' are used interchangeably signifies how the carrier of the receiver, the user, is

82 See: https://www.GPS.gov/systems/GPS/space/

integrated into the navigation system. For example, the reasons why civilians have increasingly become participants in the user segment is because GPS receivers are routinely integrated into most smartphones.[83]

Once these three segments are put into action, the factor that connects them is radio waves. The encoded data transmitted in radio waves enables what proponents of GPS would argue to be an objective and precise identification of a position in space and time. In short, the calculation and creation of GPS data.

The development of translating a radio wave transmitted from a satellite into location data began on the evening of 7 October 1957, when two scientists, William H. Guier and George C Weiffenbach, working for the Applied Physics Laboratory (APL) at John Hopkins University in the US, recorded the radio waves being transmitted from Sputnik-1. An article, the 'Genesis of Satellite Navigation' by Guier and Weiffenbach (1997), recalls the effect of Sputnik-1 in relation to the Cold War and their 'surprise that apparently no one had come to the laboratory over the weekend and attempted to receive the signals' (1997, p.15). They describe the relatively simple process for anyone with a 20-MHz receiver to 'listen in' to the radio waves being transmitted by the satellite.[84] In the interests of 'posterity', they decided to record the signal, along with a timestamp.[85] The recording of Sputnik's radio waves began, as they put it, 'with nothing yet specifically in mind'. Yet by applying their knowledge of what was called the Doppler[86] effect,[87] they began to realise they could use these recordings to track the orbit of Sputnik-1 around Earth. By 'quantifying the Doppler data', a method involving

83 The receiver used to create the GPS data visualised as points in the 'network of nodes' in figure 11a was integrated into a smart phone carried by a human body. The common complaint that GPS allows for the tracking individuals is only true because they have chosen to carry a device such as a smart phone that has a GPS receiver integrated into it and have chosen to turn the GPS on. The intention of this somewhat pedantic point is to make clear the difference between the apparatus of the receiver and the voluntary or enforced participation of the user.

84 The radio waves themselves do not emit a sound. This is created by using a beat frequency oscillator.

85 What is clear from the language used in this memoir is that Guier and Weiffenbach's first response was a 'growing excitement about this marvellous achievement of the Russians', revealing a common interest between scientists rather than the competitive struggle for dominance that was funding their research.

86 The 'Doppler effect' is named after Christian Andreas Doppler, a physicist specialising in astronomy, who described in 1842 how calculations of distance between a 'stationary observer and the sound of a moving object, could be applied to observing changes of 'the colour of light from a star' to calculate distances from start in relation to earth. Britannica (2023) 'Christian Doppler | Doppler Effect, Wave Theory, Acoustics', in *Britannica, The Editors of Encyclopaedia*. @britannica. Available at: https://www.britannica.com/biography/Christian-Doppler.).

87 For a good explanation of sound waves, see: https://www.khanacademy.org/science/high-school-physics/x2a2d643227022488:waves/doppler-effect-2/v/introduction-to-the-doppler-effect.

measuring the lapse of time between the waves received, the scientists could calculate the distance between the satellite and the receivers' antennae. Furthermore, they were soon able to 'predict rather well the time of appearance of the signals' (Guier & Weiffenbach, 1997, p.15), and thus where the satellite would be at any given point in time.

A few months later, director of research at APL, Frank McClure, had a 'thunderbolt of an idea' (Qualkinbush, 1997, p.305) that the method of plotting the satellites' position could be applied, with certain adjustments, to a receiver 'with an unknown location, a ship for example' (p.306), determining its position from the radio waves. McClure's interest, while creatively brilliant, was directly motivated by his research for the US Navy on how Polaris submarines, armed with nuclear missiles, could navigate without being detected.

What becomes clear is that while the history of GPS is a consequence of space exploration, beginning with satellites being launched into orbit, it is also directly related to the vested interests of both the US and the USSR in achieving a military advantage during the Cold War. This is borne out by Guier and Weiffenbach's description of the research atmosphere at the laboratory as 'a product... of Cold War' (1997, p.14). Prior to tracking Sputnik-1, Guier and Weiffenbach were initially tasked with discovering how to apply an analysis of sound – 'signal processing' – to a missile defence system against 'enemy planes' that were flying at a low altitude in order to avoid radar systems. Their enthusiasm for applying this research to tracking Sputnik was supported, as evidenced by McClure's intervention, because of its potential military application. It would therefore be justifiable to argue that military dominance in the Cold War[88] rather than an interest in space provided this space-related research with access to funding.

88 While not the opinion of the author, proponents of military expansion argue that military dominance prevents war.

McClure's application of this research, while dedicated to the concerns of military navigation, continued the ancient relationship between navigation and the celestial, a relationship that has advanced the development of related technologies to the point that GPS, although not replacing the human navigator, has nevertheless shifted the human relationship with the light and the positioning of the stars into a technological connection with radio waves and the orbit of satellites. This technological influence has an effect on the way we orientate ourselves. The word 'orientate' is used here in its traditional sense and links to the expansive way Sarah Ahmed uses it throughout her book *Queer Phenomenology* (2006) which considers the many ways we are orientated towards or away from things by all number of things, for example, devices, institutions, race, or sexual orientation.

GPS not only informs navigation but also changes how we document the concerns of our orientation. This is most evident in the contemporary use of GPS to create maps, and perhaps more importantly, in relation to synchronising time. That GPS replaces the human navigator's relationship to the stars is evident; however, the question is what we are orientating ourselves towards through this method of navigation. The following section looks at the implications.

5.3 The Role of Action in Relation to Perception

If navigating is considered as a verb, it can be used to describe an action in relation to a landscape. Depending on the perspective we take, the relationship of action to perception is one where either action is informed by perception or, as Bergson's theories suggest, where action informs perception.[89] If we apply the latter idea, then a method of navigation, considered as an action, at the very least informs a perception of

89 It would be fair to say that in lived experience it is both. However, Bergson explains perception by placing action prior to perceiving. His cone diagram demonstrates how memories then filter down to also inform perception and consequently the different possible actions considered in the zone of indeterminacy.

a landscape. Continuing with the application of Bergson's theory of 'pure perception' – a concept he refers to as 'exist[ing] in theory rather than in fact' (1991, p.34) – what is perceived will be the consequence of one of many possible actions. GPS is one of these potential actions, but its qualities will by default negate those of other methods of navigation.

'Perception is neither illusionary nor subjective. It is simply less than the real. Perception is to the real as the part is to whole' (Guerlac, 2016, p.115). Bergson (uses the term 'pure perception' to describe being 'absorbed in the present and capable, by giving up every form of memory, of obtaining a vision of matter both immediate and instantaneous' (1991, p.34). In other words, a vision that is capable of perceiving every single quality of matter without being limited to only those qualities we are capable of perceiving.

Bergson considers that 'our bodies' actions and needs filter the images that make up the external world, setting up the particular configuration of images we perceive (1991, p.232). In the case of voluntary action, there is always a multitude of possible actions. According to Bergson, when action is voluntary, prior to fixing on an action, there is a 'zone of indetermination' (1991) or 'indeterminacy' (Guerlac, 2016, p.110) while we choose which action to take. This choice will be in relation to the potential consequences of our actions as informed by our memories. Thus, both the consideration of action and the action taken draw down memories into a relationship with matter. As such, this choice and the resulting action frames 'what we consciously perceive' (Guerlac, 2016, p.114).

There are many ways in which to navigate: there is the choice of what material objects to be concerned with and what to orientate towards. Each method negates the actions of the other and their acquired perceptions. In the case of navigating using GPS data, the action could be considered as the choice to engage with the technology.

However, the technology itself encapsulates a movement towards radio waves through the action of tuning receivers, as well as the subsequent action of their interpretation.

Though there is a danger of equating GPS data with perception and confusing an automated code with human perception, but while pure perception 'has nothing to do with representation, actual perception does include representations' (Guerlac, 2016, p.110). The application of Bergson's theories to the viewing of GPS data entails taking the theory out of the context with which it is directly concerned. Bergson's theories of perception relate to living beings and their voluntary actions of free will. The actions of GPS are, overall, involuntary, automated actions, and as such would be considered 'reflexive' and not free. However, Bergson's theories have been convincingly used to engage with the way in which the technologies of the cinema appear to document an objective representation of a moment in time (Bogue, 2013), the role of spectatorship expanding on the qualities perceived to those projected, and indeed how the technologies contribute to an understanding of reality (Blassnigg, 2009).

Shields observed how Bergson's theories of perception and durée have been used to analyse 'the representation of temporality and memory in geographical information systems' (2018, p.329). Reference to Bergson is used for a critique of GIS, the subject of the next chapter, however the concerns here relate to the data captured from GPS which fixes experience to a linear concept of time and space. Counter to Shield's critique is the research in "The Struggle with Memory' a thesis which, all be it from a different position to this research, applies considered reading of Bergson to the socio-political implications of extensive digital online databases, including GIS interface, serving or disserving memory. Bamber considers these not so much as serving knowledge but in terms of their function of holding memory 'serving action in duration', the outcome of which will inform perception (2020, p. 24).

In reverse application of this principle, this chapter considers if not the actions, in relation to memory, that inform perception, but the socio-political intentions informing the development of GPS, thus expanding on the scope on which to base critiques of the technologies driven by GPS data that are used for mapping, documentation and the simulation of space.

If we consider the history of GPS by tracing back, before the launch of Sputnik in 1957, to the theories that informed the knowledge of the contributing scientists and engineers, we see that these were related to the qualities and actions of matter. Take the 'Doppler shift', a theory used to calculate distance through space, which took its name from Christian Doppler (1803-1853) (Britannica, 2023). Doppler first noted the different qualities of colour emanating from stars due to the ripple of light waves and their effect on the perception of colour. All of these elements, the star, the light and the ripple are part of 'this aggregate of images which I call the universe, (Bergson, 1991, p.18).

According to Bergson, the 'image' we perceive is not the universe, but, as mentioned earlier, 'a certain existence which is more than that which the idealist calls a representation but less than that which the realist calls a thing' (Bergson, 1991, p.9). Accordingly, an 'image' could be said to include qualities that are perceived as the result of actions, be they human, mechanical or of natural phenomena. These qualities are what we perceive of matter, and in this respect the GPS data is a representation of perceived qualities. Thus, Doppler's study of stars informs the largely automated system of GPS, which involves the measurements of qualities, replacing the navigator's relational alignment using the quality of light between the horizon and the celestial orbits with radio waves from satellites. The hourglass has been replaced by synchronised clock time and the navigator's quadrant, a tool used to calculate latitude, has been replaced by a receiver.

The relational shift, from starlight to satellite, in itself suggests a change in the potentially related action applied to the 'zone of indeterminacy'. This is because, with each technological 'advance' in a method of navigating, the associated actions will also change. An example would be the literal shift in the position of the body in relation to the technology, which would, according to Bergson, adjust perception. There are different ways of navigating, including wandering, leading to the question of why the qualities of GPS data are considered a desirable method of navigation or – more pertinent to the concerns of this thesis – of documentation.

Before the action of navigation from one point to another comes the action of interpretation. This is where the shift from stars to satellites resides. GPS data in itself is not a human action, it is the representation of an interpretation. The interpretation involves the automated actions of machines that are put into orbit around the Earth. However, the genesis of this automation derived from human action: the technology did not evolve in a vacuum but developed out of human calculations that were both informed by and reinforced a certain perception. This particular 'realist' perception, like any perception that is not 'pure perception', 'involves a kind of limitation or framing of the real according to pragmatic criteria' (Guerlac, 2016, p.115).

According to the proponents of GPS, this 'pragmatic criteria' is an objective quality of location, perceived through measurements and represented as a series of digits. We could draw parallels with Guerlac's synthesis of a Bergsonian view of how we frame the 'image' by converting it 'into something like a code, which accords with scale, reach, and the interests of our action. The rest is edited out' (2017, p.115). Critics of GPS could argue that there are different criteria with which to perceive a location. One of the reasons why GPS is considered is perhaps precisely because factors such as the inhabited experience of a location are omitted from the data under the pretext of objective realism. It is important to note that Bergson wished to bridge this

realist/idealist divide, since any human perception of a location, whether realist or idealist, can result in the other being compromised. For example, a relational subjective experience, such as an autoethnographic mapping practice, can edit out the quantitative measurement – and vice versa. Bergson's 'pure perception' would include both.

The point of this chapter, however, is to understand the quality of GPS and why it was developed, not to negate its usefulness. Rather, by understanding its qualities, we can begin to learn how to incorporate GPS as a tool in the full awareness that we are in turn being incorporated as the 'user segment' of the system, and the potential effect of this.

5.4 What is GPS Data?

Before moving on to a description of the way in which the technology was developed, let us consider how the subject of its 'genesis' contributes to answering the central question of this chapter: what is GPS data? There are many descriptions of GPS data in the literature. Proponents describe it as providing 'more accurate and reliable data' because it is 'not bound by constraints such as line-of-sight visibility' ('GPS.gov: Survey & Mapping Applications,' 2023). Some point towards the military heritage of GPS (Specht, 2012, p. 7). Another describes the value of GPS as answering, 'the simple question "Where am I?"' (Kleppner, 1997, p. 2). This is clearly in relation to measurable and absolute qualities as opposed to information that is qualitative or subjective and relational. This distinction is picked up in a study involving the tracking of children using GPS and mobile phones 'In principle, GPS data are objectively recorded because the technology producing them ascribes no meaning to the data; however, this does not necessarily mean that the data material will produce an objective representation of the children's everyday movements. (Christensen *et al.*, 2011, p.234).

Both proponents and especially critics often, understandably, conflate the technology of GPS with GIS (geographic information system) being that GIS is often the interface representing the GPS data. When Propen's paper 'Critical GPS' (2015) begins to expand on the critical engagement of 'critical GIS', GPS remains framed as the other side of the coin. The objective of this chapter is to frame it in isolation and consider the data all be it in the context of its evolution. Hence, in order to construct a taxonomy of GPS data, we must first set the parameters for an analysis and define the terminology.

If we consider first the word 'data', there is a somewhat confusing conflation of the word with different kinds of information, in terms of both form and quality. Within a research context, the quality of data can be categorised as quantitative or qualitative evidence. These criteria change according to the context, however, and this dualistic division is often regarded as problematic. Quantitative data is generally considered objective because it is based on measurements and deductive reasoning, while qualitative data is subjective because it derives from individual opinions or perceptions. In a political context, the word 'data' is often used to imply an association with information based on fact rather than opinion. This was evident during the Covid 19 pandemic when news headlines such as 'Boris Johnson to focus on 'data, not dates' (Triggle, 2021) demonstrated how the word was being used by government to imply a decision would be arrived at through an objective analysis of evidence, rather than following subjective political concerns, without mentioning what precisely that data was, or which method of analysis was used to arrive at a particular decision. It is worth noting that these decisions had significant implications for citizens' quality of life, and yet the overwhelming majority of (quantitative) data reported in news bulletins consisted of new Covid-19 cases or financial reports on the economy. This is perhaps because the impact of lockdown on qualities of mental health is harder to quantify.

By its association with the abbreviation 'GPS', it is safe to assume that the data under consideration is in a digital form. This needs to be underlined because, in contemporary society, the term 'data' can encompass information presented verbally, inscribed by hand, or captured on audio-visual devices. As such, data can be considered to be both the 'raw material' and the representation of that material, such as the GPS data and its representation as a GPS trace in figure 9 ('Untitled 01') in Chapter 4. An example of an analysis of GPS data being attributed to the representation of GPS data can be found in a paper connecting 'spatial literacy' and children's everyday lives with the use of GPS (Jarvis, Kraftl & Dickie, 2017). The authors state that 'only in somewhat more exceptional studies' have children engaged 'directly in the analysis of GPS data', citing the research of Walker et al. (2009), Cope and Elwood (2009) and Christensen et al. (2011). In the context of this paper, the data being referred to is not actually GPS data but its representation as a 'GPS track' – that which is described in Chapter 4 as a 'GPS trace' or, in Ingold's words, as a line connecting a sequence of nodes. It is interesting to note that Jarvis calls for 'research that more rigorously explores the experiences and, especially, qualitative responses of children themselves to the GPS tracks of their own movements'(2017, p.23).

The research described in this thesis could be used in support of Jarvis' call for more rigorous research in terms of understanding the qualities that underpin these GPS tracks, and by so doing, engage children as participants in an analysis that contrasts their qualitative experience of urban landscapes not simply with the line of the GPS track but also with the structures of the quantitative data informing that line. However, as this thesis seeks to exemplify, any analysis needs to grapple with the technologies, systems and positivist world views that inform the GPS point prior to the interface that creates the line.

An example of 'very basic data analysis' (Allan, 2020, p.240) that questions the separation of data into quantitative or qualitative categories looks at this practice in the context of humanitarian projects using GPS data to identify locations and people in isolated areas. The analysis consists of cross-referencing different quantitative and qualitative data types. The qualitative data includes people feeling ill and the 'remote-mapped shelter imagery'. The qualitative data includes 'population per household' and the location of this 'shelter imagery' which would be located according to GPS data references. Allen describes the critical value of the two types of data, raising a key point pertinent to the concerns of this chapter: that is, 'quantitative data should always be analysed in terms of what qualities they convey'(2012, p. 240). Another example of comparative analysis of the constituents of GPS data can be seen in a paper looking at data gathered from the receivers monitoring 'significant seismic activity'. Here, the analysis refers to 'the ability to process GPS data from hundreds or thousands of receivers every day' (Zumberge *et al.*, 1997, p.5016) – in effect, from a network of nodes.

In contrast to the above example, this chapter is concerned with a single node rather than the comparison of a network of nodes, geolocated using GPS data. This involves the separation of a whole into its component parts, defining GPS data in the context of the technology itself. Technical journals, when describing how GPS signals convey data or when providing names of different formats used to display or share the data – GPX[90] (GPS Exchange Format), for example – differentiate between the quality of GPS from other signals or data sets. Thus, the analysis of GPS described in this chapter began by first dissecting the apparatus from the data and the material forces and qualities that were used to determine the measurements and subsequent calculations. In addition, the process of dissection defined the data as falling into two different

90 A cross-platform file format used to share GPS data, as in Open Street Map, for example.

categories. The first category is the signal[91] transmitting data on radio waves. This conveys instructions from the control segment to the space segment, and the measurements from the space segment to the user segment. The second category comprises the calculations made by the receiver from the measurements of the first category. It is this second category that is used in the context of this thesis as a parameter for GPS data.

At the same time, the GPS data under consideration is a result of the first category, a data of measurements. So, although the first parameter (stated above) provides the focus of analysis, without knowing what informs the calculation (the measurements) there is no qualitative information. There needs to be a context as there is little value in a number if we do not know what the number refers to. This returns us to the principle that 'quantitative data should always be analysed in terms of what qualities they convey' (Allen, 2012, p.240). Herein lies a paradox: while GPS data is presented as quantitative and not qualitative, the measurements are made by assigning qualities to matter. In view of this, the question 'what is the GPS data?' should be rephrased as a question of provenance, such as 'what is the source of the GPS data?'. Thus, this chapter has now traced the question back from 'what informs the node?', through a number of stages, arriving at the question of what informs the measurements. While these measurements may be considered as objective qualities, they are based on the actions of matter and its perceived qualities.

Before moving onto the development of the technological apparatus that transmit, calculate and communicate the information, the theories that informed the measurements in terms of observations of the actions of matter should be considered.

Guir and Weiffenbachs (1997, p. 15), as described in section 5.2, applied the Doppler shift to tracking a satellite's movement. They drew on Doppler's observations

91 The signal is transmitted using different frequencies of radio wave: for example, 'carrier phase (L) and pseudo range (P)' (Zumberge, 1997).

of how the qualities of light waves influence an observed colour spectrum depending on the distance between the ripples of the wave. The ripples, 'similar to a stone thrown into a pond, increase in diameter the further they travel from the centre' (Kennedy, 2002, p.52). In a sense, the wave could be considered as an action influencing the qualities we perceive in matter.

The use of the Doppler effect and the radio wave is sometimes confused with the qualities of sound. A sound, while not a radio wave, is a receiver's way of representing a radio wave. If we apply Bergson's theories on the role of action in relation to matter and its effect on perception to the context of a technological interpretation,[92] we could say that the matter of the radio wave is perceived through the effect of the action of the receiver. Hence, we could interpret it as a visual graphic or sound, or in other words a perception of sound. In this example, the wave has become a perceivable quality of sound, but the question is: has the matter itself changed and, if it has, when did it do so? 'Scientific realism can find no point of contact because it develops matter into homogeneous changes in space, while it contracts perception into unextended sensations within consciousness' (Bergson, 1991, p.70). Did the technology change the matter or did our engagement with the technology simply change our perception? This either-or question is one that Bergson (1991, p.70) refutes: '[W]e can easily see how perception and matter are distinguished, and how they coincide.'

In terms of distinguishing qualities, the matter of a radio wave is not in itself the perception of sound – a sound wave is different. However, the qualities of sound that can be used to measure distance can be applied to a radio wave. For example, if we know about the speed of sound,[93] we can calculate distance via a technology that measures time, like a clock, and a simple equation (Kennedy, 2002, p.52). The equation

92 Bergson's theories are applied here in the knowledge that this was not their intended context.

93 Note that the example uses sound. Although many histories of GPS describe the radio waves as sound, the sound is in fact made by the receivers interpreting the on-off signal of the wave, not by the waves themselves.

is: distance equals the time between sound signals divided by the speed of sound. The component of the signal (in this equation) can be replaced by a radio wave and the speed of the radio wave.[94] Radio waves are faster than sound; hence, the qualities of radio waves are used rather than the quality of sound waves.

We can then combine this equation, which can be adapted according to waves of different qualities, light and sound, with geometry and apply it to reducing the possible positions of a receiver. Once we know the point emitting the wave and have calculated the distance between this point and the receiver by using the equation above, then we can draw a circle with the known point as its centre and the distance as its radius. If drawn on a 2D plane, the possible positions at which the sound was received is reduced to a point somewhere on the line of the circumference (Kennedy, 2002, p. 52). By applying this relationship that encompasses physics and geometry to two fixed points, we can draw the circumference of two circles, and this will reduce the receiver's position to the circles' two intersecting points. In many cases, one of the two points can be disregarded, leaving a single point – for example, if the receiver is placed on a boat at sea, any point on land is clearly not relevant, thus reducing the receiver's location to the remaining point of intersection (2002, p. 53).

Underpinning the calculation of positions is our relationship with space, which is associated with a certain perception of time. In this case, the quality of time is perceived as linear action or movement from one point in 'time' to another. Bergson (2011) describes this way of thinking as associating time and space with a 'homogeneous' quality. He contends that this is contrary to how we experience life, the quality of which he describes as durée, a non-linear experience that does not move from one point in time to another but is an enfolding one, as opposed to the movement studied by engineers

94 The decision to use radio waves rather than sound waves was informed by the fact that radio waves are faster than sound. It is interesting to note that one of the reasons why GPS technology is used in many cases is not only the accuracy of location but the speed. This raises the question, however, of why things must be done at speed and whose interests this serves.

which is ‘a common measure, a common denominator, permitting the comparison of all real movements with each other’ (2011, p. 202). The point of differentiating between these concepts is not to establish one quality of time over the other but to suggest that the measurements are based on a particular perception of time. If durée was applied to this equation, the resulting conclusions would be quite different to those influenced by linear clock time.

Considering the inherited theories that inform GPS in terms of qualities experienced rather than simply measurements and calculations opens up the hypothetical possibility of applying different qualities/criteria to these measurements in order to identify a location. These alternative criteria may not have any bearing on linear time or mechanical movements; they would, however, still be measurements. A potential conclusion to this hypothesis is that the definition of GPS data as objective because it is the result of a quantitative measurement does not give us the whole picture. If we apply Bergson’s theories to this criterion, it could be argued that GPS data negates different perceptions of a location that are not limited to time and space as a homogenous linear experience.

However, as satellite navigation systems are tied to a homogenous perception of time, the apparatus must be synchronised with the same mechanistic quality. This relationship is a fundamental factor in the development of related technologies that are integrated into our ‘networked society’. Since the speed of a radio wave moves at the speed of light (Hurley, 2017) if the system is to work, a network of atomic clocks, accurate to a few billionths of a second per day, is required.

The use of atomic clocks, albeit in different configurations, is a common factor of the two satellite navigation programs, Transit and Program 621B, that are accredited with shaping the technologies of today’s GPS system (Parkinson & Powers, 2010;O'Connor *et al.*, 2019). The first (Transit) was sponsored by the US Navy, and its

main purpose was to pinpoint the position of enemy submarines armed with nuclear missiles. The aim was to develop technological systems on Earth that could calculate and re-calibrate the satellites' positions once in orbit. This was a critical development because it enabled a 'a global network of ground facilities that track the GPS satellites' in order to send commands and data to the constellation as well as monitoring the data they emit.[95]

In 1960 the US launched a satellite, Thor, part of its Transit programme, into the stratosphere. Thor imploded mid-air and some of the pieces fell over Cuban airspace, killing a cow ('Foreign Relations of the United States, 1961-1963, Volume XXV' 2023). In the US, the incident was simply mentioned as an amusing aside; from the Cuban perspective, however, the cow had a name, Rufina, and her death was seen as a calculated demonstration of US aggression and power, prompting angry demonstrations in Havana (Phillipsspecial, 1960) and a protest by Fidel Castro himself. These two different perspectives on the incident illustrate how different stories can be told about the development of a technology. Was Transit simply intended to calculate measurements of space and time for navigational purposes? Looking more closely at the story of Rufina, a more questionable narrative emerges. The fact that the incident is mentioned in the histories of Transit but never really discussed could be said to reveal the intentions that underpinned the system's development. Indeed, Transit was capable of fixing a submarine's position within '10 to 16 minutes of exposure of [its] antenna on the surface'[96] (Powers, 2010a), and it became fully operational for military use in 1964.

Meanwhile, Program 621B was developed by the US air force. This involved a different method of transmitting data between the space, control and user segments. The configuration of four satellites enabled a method of fixing location using trilateration.

95 The difference between the use of satellites and the use of stars as a means of navigation is that, with the latter, the 'data' is not controlled by a 'ground station', and the user is directly in contact with space, armed with nothing more than a knowledge of astronomy.

96 This would now be considered prohibitively long for someone orientating themselves using GPS, but this amount of time was needed for sufficient data to be received from a single satellite, whose position was known, to calculate the submarine's position with an accuracy of 25 metres.

This was adapted from an earlier method whereby the intersection of circles on a 2D plane fixes a point to a 3D space. Trilateration actually works in four dimensions, three of space plus one of time. Project 621B's concept of using 'four in view' (Powers, 2010b) became the bedrock of the GPS design. The system required quick, secure transmission of data from the space segment to the user segment. This encoded signal not only had to fit considerable amounts of data[97] into a moment's transmission, but was tasked with avoiding prohibitively expensive or bulky receivers for the decoding and subsequent calculation of its position. Hence, a team of scientists from different US corporations developed a receiver using a single frequency that would receive the signal from any satellite coming within range. The encoded data carried on the radio waves included the identity of the satellite, its location and the time of its transmission.

Nevertheless, Program 621B applications for further development in August 1973 were declined (Powers, 2010b, p.19) probably due to antagonism between vested interests in the air force and navy. Indeed, while both projects made critical contributions to the development of satellite navigation, their different methods and their rivalry meant that financing the development of one often took place at the expense of the other. To avoid the negative impact of their competition, a new programme, managed as a 'Joint Service Development Program' (Parkinson & Powers, 2010, p.37), amalgamated the strengths of both into what became known as GPS. By incorporating the method of trilateration and the code design of the air force's Project 621B, the new system could maintain the navy's development of atomic clocks, ensuring a highly accurate synchronisation of time, while also developing the apparatus of the receiver to ensure it would be lighter and cheaper. This versatility was not only a concern for the battlefield but also for those who had a commercial interest in developing the technology for civilian use.

97. The data was limited to 50 bits.

Project 621B 'dual use' signal was also adopted so that the 'new system' of GPS could concurrently transmit a coded signal designated for military use (P/Y)[98] alongside a C/A (Coarse/Acquisition) code for civilian use (Kennedy, 2002, p.91). At any point, the C/A code could be cut off while maintaining the flow of data to military devices. This dual use illustrates the two opposing objectives of the GPS system: one to open up civilian access to GPS data and the other to restrict it for the military or paid-up corporations. An alternative way of describing the objectives of dual use is 'controlled participation'.

Initially, this change in navigational methods was developed with the focus on war, in which the ability to navigate, orientate and identify are critical. However, it could be argued that the Cold War was replaced with a battle over who controls the GNSS technologies that societies' infrastructure is increasingly dependent on. Thus, the challenges moved from direct military concerns to commercial ones of affordability and versatility. At the moment, GPS is ahead of any other GNSS system in meeting these challenges.

5.5 Why is GPS Data Used?

The question remains, however, given the many other methods of documentation available, as to why so many participate in this system. One answer is 'the possibility of georeferencing the information produced' (Specht, 2012, p.77), which enables the cross-referencing of databases using location and time as categories. Of course, georeferencing in itself does not provide sufficient reason why GPS is selected over other methods. For example, locations could be categorised according to descriptions of their perceived qualities. However, such descriptions are open to subjective

98. Y stands for the anti-spoofing signal and P for precision.

interpretation, and there could be too much variance between interpretations to enable the construction of a database. Two other methods are described as 'relative' and 'absolute' factors (Kennedy, 2002, p.2). Relative factors locate a subject in relation to other subjects, such as another town or significant site in a landscape and are considered more objective and accurate than a perceived quality because they relate to a form of measurement: a quantity not a quality as an approximation of distance. A relative factor remains open to a degree of interpretation, and as such, is not considered as precise. GPS is considered to be an absolute factor that can be cross-referenced with another example of an absolute factor.

As GPS data is defined as an absolute factor, free of the variance of either individual perception or objective relational points, maintaining its accuracy is a critical concern. The other concern is reliability. These both affect the level of uptake with a particular satellite navigation system. Accuracy is affected by what GPS engineers call the 'dilution of precision' (DOP). This depends on two factors: one is the manual adjustment of the 'control segment' overseen by whoever controls the system (in the case of GPS, the US military); the other is a technical concern dependent on the different technological components and how they interrelate. Because of its technological methods and the scope of its global 24/7 coverage, GPS is considered to have the least DOP, and thus is the most attractive to commercial concerns.

However, as Kennedy (2002) points out, a 'factor of accuracy' will never be exact. Instead, what the user usually wants is a 'good enough' estimation of location, and the definition of 'good enough' will depend on their requirements. For example, the factor of accuracy will vary according to whether the user needs to be alerted to 'the spread of disease' (Specht, 2012, p.90), to identify locations for the management of humanitarian aid, or to navigate a missile to its target. The factor of positive impact on the location in question will also vary depending on perspective. The purpose of this

chapter therefore is not to deny the reality of either the positive or negative impacts of the accuracy of the absolute factors. The intention is, rather, to critically analyse those qualities that are also engaged in these factors, in order to determine whether GPS technology is necessarily the right choice for a participatory mapping project in terms of how it defines the relationship to landscape.

5.6 The Singular as Part of a Network

While this chapter's focus is on a singular GPS point, this point becomes part of a 'network of nodes' when a receiver calculates subsequent signals and different intervals in time. This produces a data log. If there is a change in the absolute factor, calculated by trilateration, an analysis of the data log could conclude that the receiver has moved, or there is an error in the data, or simply a variance in precision (DOP).

Presuming that the change in the data is due to the GPS receiver's movement, it is important to define the movement, whether it is related to the Earth's seismic shifts or to the movement of bodies, and then to calculate it. However, the data does not track the device as it moves across space but takes quantitative measurements of successive moments that are not themselves movements. These moments are not defined by the time of durée but the time of the atomic clock.[99] It is almost as if the system of documentation extracts these points from time and space to create a series of GPS data sets. Because the GPS data includes a quality of time defined as 'absolute' at the point at which it was recorded, an order of consecutive GPS points can be created called a track log, which is represented in figure 11, at the beginning of the chapter, as a 'network of nodes'.

99 There was a critical disagreement between Einstein and Bergson over the relationship to time and the theory of Relativity. It is commonly asserted that during their confrontation Bergson lost to the young physicist. Canales, J. (2005) 'Einstein, Bergson, and the Experiment That Failed: Intellectual Cooperation at the League of Nations'. *MLN*, 120(5). pp 1168-1191.

Aside from tracking movement, GPS data can also be automatically integrated into the digital files of an audio or photographic document created by a device equipped with a GPS receiver. This type of documentation is considered to be qualitative because it portrays more than a measurement, but its digital file has now been 'injected' with an 'absolute factor' of GPS data. The combined effect is that all forms of documentation can be referenced according to a common absolute factor of accuracy which can assist in the data analyses. The emphasis on these absolute factors, devoid of subjective qualities, points to the pertinence of Ingold's critique, mentioned in the Chapter 4, in which he reduces a line to a network of nodes. Figure 11 is a representation of a network of GPS data points, devoid of subjective factors, whose historical military context and contemporary commercial application illustrates Ingold's (2007, p.81) statement that 'imperial powers have sought to occupy the inhabited world, throwing a network of connections across what appears, in their eyes, not a tissue of trails but a blank canvas'. This 'tissue of trails' refers to the experience of 'inhabiting' in and through the landscape – in stark contrast to the elevated perspective of a government-controlled satellite orbiting the Earth. In the case of GPS, the data derives from a source expunged of any subjective quality and laid onto a blank canvas. How these nodes are then used to populate the canvas is a question that will be explored in the next chapter.

Conclusion

An objective of this chapter has been to understand how and why GPS was developed and, in certain cases, the effect of its association with matter. While many accounts of GPS history present the civilian application of the technology as a follow-on to its military purpose, the fact that lobbying and prior development were involved in the civilian application questions this narrative. A hypothesis could be that governments with an objective of maintaining socio-cultural dominance have several tools at their disposal; one is the military's dominance of GPS, the other is commerce and a developing consumer dependency on what is supplied. Both tools; war and commerce have a history linked to the skills of navigation. What was perhaps not fully realised at the outset of its development was how quickly civilian infrastructure would become reliant on a synchronised quality of time maintained by GPS. Considering Bergson's theories on perception, it could be argued that GPS invites a controlled participation in a linear perception of both space and time that negates other perceptions of individual experience.

Although this chapter suggests that the intention behind the technology was to extend and maintain control through widening participation, the aim was not to provide a definitive argument but rather to structure a theoretical framework that considers the technology's role in determining a certain perception of time and space.

Having clarified what qualities are either the inheritance of GPS data or inherent in the material of the data itself, the next chapter focuses on the visual representation of relationships of GPS data points or other data types injected with GPS data. This will highlight discrepancies between GPS data and the qualities of its visual representation using the interface of GIS. In so doing, these two chapters combined further challenge descriptions of GPS and GIS as objective representations of movement.

In terms of the politics of participation, this close investigation of mapping technologies and the resultant theoretical framework aims to contribute to methods for the conscious use of GPS data in participatory arts and mapping practices where actions in relation to matter and resulting perceptions have not been determined. This framework is tested in the final chapter of this thesis which presents an alternative perspective to 'controlled participation' that uses GPS to map durational experience, in the vein of what Debord calls a *détournement* (a hijacking or rerouting).

Chapter 6: The GIS Interface

This chapter moves beyond the single GPS data point, defined in the previous chapter as a coordinate measured according to the absolute factors of time and space, to consider how multiple data points are represented within the interface of the Geographic Information System (GIS). Throughout the 1960's and 70's the development of technologies of GIS, often confused with GPS due to their integration, made substantial progress. A key factor in its development was the need to represent 'human and physical processes' in relation to a landscape or physical environment to create representations of landscape. A leading company in the development of a GIS interface was the Environmental Systems Research Institute (ESRI) founded in 1969 (Crampton, 2010). A critical factor in its success has been its ability to automate the integration and visualisation of relationships between different data sets and types, and to combine both qualitative data, such as audio or photographic documentation and street maps, and quantitative data provided by GPS and archived on a hard drive or live streamed through a computer network. GIS uses the GPS coordinates that document locations in time and space to position subjects in the framework of its interface. Changes of position are automatically updated. GIS is thought to provide access to almost instantaneous, accurate information of who or what is where and when, and as such offers a way of documenting and representing lived experience of a landscape in terms of space and time.

The visualisation of the interrelationship between geolocated data has a multitude of different civilian, commercial and military applications (Council et al., 2006), be it 'modelling the spatial determinants of economic activities, (Goodchild et al., 1995, p.46), delivering humanitarian relief (Specht, 2012), 'establishing security and surveillance' (Crampton, 2003; Pickles, 1995), tracking 'seismic waves created by earthquakes', (Kennedy, 2002, p. 4) targeting missiles (Smith, 1992), town planning

(Wong, Coomes & Raybould, 1991), or arts practices engaging with location (O'Rourke, 2013; Mark, 2005; Rieser, 2011).

There are also many kinds of GIS software, including ArcGIS and OpenStreetMap (OSM), as well as other closely related systems like Google Maps. These systems have helped to integrate the data of GPS into the mapping of our everyday lives, and to 'inform policy formulation and decision-making' (Worrall, 1994; Goodchild *et al.*, 1995). The versatility of GIS has propelled growth in 'geospatial companies' reported as generating '£6 billion in annual turnover' (*UK Geospatial Strategy 2023*, 2023). Esri UK accounts report an annual profit of over 23 million for the year 2021 ('ESRI (UK) LIMITED filing history', 2023).

A familiar output of GIS is the GPS trace, otherwise known as the GPS path, track or route. 'Untitled 01', first introduced in Chapter 4, is one such example of the representation of an individual's everyday movements. The GPS trace is commonly used in car navigation systems and smart phones – for example, the blue line in Google Street Map (GSM) represents where someone has been and indicates where they should go. The GPS trace is placed over a street map to give it a context considered useful for a specific journey. When it comes to navigation, therefore, the GPS trace removes the need to read a map manually, and the GIS interface determines the choice of route, as well as reducing the chances of getting lost. It is worth noting, however, that the chosen route is generally quantitatively assessed as the one that takes the least time, disregarding the journey's experiential qualities, in contrast to the dérive ('urban drifting') of Guy Debord's psychogeography (see p28).

This chapter provides an overview of how GIS software creates this line, and integrates it with other data, in order to establish a foundation for chapter 7, which considers this method of documentation through the lens of a socially engaged arts practice. In 6.1 the GIS interface is critiqued through 'a close study of the process'

(Jukes 2017) of the conversion of GPS data into “Untitled 01”, the line created during the dérive experiment described in chapter 4, laying the ground for Part 3 of this thesis, which begins to engage with the aesthetic considerations of GIS that are brought into focus by arts practice. Questions are asked concerning the framing of the line and how the GPS data becomes such a line. The significance of perspective; when the addition of aesthetic documentation blurs perception of what objective GPS data and the subjective representations of GIS actually are, is discussed, as well as the ensuing implications for community arts practice engaged with participatory mapping.

Critiques of the military genesis of GIS and its dualist background, informed by Marxist-feminist theory, and which argue for the repurposing of the tool, are then described as well as the often indiscriminatory use of the tool by participatory arts practitioners, which is questioned in the light of Elwood and Cope’s 2009 call for a more critical engagement with the integration of qualitative elements within such interfaces.

In section 6.2, besides GIS, with its qualitative attributes, being differentiated from the measurable data of GPS, its own intrinsically quantitative structure, based on a colonial division of the world, is revealed. This introduces the contribution of this thesis to the body of work that critiques GIS; a focus on the aesthetic dimension. Recognition that the use of GIS within arts practice which embraces disruption is still constrained by underlying structures informed the research described in Part 3, and led to the resulting exploration of a solution outlined in chapters 8 and 9. This goes someway to addressing the critical engagement which Elwood and Cope (2009) described as being necessary amongst those who work with mapping qualitative elements within GIS in community arts practices.

The notion of the blank canvas is addressed in the next, brief, section. GIS is recognised as a mark-making tool but one that is restricted by the underlying structure

of the interface, which is delineated around notions of time and space. A close description of the components that together make up the interface highlights what is beneath the mask of the blank canvas. Section 6.4 then goes on to describe the qualitative difference between GPS and GIS. An exposition of the interface's multi layered elements follows a presentation of the diverse arguments provoked by the Cartesian grid that underpins GIS.

6.5 describes how the combination of the technologies of GIS and GPS used in mapping software conflate the qualities of GPS to form a line such as 'Untitled 01', with distinctly different qualities, involving the sequencing of data following Euclid's geometric principles, with the addition of time adding the suggestion of movement but without any qualitative elements. Concurring with Shield's 2016 critique of GIS, the application of Bergson's theory of pure perception is suggested as one possible alternative to the GIS grid, whilst acknowledging that all perceptions are possible, with Bergson's proviso that one perception can perhaps negate other perceptions. Whilst accepting the inevitable constraints around aesthetics, necessarily founded as it is on designers' subjectivity, the enrichment of the quantitative with the qualitative by adding a media file layer as conscious documentation is found to be useful by proponents, just as cross-referencing between the initial layers that go to create the GIS interface provide reliability, connecting it to a particular space. The chapter concludes with a reference to Bratton's notion of stacks (2016) as an analogy to the relationship of the layers of GIS where users may not get the results they hope for due to the constraints of the political bias of the underlying quantitative data.

6.1 The GIS Interface and the GPS Trace

The research experiment described in this part of the thesis was inspired by an unlikely[100] pairing of Debord's search for an objective alternative experience to that of the normative construct of the cityscape with Henri Bergson's theories on perception as a relationship between matter and memory. Thus, I used a GIS interface application on a smartphone to document losing myself in the landscape of Lisbon (a city I had never been to before) while creating a map of the memories that arose while I was wandering its streets. To create a form of psychogeography, I elected to use a GIS application, OpenStreetMap that, unlike Google Maps, provided the option of not having a street map to guide me along predetermined lines. Instead, the experiment began with a blank canvas that I could populate with the documentation of my wanderings by recording my voice on the phone or photographing any objects in the landscape that drew my attention or triggered memories. The content of the qualitative data that I gathered with the intention of documenting a relationship between matter and memory at the time of my wandering is discussed in chapters 8 and 9. The outcome of using the GIS interface on my phone, integrated with a GPS tracker, a camera and an audio recorder, was the line called 'Untitled 01' (fig 9 p. 126), which represented the sequence of GPS data points that traced my wanderings (see Chapter 4).

Lines of this type are often associated with movement, whereas in fact they are a representation of quantitative factors of speed and time. In contrast, data considered to be qualitative – for example, a photograph or an audio recording – are represented within the GIS interface as icons placed along this line. These can be clicked on to reveal data thought to contain or rather represent qualities that have a subjective resonance that cannot be reduced to the coordinate factors of GPS. What this differentiation disavows, however, is the aesthetic, qualitative dimension of the line.

100 I call this 'unlikely' because Debord was highly critical of philosophers whom he considered to be idealists and wedded to the institutions he regarded as maintaining the status quo.

The analysis in this chapter uses 'Untitled 01' as a device with which to critique the GIS interface, laying the ground for chapter 7 of this thesis, which begins to engage with the aesthetic considerations of GIS that are brought into focus by arts practice.

When the research project in Lisbon began, the GIS interface was presented as a blank canvas waiting to be populated by data. If we consider that 'Untitled 01' (within a GIS interface) is not a 'drawn illustration of a path of movement' (see Chapter 4) but a technological construction, the first question of this enquiry is how GIS frames a GPS data point, and the second is how the presentation of GPS data becomes a line. To answer the first question, we must engage with the structures underpinning the 'blank canvas'. Then, for the second question, we must explore the logic of geometry that transforms the quantitative data into a line. Having established how the line is constructed, the questions move onto how the GIS interface frames the line. This demonstrates the wider context of the infrastructure, extending to a system of layers in which the GPS trace overlays the other data. This system can be considered from either a bird's eye view or through magnification and close scrutiny.

Considering these questions from an artistic and autoethnographic perspective points towards the influence of the qualitative parameters of the GIS interface on the documentation and demonstrates how GIS attributes aesthetic qualities to the data. This is borne out by examples of arts practice that use alternative methods of representing GPS data or the interface, as discussed in chapter 7. These observations, however, raise the potential for an aesthetic of representation – designed qualities of a subjective nature – to be conflated with the supposed objective reality that is attributed to the GPS data point.

The intention of this chapter (and the thesis as a whole) is not to undermine claims for the utility of GIS. It is undoubtably useful, for example, in cases of humanitarian disaster relief, where the overlap of quantitative and qualitative data

facilitates a more nuanced and targeted approach to the effective delivery of aid (Allan, 2020), or for the land right claims of indigenous peoples, where the GPS trace documenting participants walking along the boundaries of their territories helps define the extent of their land (Corbett, 2009, p.83). However, it is precisely the fact that GIS is useful that means it needs to be subject to constant scrutiny, particularly because *'space has provided an attractive lexicon [...] the focus for public art and geo art, and a grammar in cultural discourse more broadly' (Smith & Katz., 1993, p.66)*. Examples of often-uncritical forums that use GIS are community arts practices and participatory mapping projects, which employ the technology without considering its influence in determining what is represented. This research draws attention to the inherent qualities of data and how interfaces like GIS can, albeit unintentionally, both represent and negate qualities of the lived experience of landscape. What becomes clear is that the quantitative nature of the GPS documentation, considered by some to be an absolute quality, does not mean that GIS necessarily provides an objective portrayal of the lived experience of space.

Alternatives are suggested in Part 3 where, focusing on a section of 'Untiled 01' and related qualitative data, an analysis and mapping practice does not take the perspective of a geographer but one that is closer to the concerns of 'locative media', an arts practice informed by a Marxist critique of geography and critical theory. Locative media is a term *that refers to 'art that is enabled by [the] technological infrastructure' (O'Rourke, 2013, p.125) which includes GPS and GIS to tie together 'a set of questions, critical perspectives and practices*' with the intention of contributing to a 'civilian awareness and engagement with a particular "operational construct" with military origins' (Galloway, 2008). Although 'Untitled 01' is not intended to be considered a work of art, by employing the lens of arts practice, it is possible to focus on the aesthetic implications of representation in relation to the social-spatial concerns of geography,

drawing on three directly related fields of enquiry: critical GIS, first articulated by Nadine Schuurman in 1999 (Wilson, 2009), participatory GIS and qualitative GIS. Each of these fields will now be considered in turn.

Critical GIS clearly refers to the field of study that critiques GIS. The first wave of critique, informed by Marxist-feminist theory, traced the technology's underlying positivist rationality back to a patriarchal, military origin. This origin is evident in the underlying structure of GIS and its relationship to GPS data, as well as the grid system of longitude and latitude underpinning the layout of what is often considered to be the empty canvas of the interface. These concerns drew attention to the way in which the software's development in 1960 aligned with positivist epistemologies (Elwood & Cope, 2009), initially placing GIS in opposition to qualitative methods of research. The tools for representing the relationship of humans to a landscape steered the documentation towards only that which could be underpinned by the quantitative structure.

The second wave of critique, however, argued that the association of GIS with quantitative data *does not by default imply a reductive,* 'positivist/masculinist connection that was historically constituted' *(Kwan, 2002b, p.648). Kwan cites Geraldine (1989), Victoria Lawson (1995) and Eric Sheppard (, 2001)* as arguing *against a necessary connection between quantitative geography and positivism.* An alternative proposition for a feminist critique was to move towards repurposing the use of GIS, away from claiming universal truths or law-like generalisations about the world and towards illuminating those aspects of everyday life that can be meaningfully depicted using GIS methods.

As critical engagement with GIS progressed, a broader feminist perspective arose that questioned the dualistic thinking behind GIS quantitative frameworks (Kwan, 2002). Using quantitative tools for research gives *'irrefutable scientific authority to GIS*

[and] also silences its non-quantitative functionality' (Pavlovskaya, 2009, p.25). This critique paved the way for qualitative GIS (Elwood and Cope, 2009), which sought to incorporate the interface rather than be contained by it, in order to document and visualise the qualities of lived experience (see below).

However, critical GIS was not the only influence on the development of qualitative GIS. The proliferation of smartphones and applications using GIS interfaces gave rise to the field of participatory GIS (PGIS), which uses the accessibility of the GIS interface to involve people other than professional mapmakers or geographers in mapmaking. Indeed, PGIS has become a tool for the pursuit of social and environmental justice by encouraging the participation of *the excluded or marginalised*. It shares many of the concerns of community arts programmes like Re-Imagine your Town (RIYT), discussed in Chapter 1, and likewise uses a technological apparatus, underpinned by the absolute factors of realism, to represent a landscape and the relationship of the participants to that landscape. But whereas RIYT used the digital interface of games engines and VR, which required machinery beyond the reach of non-specialists, PGIS has the advantage – from an economic and ergonomic perspective – of accessibility, needing only a smart phone to download GIS applications. This brings the creation of '*verifiable maps'* within the reach of the *'citizen mapper'*.[101]

Facilitators of PGIS can use the ease of creating a GPS trace to encourage participation, kickstarting a participatory process. The almost instantaneous result of a GPS dot appearing on the screen of a smart phone, followed by a line emerging as the smart phone's GPS receiver is tracked, provides visible feedback that can be critical in encouraging people to take part. One of the reasons for using a GPS trace as the subject of this analysis is because it is an example of participation in the representation of movement in relation to space in everyday life.

101 A term used for non-professionals who contribute to the making of maps.

The use of the GIS interface for participatory mapping practices, however, raises the question of the power dynamics involved in mapping and the way its epistemologies are formed by the structures underpinning the technology. The questions about who the map is being made for and what purpose it is meant to serve cannot be answered by simply pointing towards who is making the map because how the map is made and what it can document is determined to a significant degree by the apparatus governing the technology. A critique of PGIS, a familiar one in community arts practice, is that any challenge to the status quo *'is inherently limited because it primarily aims to enhance the inclusion and participation of the historically marginalized by working within established frameworks of institutionalized governance in particular places' (Radil & Anderson, 2019, p.195)*. Other critiques of GIS, informed by the politics of participation, speak of how *'PGIS has become de-politicized, operating within, rather than disrupting, existing spheres of political-economic power'* (p.195). A similar concern, albeit directed at a different software, was expressed in Chapter 1 concerning the participatory mapping project RIYT. Also, where methods of participatory or community mapping use a GIS interface, it involves inviting people to share their data. Ethical concerns commonly include the requirement for participants to give their informed consent to their data being shared in this way. 'Informed consent' should mean that participants understand how and where their data is to be used; From my experience community arts and participatory mapping it is sometimes questionable to what degree this is always the case. If an aim of participatory mapping is 'to enhance the political engagement of historically marginalized people and to shape political outcomes through mapping' (Radil, 2019, p.195), it would be reasonable to widen participants' awareness of the historical background of how the data they share is being framed by the technology.

Combining the findings of both critical GIS and participatory GIS qualitative GIS incorporates the concerns of both, focusing instead on a non-dualistic perspective and questioning the claims of GIS to be an objective tool for observation. There are also continued efforts within this field to encourage the integration of qualitative data while maintaining a critical engagement with the interface as a tool (Elwood & Cope, 2009). In fact, it was through using the GIS interface in Lisbon to map the relationship between matter and memory, and reflecting on the outcome, that I was led to develop an alternative interface for the data, as described in Chapter 9.

Matthew Wilson (2009) , in his genealogy of critical engagement with GIS, calls on us to recognise the traces of earlier debates, including insider-outsider ones, that permeate our contemporary projects. As such, qualitative GIS is defined as incorporating, on the one hand, the 'disciplinary strategy' (2009, p.168) of critical GIS – that is, focusing on the technology in ways understood by technologists (Schuurman, 2000) – and, on the other, participatory GIS concerns of accessibility and participation. It is distinguished by what Wilson (2009) describes as its 'techno-positionality', encompassing the stance of the researcher, the context of the research and critiques of the history behind the technology. Qualitative GIS is aware of the contradictions, engaging with *'the machine' (Elwood & Cope, 2009, p.20) on its own terms while simultaneously seeking to create openings for new ways of knowing.*

6.2 A Line between GPS and GIS

The GPS trace or track has become almost synonymous with the GPS data it represents, so much so that conflations occur in research with descriptions of an analysis of GPS data. For example, the paper, 'Spatial literacy with children's geographies' describes participants as having 'been involved directly in the analysis of

GPS data' (Jarvis, Kraftl & Dickie, 2017) when what is *being referred to is its representation by a GIS interface. This section and section 6.4* introduce how the aesthetic qualities of a line, created by a GIS interface, are distinctly different to the absolute measurable qualities of GPS data. This is expanded on in Chapter 7. Raising the question of aesthetics is not to suggest an unrealistic expectation, it is simply to invite producers and facilitators to observe an appropriate vigilance concerning how the interface frames the data. This invitation aligns with the field of qualitative GIS, albeit from an 'aesthetic' perspective. At the same time, it reminds any user, swayed by the inclusion of qualitative attributes, how GIS is fundamentally underscored by a quantitative structure.

Researchers of GIS, who use the technology in field studies and who are thoroughly conversant with the first wave of Marxist-feminist critique, argue that '*the purpose of using GIS in feminist geographic research is not to discover universal truth or law-like generalizations about the world [rather] it aims at illuminating those aspects of everyday life that can be meaningfully depicted using GIS methods' (Kwan, 2002, p. 648*). The suggestion is that by engaging participants in an aesthetic consideration of how the line documenting their lived experience is made, they are able to access a critical understanding of what underpins the method of mapping and subsequent representation of landscape that may or may not negate the fullness of their lived experience. Although 'Untitled 01' represents an individual's data captured on a database (see Chapter 4), critical engagement with the aesthetic qualities of this line and the framework underpinning the representation is relevant to the ethical concerns of community or participatory mapping projects that involve multiple participants. In order to re-engage with the political dimension of participatory GIS both from the techno-perspective of critical GIS and the concern of qualitative GIS, this research suggests

drawing out the aesthetic dimension, which, although a concern of arts practice, has not yet been fully incorporated into critiques of GIS.

The developers of GIS and users of related interfaces have in fact developed methods of integrating a greater variety of qualitative data and alternative modes of representing it in order to widen the pool of participants gathering the data. Although this could be considered a response to the critiques of GIS, it is primarily propelled by commercial considerations. Indeed, the commercial development of the technology, which includes greater integration of qualitative attributes and greater ease of the user interface, are contributory factors in the increase of civilian participation in gathering and sharing documentation of their everyday lives with other users through networked databases such as Google Street View (GSV), as discussed in Chapter 3.

In terms of navigation, the GPS trace is considered useful in that it removes the need to manually read a map or navigate the way to a destination, reducing the chances of getting lost and ending up somewhere else. Of course, its 'usefulness' is defined according to a quantitative factor of the least time taken to make a journey, disregarding potential qualitative experiences. For example, if the objective is to wander, as in a dérive, the aim may be precisely to experience getting lost. In this context, the GPS trace in relation to other data such as a street map maintains a constructed observance of the 'town plan'. And yet, the interface could, if used in a different way, suggest a means of disrupting this observance. Arts practice often uses disruption as a method for both creating artworks and intervening in socio-environmental concerns. However, a criticism of community arts practice is that, despite the belief that widening participation in creative opportunities may have a positive impact (Miessen, 2010; Bishop, 2012), they remain constrained by predetermined criteria, be these societal norms or the structures that underpin the methods they use. While PGIS has been considered as a method for marginalised communities to be given a voice it is argued

that it 'has become de-politicized, operating within, rather than disrupting, existing spheres of political-economic power' (Radil & Anderson, 2019, p.195). Adherents of Debord would argue that any method of insurrection will be incorporated into the 'society of the spectacle' – a term he used for a society where we are watched and willingly submit to or even court being watched.

Artist Simon Weckert furnished us with an example of hacking into this 'spectacle' by pulling along a trolley loaded with 90 smartphones owned by different individuals who had shared their location with Google (Weckert, 2023). This data indicated to Google that there was a traffic jam, and the automation of the GIS interface turned the lines indicating this route to red to signal to those using Google for navigation to avoid it, thus leaving it free of cars. As can be seen in this example, a line can connect – or it can disrupt.

6.3 A Blank Canvas

In the case of 'Untitled 01', the line was formed as part of the research experiment I undertook in Lisbon (see Chapter 4). As stated above, this representation of a relationship to landscape was created using a GIS interface with the option of a white, almost blank canvas rather than a street map. 'Untitled 01' was considered an objective documentation of movement in a landscape because it was a representation of GPS data. This apparently objective line, when seen in association with other data documenting qualitative subjective relationships to the landscape, provides an association with subjective perceptions of lived experience within a realist framework of objectivity.

The current analysis has been informed in part by what feminist theorists would consider to be a *'relationship between geography's visual practices and the masculine desire for and pleasure in looking' (Kwan, 2002, p.648).* Yet, due to its autoethnographic nature, my position in the research is not only as the observer but also as part of the subject or the observed. As such, while any critique of GPS or GIS cannot *ignore the Foucauldian trope of surveillance, t*his analysis does not focus on the aesthetics or architecture of the surveillance of shared data but looks at the way in which the aesthetics of 'Untitled 01' and its framing document subjective experience.

A career in animation and experience in producing participatory arts projects led to my interest in the qualities of the line. As an animator, the narrative was communicated through the shifting movements of the line over a succession of frames. The GIS interface could also be considered a method of mark-making. Like any tool, the technology informs the aesthetic qualities, not only in the textures of the line and its form, but also in its compositional framing. Karen O'Rourke, in her book, *Walking and Mapping: Artists as Cartographers* (2013)*,* describes the GPS trace as qualitatively different from physical traces like paint. Producing a participatory arts project with an application to local government, as discussed in Chapter 1, shifted the objective from facilitating participating residents to creatively engage with ideas for their town's development to framing their 'idealistic' ideas with the apparent 'realism' of technological renderings of a landscape created from quantitative data. As such, the mark-making was not the direct response of the participant to the landscape but one filtered through the technology underpinning the interface.

The term 'interface' is used to describe what lies between the data and the participant viewing the representation of data. Unless otherwise stated, the representation of data using the GIS interface is screen-based, using a computer or smartphone. This type of smooth surface, however, is only one component of the

interface. What is represented on the screen is reliant on software, such as GIS, for an 'operational-technical' relationship with data stored on hard drives. The software can sometimes mask the 'material and technical format that juxtaposes the operational with the representational' (Andersen, 2018, p.18). An example of this masking was given in section 6.1, which described beginning the research experiment in Lisbon 'with a blank canvas that I would populate with the documentation of my wanderings'. This description, suggesting a surface void of qualities, denies the influence of a particular relationship to space, and the technical and ideological infrastructure informing how *'mapmakers take data about the spatial environment and turn it into published maps that inform the spatial thinking and behaviour of map users' (Cook, 2002, p.138).* One method, common to analogue maps, is projection. This involves the conversion of a map documenting locations on a 3D curved surface into a 2D plane, thus distorting the reality of the Earth's surface. To consider an overview of the relationships to space and time that inform this projection a distinction needs to be made between the two different methods of representing space, GPS and GIS, that are integrated into the interface.

6.4 The Distinctions between GIS and GPS

The distinction between GPS and GIS is often overlooked in the layperson's description of navigating interfaces. Examples commonly describe the satellite systems used by GPS (or its alternatives) but fail to mention or acknowledge the influence of the software such as GIS. In so doing, they mask the software's influence on what is made visible to the user and how it is made visible.

To begin considering the distinction between GPS and GIS, it is useful to first acknowledge why they are often conflated. They are similar in that they both use quantitative data and a coordinate system to reference points in space. This is why GIS

is sometimes referred to as *'the Cartesian grid' (*Pavlovskaya, 2006, p.2014). This reference to 17th-century philosopher René Descartes, albeit an oversimplification, is due to his early development of a coordinate system and publication of related equations in 1637 in *La Géométrie* (Charbonneau, 1996).[102] These equations bring together the disciplines of geometry and algebra – both of which are present in GPS and GIS.

These similarities aside, however, while GPS and GIS involve measurements related to Earth and it could be argued that they unite or at least interrelate the disparate qualities in a landscape, the methods by which they respectively arrive at the quantitative data used within a coordinate system is, from a qualitative perspective, significantly different. GPS, as discussed in the previous chapter, uses a method involving satellites to gather quantitative data of distance and time, whereas GIS is oriented around what is arguably the arbitrary selection of the Greenwich meridian. The method of longitude and latitude began to evolve over 2,000 years ago in ancient Greece, *(McPhail, 2011)* where the development of an understanding of geometry in conjunction with *'the notion of a spherical earth' (p.9)* led to the idea of placing horizontal and vertical lines around its form. The resulting grid could then be used to consider the Earth as a whole or in parts, and these measurements could be subsequently transferred to a 2D plane. The decision to orient the measurements of this grid by the Greenwich meridian was agreed at the International Meridian Conference in 1884 by an overwhelming majority of the twenty-six countries invited to attend (Palmer, 2002). Not a single country from the African or Asian continents, with the exception of Japan, was invited to consider an alternative absolute point of reference. And France, having adopted a different meridian that accorded better with its own colonial objectives, chose

102 It is worth pointing out that the evolution of a coordinate system in fact predates Descartes and can be traced back to the Greek mathematician Apollonius in Egypt in the 3rd century BCE. Hoshen, J. (1996) 'The GPS equations and the Problem of Apollonius'. *IEEE Transactions on Aerospace and Electronic Systems*, 32(3). pp 1116-1124. Available at: 10.1109/7.532270.

to abstain. It is this system, with its, at the very least, colonial structure, that the GIS interface adopts for the interrelationships between points on Earth.

It is also interesting to consider GPS, whose coordinates are sometimes referred to as 'absolute measurements', in relation to the concept of 'absolute space', which became popular in the 17th century among both philosophers and scientists. Absolute space could be divided like the Earth into parts while remaining part of an infinite whole. For some, like the polymath Isaac Newton, this absolute quality *was 'the empirical proof of an omnipresent God'* (Smith & Katz, 1993, p.74). It could be argued that this 'omnipresence' encouraged a hierarchical perception of space, justifying the mapping of landscapes according to a colonial appointment of the meridian. 'The placement of the prime meridian is a purely political decision' (Sobel, 1996, p.4) When it became more acceptable, in the 20th century, to question the existence of a god, an opening was created for philosophers like Henri Lefebvre to consider qualities of space not as absolute but as affected by the people who live in it (or indeed by those who maintain power by controlling it through ownership of the satellites that beam down data and the software replicating the symbols of everyday life).

The integration of these two systems (GIS and GPS) that are used in everyday life requires the translation of the data called Geodetic datum (Kennedy, 2002). This transference from one system of measurement to another also means an important shift in qualities. I would argue that GIS contains a subjective aspect, in that the 'blank canvas' is underpinned by a grid that orients the division of the *spherical Earth according to* a colonial perspective. As such, GIS is based on *'some abstract coordinate system such as latitude and longitude. Location may be no more than a zero-dimensional space' (Smith and Katz, 1993, p. 68)*, whereas GPS is based on an absolute system of measurements whose objectivity, from a realist point of view, cannot be denied. Hence, if the conflation of GPS with GIS is left uncorrected, it accredits the

quantitative data of GIS with the objectivity of the quantitative data of GPS and denies the qualitative aspect of GIS underpinning the 'blank canvas' of its interface.

Today, although the omnipresence of God may be disputed, the effects of the relationship between GPS and GIS are instead increasingly omnipresent in our lived experience of everyday life. *As Smith and Katz comment:*

> *Society is implicitly rendered as a mappa mundi, a blank space on to which social locations are projected – a New World of sorts, ready for colonization; identities are located, positioned, elbowed into an already existing social mosaic. (1993, p. 76)*

The part that GIS plays in this politics of space can be seen in the way it frames the data. This depends, in turn, on a way of measuring both space and time that is aligned with a certain (colonial) division of the Earth's surface. As Ahmed puts it 'we know that there are other ways of inhabiting the world (2006, p.13).

Having untangled the conflation of the qualities of GIS and GPS, it is worth noting a possible further confusion. These technologies are often referred to as 'Cartesian' for two distinctly different reasons. As mentioned earlier, the GIS structure has been called *'the Cartesian grid' (Pavlovskaya, 2006, p. 2014),* referring to the fact that the GIS referencing system integrates longitude and latitude with a coordinate system. Although it makes a valid point, this critique fails to acknowledge that the system is not simply a Cartesian grid but an intertwining of two different systems of measurement or division. The first, GPS, has its roots in a military history, as described in Chapter 5; the second, GIS, is oriented according to the colonial perspective of the International Meridian Conference of 1884.

A further critique that labels these technologies as Cartesian argues that a method of mapping that uses quantitative systems of measurement denies embodied experience, reducing it to a documentation of points in space. This argument derives

from an understanding that Descartes' defining statement, 'I think therefore I am', led towards the separation of body and mind and thus initiated a *'dualist ontology [through] which the world is conceptualized' (Hacıgüzeller, 2012, p.251).* Descartes is said to have used the rationality of mathematics to inform his ontological inquiry, making connections between 'separate' points, but as Joseph (Almog, 2005, p. 725) states, *'[r]eal beings do not come as differentiated bare points, on which we may or may not impose structural relations'.* Descartes is also described as progressing related equations *'from ancient pure geometry by according an essential place to the imagination of mechanical instruments' (Molland, 1976, p. 21)*. If viewed in this light, GIS could be considered the 'imagination of the mechanical'. Nevertheless, it is commonly assumed to be a rational instrument that facilitates a realistic representation of lived experience despite reducing qualities of experience to connections between nodes of data.

In order to understand this instrument further another element which may not be visible or obvious to users is described next.

Up to now, when exploring the way in which GIS is presented as a blank canvas waiting to be populated, we have considered it as if it were a single layer; however, the software integrates multiple layers of data that can be switched on or off. Historically, this idea connects the development of GIS to a 19th-century technology called photozincography; a photographic printing method combining multiple plates of visual information into a single image ('GIS: Geographic Information System', 2023). The fact that cartographic methods of production continued to be a concern is demonstrated by the report of a conference in 1944 that was called to decide on the methodology for an atlas of diseases. The report discussed the problems of scale and the distortion that comes with projection and spoke of moving towards a method of mapping that used overlays (Stacey, 2005).

In parallel with advances in technology, 'control over image production shifted from the printer to the cartographer' (Cook, 2002, p.137). In the 1970s, the increasing availability of computer-related technologies meant that (a degree of) of automation superseded these methods and the role of the scribe. The mapping software based on GIS platforms that is currently widely available means that participation in mapping (for example, in Google Maps or the open-source OSM) has shifted to incorporate users' contributions of layers of data to these mapping interfaces. GIS uses a system of assigning data sets to individual layers with differing information that can be projected alone or cross-referenced with other data according to their spatial or temporal relationship. Esri, which developed the first commercially available GIS system, promotes the advantage of layers as a collaborative tool in its promotional material:

> '*GIS gives people the ability to create their own digital map layers to help solve real-world problems [...] creating billions of maps every day to tell stories and reveal patterns, trends, and relationships about everything'* ('History of GIS ', 2021).

The distribution of data on different layers may be of the same type, as in GPS data, or distinct types, including qualitative data such as audio, photographic or video.[103]

However, who is in control of this data and indeed of the intention behind the mapping remains a contentious question, although it is not one that this thesis confronts directly. Rather, this research is concerned with how a certain framing of these layers of data provides the conditions for *'the interconnectedness of metaphor and materiality' (Smith and Katz, 1993, p. 67).*[104] The aim in this chapter is to uncover how a layer of representation thus frames the GPS data point and to discover the perceived and unperceived qualities of the common representation of GPS tracking data as a line.

103 A common factor would be that the information has been archived in a digital form and of a file type that the GIS software can read.

104 Smith is referring to metaphors of language rather than visual metaphors.

6.5 Framing the Line

All three commonly used names for the GPS line – trace, track, path – derive from qualitative associations with an equivalent action. For example, the word 'track' derives from the fact that the position of the GPS receiver can be tracked by following a sequence of data points, as we would a series of footprints. 'Path', on the other hand, usually refers to a sequence of data points that coincide with an already established route.[105] In the context of this thesis, the word 'GPS trace' has been selected because 'to trace' can mean to copy something, or alternatively it can refer to something that is present but 'not always quantitatively determinable' due to its small size ('trace' 2023). (It also means, in line with the intention of this research, to find something out by following a line of enquiry.) Both definitions of trace are relevant to the outcome of the analysis of the qualities of 'Untitled 01' in chapter 4 which concluded that it is not a copy of the qualitative points of data, nor a representation of the qualities of movement as experienced and documented by the sequence of data. However, it could be argued that within the line there is a trace of the GPS point.

We can see how in figure 12 (below) a 'network of nodes' represents or indeed frames a GPS data point.

105 Animators also use the word 'path' to refer to a method used to structure a movement according to a set of coordinates.

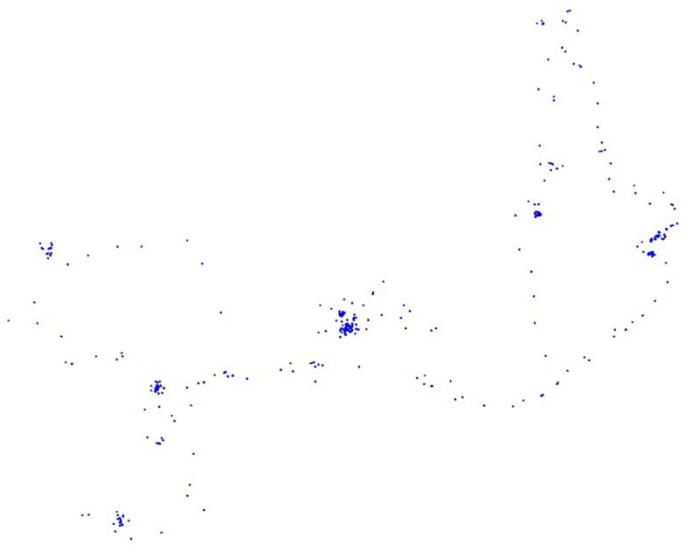

Figure 12: A Network of Nodes (b)

Without a familiarity with the GIS interface and GPS, we might assume that figure 12 is the action of an artist covering the primed warp and weft of a white canvas with a scattering of dots. However, it is in fact an example of a technical process by which the GIS interface automatically adjusts the colour of pixels, in this case blue on an otherwise white background, according to the corresponding coordinates of longitude and latitude embedded within the GPS data on a hard drive. Figure 12, therefore, is a representation of GPS data, collectively known as a 'tracking log', that documented my movements, or more precisely the position of my smart phone, as I wandered around Lisbon.

It is worth noting that a primary distinction between a screen grab and the representation of the GIS interface is that, with the latter, the dots remain individually dependent on corresponding data within the hard drive. As such, at the beginning of my wanderings, there was simply one static dot on the 'blank canvas' of the GIS interface on my smart phone. This represented the GPS data documenting the location of my

smart phone at the moment I activated the software. As the wandering progressed, the number of dots representing the GPS tracking log increased[106] at set intervals.[107] At this stage of creating a representation of the embodied experience of wandering in Lisbon, the network of GPS data simply documented a number of points in time and space. What is missing from this representation is the qualitative aspects of the research experiment, the embodied experience of the journey.

Having seen how GIS frames a GPS data point, the next step to consider is the development of a layer of dots or nodes into a GPS trace, which represents the relationship between them; see figure 13, 'Untitled 01 (b)' below. Now the question is how the presentation of GPS data as a network of nodes becomes a line. The answer lies in the documentation of consecutive GPS data points based on logic that derives from the founder of geometry, Euclid (c 350 BCE), and his five postulates. Euclid's aim was to develop an understanding founded on truths that could be proven. His book, *The Elements*, progressively builds up geometric principles beginning with postulate 1: 'A straight line may be drawn from any point to any other point' (Fisher, 1979). This postulate inspired the work of philosophers such as Descartes and scientists like Newton (Smith and Katz, 1993, p. 74), and is an ideal example of a principle that can be proven in practice (see figure 13, below).

106 The fact that accessing the same GPS data on a hard drive will consistently result in the same configuration is evidence of the consistency of the GIS interface.

107 In the research experiment in Lisbon, the interval between GPS points was set at 1.5 minutes, but there were times when the GPS receiver did not receive a signal, resulting in some drop out, so the average time taken over ten GPS points was every 1.49 minutes.

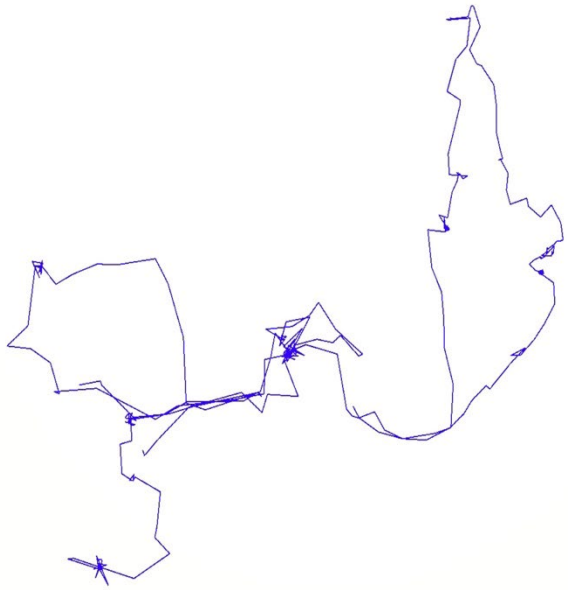

Figure 13: Untitled 01 (b) using © Open Street Map CC-BY-SA

Figure 12, 'A network of nodes', which represents a complete set of GPS tracking data documented over a week, is an example of Euclid's postulate 1, which could be applied to the relationship between any two points. Hence, for the creation of a line such as 'Untitled 01', the GIS software applies an additional parameter: the line should be drawn between a sequential ordering of points. This automated sequence is defined according to clock time. The additional parameter of time is significant because connecting two points together with a line suggests a journey between them; however, although the line does allude to movement, it does not appear to document any of the qualities of movement or thoughts arising experienced on a journey. As Shields points out in his paper *Bergson's GIS* 'While location is innate, experience is a foreign concept to GIS' (2018, p. 317).[108]

108 This application of Bergson's theory to critique GIS is not the only parallel with this thesis. Another is the fact that Shields is an authority on Lefebvre. His adoption of Bergson in relation to a critique of a technology representing space supports this thesis's rapprochement between the theories of Bergson and Lefebvre. It should be noted that within the scope of his paper, Shield's application of Bergson's theory centres only on the concept of durée.

It could be argued that if we use the lens of what Bergson called 'pure perception', in which all perceptions exist, it is indeed possible to consider these quantitative points of time and space, despite their limitations, as part of the experience of movement. However, as Bergson points out, pure perception is an impossibility. 'When we shift from the hypothetical model of Pure Perception to actual perception, then, what we need to consider is not how perception arises, but how it limits itself' (Guerlac, 2006, p.109). Thus, the concern is that, if what we perceive involves negating other possible perceptions, the line's absence of other qualities of movement could contribute to distancing the viewer from a more complex experience.

The lack of representation of the experiential qualities of movement becomes clear if we interrogate the relationship between the etymologies of the two underlying principles of GPS, geometry and algebra, and how these can be applied to the creation of a line between a scattering of disparate nodes. The etymology of 'geometry' (2023) is 'geo' or 'Earth' and 'metry' is 'to measure', while the word algebra (2023) comes from the Arabic '*al-jabr*', meaning 'reunion of broken parts'. The genesis of the line involves a process of measurement that first divides or breaks the Earth up into a grid of intersecting lines, then reunites them through the construction of a GPS trace. Viewed in this way, the GPS trace, reuniting the disparate elements of experience, represents the overbearing concept of a linear relationship to reality and lived experience rather than the quality of durée central to Bergson's theories of perception. An alternative parameter to Euclid's first postulate is explored in Chapter 9, which takes a section of the GPS trace 'Untitled 01' and sequences the data according to the memories that arose in relation to a material object (a letterbox) encountered on this journey in Lisbon.

Aside from the method of sequencing data, another consideration concerning the representation of data is the aesthetic attributes. Unlike the fluidity of a drawn line where, as Paul Klee famously commented, 'a line goes out for a stroll', a GPS trace is

constrained by the 'objectivity' of its coordinates. In this containment parallels can be drawn with Hewish's (2015, p.3) consideration of the translation of Klee 'utterance' in English as 'taking a line for a walk where there is a shift in agency of the line. Within this 'mis-repeating' there is a 'significant (signifying) unease around agency and object; around improvised and determined form; around embodiment and subjectivity' (p.3). To a certain extent this is mirrored in considering how this line represent qualities of a walk without a predetermined destination. One hypothesis, informed by arts practice, is that if the qualities of the GPS data in the field of geography are considered to be quantitative data because they describe points in space and time arrived at through a system of consistent measurement, it would follow that their visual attributes represent nothing more. Of course, any representation of reality will differ from the reality it represents, but to accredit the line with no more than the supposed objectivity of GPS would be to ignore the additional aesthetic qualities defined by the subjectivity of the designer. This point of aesthetics will be expanded on in the next chapter, although an in-depth analysis of the aesthetics of GIS is beyond the scope of this thesis. The point here is to draw attention to the way in which qualities that are implicit in the representation of GPS data by GIS, which can modulate an engagement with the documentation, are in danger of being overlooked or even denied.

Despite the aesthetic attributes, the first two layers of GPS data are generally considered to represent the absolute qualities of measurement, one layer being a representation of changes in position (the 'network of nodes'), overlaid by another layer, in this case 'Untitled 01', which suggests a relationship between these data points. The fact that accessing the same GPS data on any GIS interface will consistently result in the same configuration of nodes or the same form of line is evidence of the consistency of the GIS interface. Proponents of GIS point towards how this results in a reliable cross-referencing of different layers of documentation, enabling the objectivity

of measurements of time and space to underpin a modelling of human and physical processes that is integrated with qualitative data, as the illustrations of the next two layers in figure 14 (the base map of Lisbon overlaid with the GPS trace) and figure 15 (media icons placed along the GPS trace) demonstrate.

Figure 14: 'Untitled 01' Overlying a Street Map of Lisbon. © Open Street Map CC-BY-SA

Figure 14 shows a street map of Lisbon with figure 13, 'Untitled 01', laid over it. The base layer of the map introduces qualitative data: recognisable graphic representations of features like the green of parks, the blue of water and the straight lines of roads between buildings. This demonstrates a shift from a representation of the quantitative data of GPS onto a supposedly blank canvas to an integration with the qualitative data of a street map. This shift is one where lived experience becomes oriented around a subjective representation. In this example, the map is structured around symbols considered important for everyday interactions, such as transport and municipal buildings.

Whereas the first two layers represent quantitative data documented during the week I spent in Lisbon, the map, the base layer, is accessed from connecting to a hard drive from the wider network. This provides a number of options of street maps

designed with different intentions to those of a research experiment engaging with matter and memory. Viewed in this way, the relationship between GPS data and its representation, here 'Untitled 01', is no longer situated within a metaphorical blank canvas but *'assumes a particular space [...] a one-to-one correspondence between representation and represented, such that the outcome – the representation – is considered "accurate" for some specified purpose' (Smith and Katz, 1993, p. 68).*

The next layer overlaid onto the base map comprises icons representing media files, digital photographs, videos and audio recordings, documenting a subjective relationship between matter and memory (figure 15, below). The icons are placed according to the GPS data automatically inserted into the relevant file at the time of documentation.

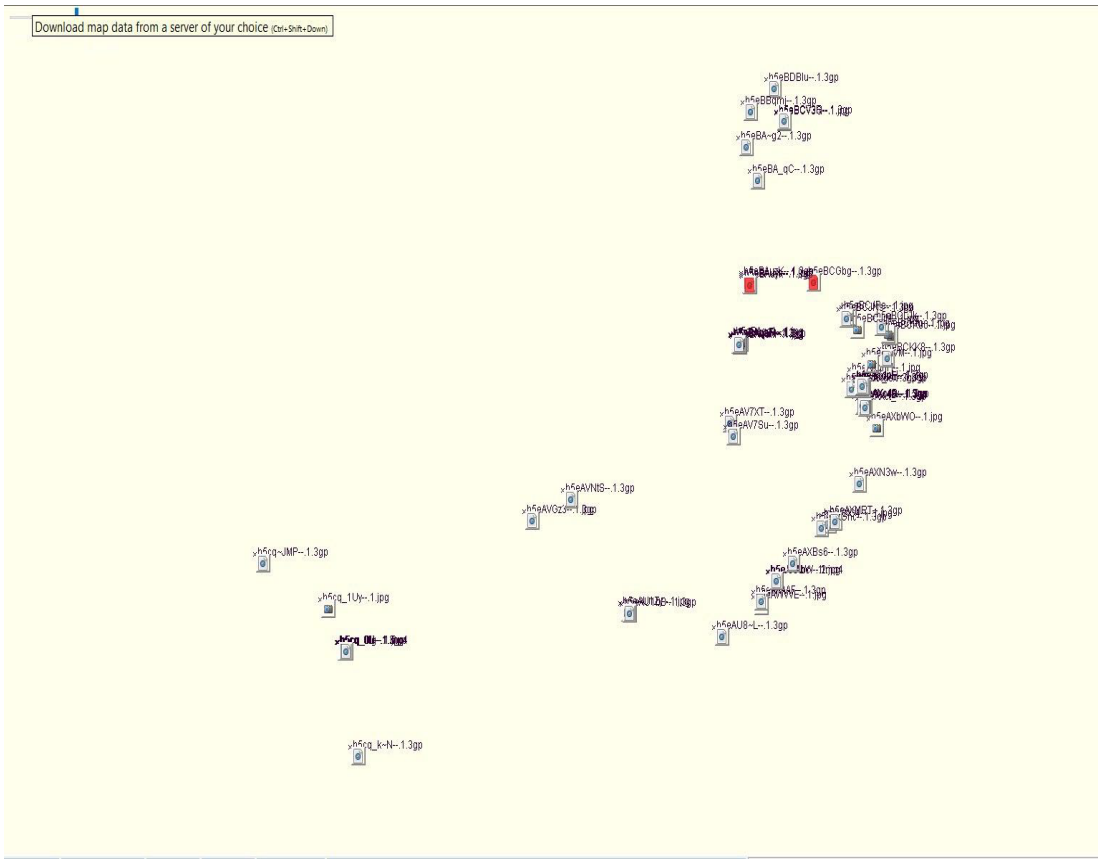

Figure 15: Fig. Media Files Placed Along the GPS Trace. © Open Street Map CC-BY-SA

This layer of media file icons follows the same path as the GPS trace. If the trace is considered to represent quantitative data, to a certain extent these media files could be considered to animate the qualities experienced along this path. This qualitative layer

differs from the base layer in that it represents a conscious act of documentation as opposed to being generated by an automated system. Subsequent chapters, in Part 3, discuss an example of an audio recording and a photograph of a letterbox in relation to the experience of memory. Thus, it could be argued that the combined effect of these layers is to enrich the quantitative factors of space and time represented by the line with a subjective experience of landscape as the line visually locates where and when the media files (the qualitative data) were recorded. This combination, line and media files, can then be contextualised within the base map. Into this layered interface, other data from multiple participants can be integrated, hence its application to Participatory GIS.

Conclusion

In many respects the *'stack', a term coined by Benjamin Bratton to describe 'a new architecture for how we divide up the world into sovereign spaces' (2016, p.xviii),* could be used to describe the relationship between the multiple layers of GIS and its impact on everyday life. The description of the stack as *'at once technical, cultural, and part of a new political reality'* (Andersen, 2018, p. 18) equally applies to GIS. It is made, like the game engine discussed in Chapter 1, of replaceable components, 'so this megastructure is also a platform, and an interface presenting an opportunity for the redesign and replacement of 'the Stack-we-have with a Stack-we-want' (Bratton, 2016, p.xviii). Critics of GIS argue that the absolute factors that are considered quantitative data more often than not determine the position and relationship of qualitative attributes. As such, GIS may contribute to creating the '[s]tack-we-want-the-least' (2016, p. xviii) while GPS could be conceptualised as part of an invisible strata of this stack.

Though GIS undoubtedly provides a tool for research, it is important in terms of this thesis to be aware that the association between the layers of data and GPS is framed

by a particular structure. The purpose of critiquing this structure here is not to totally undermine it but to return attention to the fact that, no matter how much qualitative data is fed into it, the apparatus is structured by a certain perception of landscape that is not as objective as it is often made out to be.

In this chapter it has been found that whereas a GIS interface can seem to be like a blank canvas for marks to be made on, in actual fact it is a place where the marks and associated qualities added to it are limited by a certain relationship to space and time. As such, an aim of this thesis is to raise awareness, amongst artists engaged in participatory mapping, of the conflation of the objectivity associated with GPS data and the subjectivity associated with the qualitative attributes of the GIS interface, which have been structured around, as Ahmed (2006) terms it, colonial perception.

The next chapter introduces Part 3 of this thesis, which expands on the critiques of GIS and develops the idea of the aesthetic considerations of the digital interface through an engagement with arts practices. That is not to say that the line, 'Untitled 01', which will be the subject of the exploration, is being viewed in terms of an arts practice; rather, it uses arts practice to support Shurmann's 'articulation' of the objectives of the field of critical GIS and to *'investigate the inner workings of these systems, to remain responsible to the issues of the technology' (Wilson, 2009, p.159).* The analysis of the qualitative media is adjusted by the experience of the artist, similar to Wilson's (2009) 'techno-positionality', to encompass aesthetics of form and line in relation to lived experience. This strategy builds on the recognised interdisciplinary use of GIS and the way in which the considerations of different disciplines lead to the development of, if not GIS, then a variety of hybrids (Kwan, 2004;Wilson, 2009) for the representation of data – in other words, the creation of bespoke interfaces.

Part 3

Part 3 of this thesis marks a pivotal shift in the focus of the research and its method. The subject moves from an overview of related technologies structured around coordinate systems (GIS and GPS) in Part 2 to a close analysis of specific examples of documentation created while wandering in Lisbon as part of my autoethnographic research. Thus, the thesis explicitly shifts from technical description, history and critique to questions informed by arts practice that are concerned with the expression of subjective experience. If Parts1 and 2 provided an overview of the representation of landscape and human relationships to it, informed by a Bergsonian view of perception, Part 3 delves into specific examples of the documentation of my relationship to a particular landscape. It begins with the extreme magnification of the line representing the dérive in Lisbon in chapter 7, moves on to an absurd analysis of the audio recording I made while walking this line in chapter 8, and progresses towards the final chapter, chapter 9, in which a research experiment, informed by arts practice, uses a diagram as a method by which to analyse the documentation. The outcome is an alternative landscape in which a relationship between two points in space and time – matter and memory – is perceived to link a letterbox in Lisbon with a shed in Cornwall.

Chapter 7: Aesthetics

The previous chapter identified an aspect of the aesthetics of representation which is expanded upon in this short chapter. Following a brief overview of examples of critical artistic engagement with related geospatial technologies, such as GIS and GPS, and different aesthetic forms of representing data, the chapter describes a modest research experiment involving the reframing of 'Untitled 01' (figure 11), documenting a journey in Lisbon, which reveals different aesthetic qualities when placed under magnification. This demonstrates how the apparatus of GIS not only creates the line, a form of mark-making or documentary practice, but also frames its form. As such, GIS influences the aesthetic quality of the line and also how we view it, and both outcomes have implications for the visual representation of the GPS data that documents movement in space.

Those who are involved with the many diverse art practices that use GPS data to inform their aesthetic output, reviewed in section 7.1, drawing on the work of Karen O'Rourke (2003), often hold opposing views as to the extent to which it is determined by its history. There is the opinion that the context of its development does not equate to an 'immutable nature' which means it cannot be extricated from its intellectual origins in positivist theory or its heritage in military (Kwan, 2002, p. 256) and commercial concerns. With regard to the GIS interface, it is argued that 'very different kinds of GIS could have been developed under different socio-political interactions' (p. 648). The aim of critiquing the quantitative and qualitative qualities of a line created by GIS is to create the space for the development of alternative, 'meaningful' methods of either representing the relationships between GPS points or relating the data to this line. Arts practice can initiate and indeed has already inspired critiques relating to the infrastructure such as the film *0º00 Navigation Part I: A Journey Across England, 2009* documenting Simon Faithfull's enacted 'tracing' of the Greenwich Meridian

(Frodsham, 2015, p.119) engaging with 'the paradoxes and absurdities' of this 0º00 line, or the development of different types of interfaces to GIS, examples of which can be seen in Plan B's tufted rugs discussed on page 210.

Section 7.2 introduces the term locative media (O'Rourke, 2013) for the multi-faceted practice which describes artistic exploration of the military originated GPS from a civilian perspective. The imprecise use of the term 'movement' by many artists engaged with this type of practice is noted, although, as is pointed out, the tool can only record places where *it* has been, when housed within a device.

The aesthetic analysis of the line 'Untitled 01' that is then described in section 7.3 could of course be considered as an overly pedantic approach that simply further illustrates the established principle that GIS is a qualitative tool (Crampton, 2009; Elwood & Cope, 2009; Hemment, 2006). However, the intention is to confront any misapprehensions concerning the weight of influence that the underlying quantitative structure of the interface has on representations of experience. As such, it could be argued that GIS provides a false representation of experience. The position of this thesis is that the discourse used to describe the GPS trace infers a meaning, albeit unintentionally, which is not present in the documentation, and through habitual use this can negate the full range of human experience.

7.1 Artistic Representations of the Relationship Between Data Points

The many examples of artists using geospatial technologies to create visual marks demonstrates how the lines that materialise on the computer screen are just one way of visualising information. Karen O'Rourke (2013) cites some pioneering examples, such as Masaki Fujihata's work, *Impressing Velocity (Mount Fuji) 1992-1994*, which demonstrates how GPS data can be represented in sculptural three-

dimensional (3D) form. She also refers to two-dimensional (2D) linear representations, similar to 'Untitled 01', including *My Ghost* (2003) by Jeremy Wood[109], representing the GPS data he used to map his life in London over seventeen years from 2000 (Ferdinand, 2019),[110] as well as *The Choreography of Everyday Life* (2001)[111] by Teri Rueb,[112] who used GPS data for an installation of 'dynamic drawing generated in real-time wirelessly over the internet',[113] or the participatory artwork, *Amsterdam Real Time*, made in 2002 by Esther Polak and 72 residents of the city, who shared the GPS data documenting the journeys they made in Amsterdam over a week (MacDonald, 2018).

These 2D works are sometimes considered to share an aesthetic heritage with the drawn line. This is demonstrated by Wood's use of metaphor to describe his practice as transforming 'his walking body into what he calls a 'geodetic pencil' (Ferdinand, 2019, p.138). However, the way the artists frame the data leads to very different aesthetic outcomes. Wood's *My Ghost* is exhibited as a limited-edition print, whereas Rueb's and Polok's works involve projections that evolve through 'the accumulation of participant points' (O'Rourke, 2013, p.140). With *Amsterdam Real Time*, the visual projection unfolded 'from the paths of people moving through space [and] a map of Amsterdam gradually "drew itself" describing the GPS trace evolving into a line' (p.140). The ways in which artists engage with the additional GPS traces, using the specific qualities of the chosen interface, or how the GPS traces interact with additional data logs are also points of aesthetic presentation. In *Amsterdam Real Time*, frequently travelled points became brighter over time and turned yellow, with the most densely travelled spots accumulating red 'burn marks', indicating the increasing intersection of paths (p.140). With Rueb's *The Choreography of Everyday Life*, each set of GPS data points was printed onto individual sheets of acetate interleaved between stacked panes of glass.

109 For more work by Jeremy Wood see http://www.gpsdrawing.com/info.html

110 The date of the work depends on when the print is made, and the drawing continues.

111 See: http://terirueb.net/the-choreography-of-everyday-movement-2001/

112 Rueb also created *Trace* (1999), a sound art installation that used GPS to trigger audio pieces.

113 See: http://terirueb.net/the-choreography-of-everyday-movement-2001/

Combined, they created a 3D form similar to a display cabinet or the multi-plane used in animation production.

The potential for changing the aesthetic through framing the representation of GPS data as a line is made explicit by Plan B, an artistic partnership between Daniel Belasco Rogers and Sophia New,[114] who began recording everywhere they went 'with a GPS [from] 2003 (Belasco) and 2007 (New), as well as every SMS text message [they sent] each other' (New & Rogers, 2023),[115] Plan B both made, and instructed other participants in the crafting of a series of identically sized tufted wool rugs.[116] Each one followed a strict pattern[117] determined by an interpretation of the GPS data gathered over a number of years by Plan B (New & Belasco Rogers, 2017). This method of 'visualising the information' led to a series of lines but configured in different ways to that of a drawn line: the relationships between GPS data points led not to a line on a surface but a surface made up of black-and-white lines.

Returning to the individual points that make up these lines, the work of Laura Kurgan engages with 'the promise of GPS to give a "definite answer" to the question of orientation in the world today' (Hansen, 2005, p.1211). Her series of works, 'You Are Here', employs the drift of GPS data, a term used for fluctuations of data when recording a fixed position over an extended time, to enquire about our position in time and space. Mark Hansen considers Kurgan's work in relation to Bergson's philosophy. Whilst his paper is critical of Bergson's view of the technology of the clock being 'a spatialisation of time', his intention is to bring is theories of durée into a contemporary reading. To do so, he puts forward the challenge of introducing 'a concept of "originary technicity" into Bergson's thinking, a concept that would inject the technical into the domain of the continuous, a concept that would place technics

114 These artists are not included in O'Rourke's book.

115 At the time of writing, that equals 20 years for Belasco and 16 for New.

116 They worked in the same way as Wood, who created works on paper but plotted them by hand.

117 The warp and weft of the rug base was divided into hours over a period of time. Whenever data was gathered the threaded wool would be black and when there was no data the wool would be white.

neither on the side of consciousness, nor on the side of matter, but rather as their mediation' (Hansen, 2005, p.211)[118]. The question is both an invitation to engage with the value of Bergson's thinking, and points towards how arts practice can be the method of research that engages in the implications of technologies on our lived experience. Hansen uses Kurgan's representation of a 'drift', to introduce how a relationship between satellites in constant motion and GPS, locating a fixed position, touches on qualities of durée. Kurgan comments 'even standing still, we operate at once in a number of overlapping and incommensurable networks, and so in a number of places at once' (2005, p.1212). She further suggests that the data, 'does not simply represent the space it maps; it exceeds, transforms, and re-organizes that space into another space. Not a representation of a space, but a space itself' (p.1215). The implication is that the relationship with these technologies of mapping, is part of a spatial practice with implications beyond the representation.

The objective of referencing these artworks is not to offer a subjective valuation of their quality as 'art'; rather, it is to highlight how an artist's practice, historically engaged with the aesthetics of representation, can shift the analysis through a focus on aesthetic considerations of the implications of these technologies' representations of lived experience. While not all the works identified use the GIS interface, instead using bespoke software or even hand-crafted methods like Plan B, they nevertheless serve to demonstrate that there are alternative methods of visually representing a relationship between GPS points. This leads to the question of which qualities are highlighted and which negated through the aesthetic quality the interface and modes of projection give to the representation.

118 This question whilst using different discourse to this thesis is pertinent to future application of the thesis and points towards fields of for future research.

7.2 Locative Media

A close engagement with the aesthetic qualities of the GPS line and the framing of the interface reinforces the argument that the use of the GIS interface cannot escape and continues to support the structures on which it is founded. O'Rourke (2013) describes the artworks she refers to as 'locative media'; a term that began to be used, as Ben Russell describes, as a 'prototype category'119, explored over a series of Transcultural Mapping (TCM) workshops held across Europe in 2004. Prior to these workshops in 1999, when Google was just a year old, Russel had published the influential 'Headmap Manifesto', considered as 'a polemical, utopian vision of the world as it might have been', (Leorke, 2017). Whilst acknowledging that 'locative media' can be many things, the stated motivation 'was civilian awareness and engagement with a particular 'operational construct' with military origins' (Russell, 2004). An outcome was for this movement to be a catalyst for an overlap of both artists' and academics' concerns (Galloway, 2008).

It could be argued that any mark constructed by using GPS, no matter what the interface, be it GIS or a tufted rug of Plan B, has at the very least traces of the military and commercial interests behind its development. How conscious artists are of these traces and to what extent their work comments on such factors varies from an acknowledgment, as in the work of Wood, to seeking a more provocative détournement, using GPS to produce a subversive message as in Simon Weckert's illusions of traffic jams (2023). The point is that just because an artist creates a representation using a different interface does not negate the effects of the origins of the GPS trace.

119 The coining of the term Locative media has been also attributed to Karlis Kalnins who proposed it in 2003 during the Art. Communication Festival, 16–17 May 2003. Zeffiro, A. (2012) 'Location of One's Own: A Genealogy of Locative Media'. Convergence: The International Journal of Research into New Media Technologies, 18(3). pp 249-266. Available at: 10.1177/1354856512441148. It refers to a virtual medium that is location-based and enabled by mobile technologies such as GPS.

If locative media is a field that is engaged in 'the making of meanings (i.e., discourse)' (Zeffiro, 2012, p. 258), which, in the context of mapping using GPS, means it shares the concerns of critical and qualitative GIS and arts practice, it is striking how the language used in the description of associated work by artists, curators and researchers often implies the qualities of movement. For example: 'Using GPS, the project seeks to render visible our movement through the built environment' (Rueb, 2023), or 'Using a GPS device, Wood created a sequence of plotted movements' (Zeffiro, 2012, p.256). The latter work, although referring to points rather than lines, is considered a representation of movement, nonetheless. Plan B are more precise in their statement, saying instead that they have 'recorded everywhere they go' (New & Rogers, 2023). In so doing, they reference the act of documentation and avoid the trap of inferring movement. Of course, GPS does not literally record everywhere you go, it simply records the absolute coordinates of where the GPS receiver has been.

7.3 Magnification and Perception

The fact that the association of a series of GPS points with a richness of lived experience has entered the vocabulary of even the critically informed user illustrates how a reductive method of documenting everyday life has entered the cultural domain under the veil of language. The concern of this thesis is not the language itself but the effect of this conflation, which negates experience and to some extent determines our perceptions. If artists are critically involved through their aesthetic practices with representing the perception of everyday life, they need to challenge the generalisations, including those obscured in poetic metaphors, by reminding users of the underlying structure of the interface.

The interactivity of the GIS interface facilitates moving between a bird's eye view of the GPS trace presented in its entirety, closing into the line with degrees of limited magnification, and moving the line around within the frame of the computer screen. Interactivity implies action, which, according to Bergson, informs perception. As such, the actions of framing will influence how we perceive the qualities of 'Untitled 01'. Within this action of shifting viewpoints, the framing not only changes aesthetic perceptions of the line but brings in associations with different contexts, with the all-seeing, whilst remaining unseen, qualities of surveillance (Foucault, 1995). In this respect, the bird's eye view of Untitled 01 can relate to 'the history of science tied to militarism, capitalism, colonialism, and male supremacy to distance the knowing subject from everybody and everything in the interests of unfettered power'(Haraway, 1988, p.581). Without denying this history, feminist proponents of GIS do not consider GIS to be limited by 'positivist/masculinist epistemology'(Kwan (2002), but instead perceive it as an opportunity to introduce into the interface qualities of subjective experience. If Haraway's antidote to 'scientific objectivity' is her definition of feminist objectivity 'mean[ing] quite simply situated knowledges' (1988, p.581), then alternative uses of GIS can be argued to be developing precisely that.

However, no matter how much development goes into integrating the qualitative data of the interface that is said to be able to include 'situated knowledges', it continues to constrain the diversity of qualities by limiting what can be represented. This points towards a different conclusion; that GIS is not a quantitative tool as proponents of the technology would have us believe, but a qualitative one (Pavlovskaya, 2009), in terms of what it leaves out. To consolidate this conclusion, this chapter considers the relationship between the objectivity attributed to the line representing quantitative data, and the way the aesthetics of a GPS trace, 'Untitled 01', have been constrained by its GIS framework, as described in the previous chapter.

With this in mind, I ran ‘Untitled 01’ through a number of experiments as part of this research. What became evident was the way the default framing directly affected the aesthetics of the line. On a computer screen, GIS can isolate the analysis to a particular section of the trace by zooming into it. Magnifying a specimen is a traditional form of analysing the components of a material. Under the microscope of a digital zoom, depending on which section is chosen for scrutiny, the representation takes on visual qualities that differ from those of the overall construction. For example, in ‘Untitled 01’, there are certain areas where the line has crossed over itself a number of times, creating denser patches. Viewed at a distance, these areas appear to be filled in, but if we zoom into one of them, it becomes a mesh of shapes.

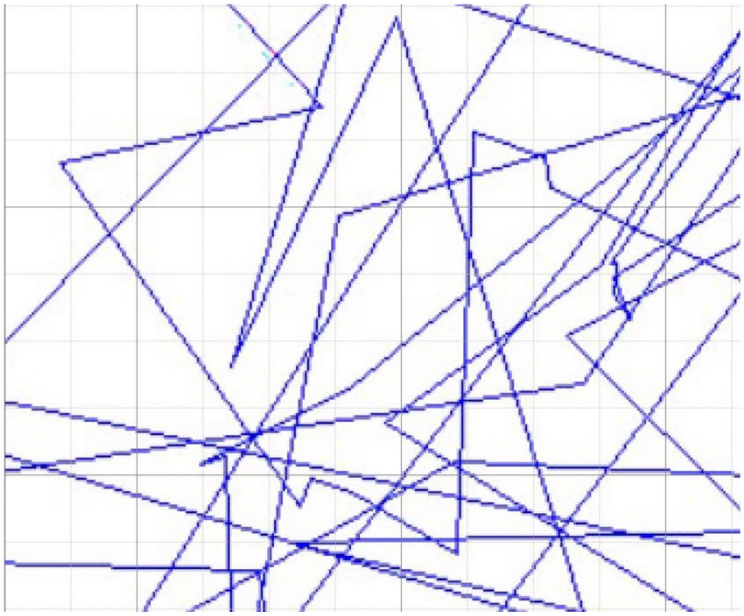

Figure 16: Close-up of Filled-In Area

The combination of these overlapping lines creating a mixture of geometrical shapes, rectangles and triangles on a 2D surface could be considered a practice of design. It illustrates how Euclidian geometry creates ‘a bridge between art and science’ (Kappraff, 2001).

If the viewer is familiar with the rules of perception, the intersection of lines creates the illusion of different surfaces in various positions within a 3D space rather

than on a flat 2D plane. This relationship can create the illusion of 3D geometrical forms or other images: for example, it could appear to be a shard of glass, where the most intense point of the intersecting lines is the point of impact, while the lines travelling from this point to the edge of the frame are larger shards moving outwards.

Whilst there is a degree of chaos in figure 16's intersecting lines the rules informing their trajectory are interesting to compare with Sol LeWitt's 'location drawings, for example, sections of 'Wall drawing 289' ('Drawing Instructions,' 2023)

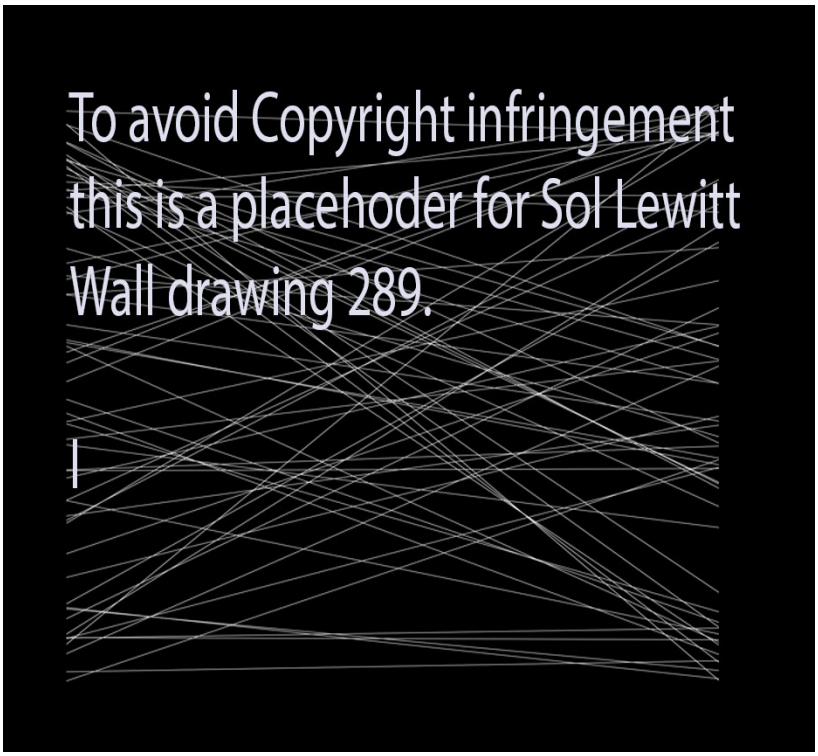

Figure 17: A placeholder for 'Wall drawing 289' Sol LeWitt

These drawings, made by people following Sol LeWitt's instructions, have been associated with how 'a programmer creates a series of steps for a computer to follow' (Armstrong, 2016, p.48) However, within these instructions an important difference is acknowledged in that Sol LeWitt's intends to leave spaces for interpretations of his plan. 'The draftsman perceives the artist's plan, then reorders it to his experience and understanding' (Lewitt, 1971). This has implications on the aesthetic outcomes of the

work which are quite different to the habitual automation of the GIS interface joining points of GPS data together.

These limits of interpretation were also apparent in how the GIS software I used for these research experiments, Java Open Street Map (JOSM), limited the level of magnification. This in itself is indicative of a lack of aesthetic freedom embedded in the software. As JOSM is open-source software, a specialist could overcome this restriction. For the purposes of these experiments, however, I resorted to using other software (Photoshop) with a further level of magnification, 1,280 per cent of the original screengrab, that facilitated a more detailed analysis of the representation of a single GPS point, or rather the apex at which two lines connect at a GPS point.

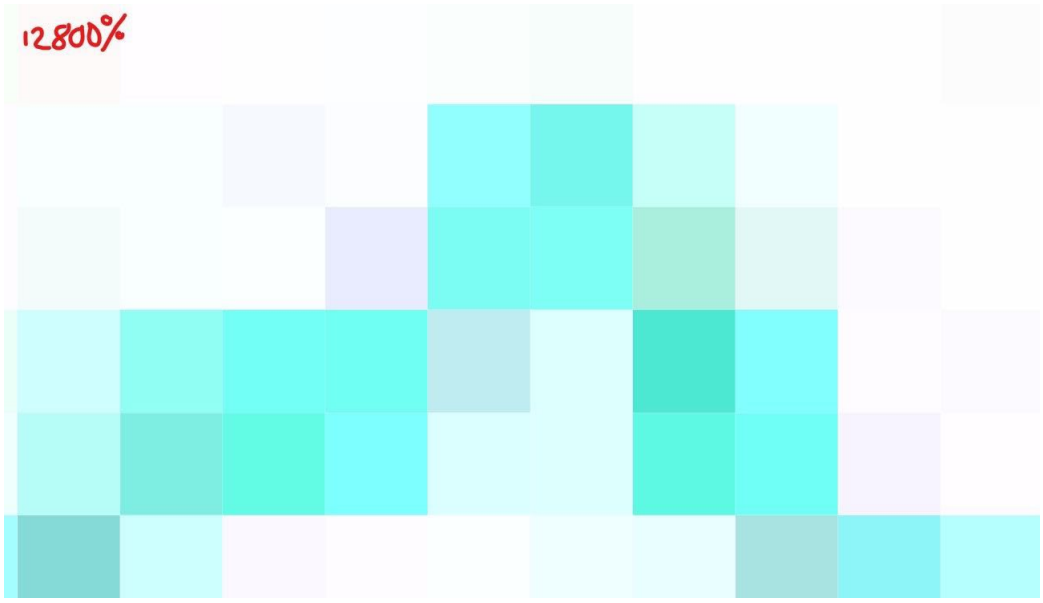

Figure 18: Extreme Magnification Using Photoshop

At an extreme level of magnification, the apex becomes a rectangular cluster of square pixels with a range of different tones of the same colour. Thus, there is no longer a line from A to B, but a number of squares shaded in different tones. These tones are simply the way a computer interface visualises the lines, and the changes in tone have no direct relationship to the representation of the GPS coordinates. The colour is

arbitrary; it is the default quality that occurs through the transference of the data into a line.

Viewing the relationship between GPS points at this extreme level is a different sensory experience to that prescribed by the limited zoom of the GIS interfaces and can be used to illustrate the aesthetic qualitative outcome of the framing of the line. 'Taking a walk' along this line illustrates the difference between the sensory experience of moving my gaze along a thin yet consistent line and moving my gaze along a clustering of adjoining squares in different tones. There are pixels with tones that appear to be part of the line and pixels that do not. When I try to define what the edge of the line is or how many squares create the point of the apex, I simply find it too hard to delineate. If the line's edge is hard to define, however, its centre can be established by running a line down the centre of clusters of toned squares: the tones attributed to the pixels are less blue the more distant they are from central trajectory of the line.

The line, aside from its length and changes in direction, is a consistent quality, whereas the squares not only provide a more complex interrelated form but also a relationship of tonal values that, when combined, create the colour we experience from a distance. This more complex structure proposes greater breadth and could be used to express relationships in terms of time spent in a location, where the detail becomes the focus. An example of this is a method of mapping created by artists Paris Souvenirs, in which the sculptural equivalent of a magnifying glass engages with snow globes placed at equivalent GPS points to the locations visited. The level of magnification adjusts according to how long a person stays at that particular location (O'Rourke, 2013, p. 143).

Conclusion

In this chapter, a review of artists engaged in creating work that uses the technologies of GPS and GIS led to the observation that very often discussions describing lines created with GPS data points unintentionally suggest meaning that this thesis would argue is absent, a framing of reality which, over time, might provoke a negation of the full spectrum of nuances present within the lived experience of a landscape. This observation led to experiments, informed by Bergson's concept of durée as method of research, conducted on the line 'Untitled 01' which opened up a line of enquiry.

If the line in itself is only an interpretation of the connection between points, this raises a number of questions: Why does it have to be straight? What does the straight line imply and what does it leave out? These questions inspired the thought experiment described in Chapter 9, in which the line is formed by connecting pins on a pinboard using a spool of golden thread. The analogue and kinaesthetic nature of this interface and the necessary kinetic interaction creates not only a different aesthetic but a different relationship to the documentation. The intention of this thesis is to offer a basis for the further development of a bespoke interface, drawing on the qualities of a line. The line could act as a mnemonic indicating a habitual action, or it could be engaged with critically and as such provide a method of maintaining agency when perceiving the 'absolute' qualities of the GPS reference point coordinates relating to time and space, and linking them with the qualitative attributes of form, line and framing; attributes which are all familiar to artists.

If this chapter, by zooming in to the aesthetic representation of objective data (a line of pixels), has served to undermine the apparent objectivity associated with the quantitative data of GPS, the next chapter applies a similar magnification to an example of data types considered to be qualitative; an audio recording (or media file) associated

with the GPS trace ‘Untitled 01’. Just as ‘Untitled 01’ was magnified as pixel cubes to reveal its aesthetic qualities, so the audio data is magnified until it becomes single words in order to undermine assumptions about the qualities present within the data.

Chapter 8: Absurd Coding

This chapter presents an analysis of qualitative data, focusing on the transcription of a set of audio files made during project 2, 'Matter and Memory in Lisbon' and the subsequent creation of a taxonomy that could be applied to the transcription. A set of categories was devised, using key terms from Bergson's theories of perception, that would allow every word in the transcript to be encoded. It was found that what became in effect a process of absurd deconstruction opened the way for the reconstruction of the data in a different form.

The reason behind this 'absurd' experiment was to build on the engagement of previous chapters with the qualities of data in order to further understand the problem of documentation and representation. Chapter 7 undertook an analysis of the GPS trace, using 'Untitled 01' as an example, within a GIS interface, and found that although a trace is considered an objective record of movement in a landscape, its representation contains qualitative aspects. This chapter, in contrast, looks closely at qualities of a data type considered to have subjective associations with a landscape. While earlier chapters presented an overview of the technologies of geolocation and the creation of quantitative data so as to understand the qualities of that data, this chapter describes an investigation into the qualities, or indeed lack of qualities, that are documented in an audio recording.

The first part of the chapter describes the development of an absurd, imperfect method[120] of analysing audio data and the deconstruction of the transcript down to each single word. Section 8.1 provides the context of the recording and the transcript, whilst acknowledging that a transcript is in fact a form of representation. In the next section, an overview which describes the coding experiment of deconstructing the transcript is provided. It will be seen that a top-down and bottom-up approach (Gibson & Brown,

120 The method is being described as imperfect because while effective it remains to be developed post-submission.

2009, p. 25) was adopted, using Bergson's theories to classify the qualities to be found within the transcript of the recording, once separated from the memory, according to coding methodology from the social sciences (Skjott Linneberg & Korsgaard, 2019; Saldana, 2021).

Section 8.4 describes the progression of the method of analysis through many stages according to a system of coding which draws on Bergson's theories of perception. The analysis included highlighting text according to a Bergsonian framework, differentiating fragments of text between time and matter, annotating text that could be associated with Bergson's theories of perception in order to form categories, coding individual words under the category headings and further assigning codes to distinguish between qualities displayed by items with a particular category. The coding matrix is introduced in 8.5 where the absurd nature of deconstructing the transcript is discussed, citing similar practices in surrealism and text interpretation.

The second part of the chapter (sections 8.6 – 8.11) contains a step by step evaluation of the taxonomy and categorisation of words in the transcript. This is undertaken by revisiting the categories in relation to Bergson's definition of terms and introduces other, related ideas relevant to the context of the research (Ahmed, 2006; Cachão, 2015; Lefebvre, 1991). The outcomes contribute to the wider critique of the related apparatus of representation and claims about the qualities of data, be it objective or subjective. In terms of the overall narrative of the thesis, this chapter could be regarded as a stepping stone to the diagram of a letterbox, described in the final chapter, which points towards an alternative apparatus of representation.

The reason why this particular data file was chosen was due to its relationship to the letterbox, which could be credited with initiating my autoethnographic methods of research. It was the qualities of the associated memories, that held a particular personal

significance, that informed , through a relationship with this object of matter, an almost intimate perception of a lived experience within a landscape I had never been to before.

In addition, I have included the photograph, figure 19 (below), a close-up of the letterbox, because I used it during the analysis to cross reference the qualities documented in the audio transcript and because it could provide the reader with a reference point. A rudimentary analysis of the photographic data is available in Appendix 6. It was not subject to the same depth of analysis as the audio transcription, not because of any assigned hierarchy of value between data types, but simply because it would involve research beyond the scope and time limitations of this thesis.

Figure 19: Photograph of a Letterbox in Lisbon

The purpose of the analysis was to investigate the contribution the audio data made to the portfolio of documentation gathered in Lisbon[121], evaluating its qualities. The aim of ascribing a value immediately raises the question of criteria, particularly given that different contexts for the presentation of the documentation would potentially

121 i.e. photographic data, GPS data and audio transcription

change the value. For example, in the context of participatory mapping, the data is gathered by participants of an identified community, sometimes shared amongst the community for consideration, and subsequently analysed and reflected on. Although a criterion of participation is that those involved in the gathering of data should also be involved in its analysis (a principle that I as a participant-researcher share), there are many cases in which the analysis is undertaken by a 'specialist' brought in from outside the community. This partial approach to participation begs the question of what qualities the data might convey independently of the knowledge of the participants who gathered it.

An immediate outcome of simply posing this question was that it drew attention to the qualities that were absent from the documentation. The data became an illustration of Bergson's theory that what we perceive is at the expense of ('negates') all other potential perceptions. In this case, the potential perception of anyone engaging with the data, aside from myself, would necessarily negate the effect of my memories in relation to the material object (the text).

8.1 The Recording and Transcription

I accessed the recording from which the transcript was made using the Open Street Map (OSM) application. This interface enables the user to take geolocated audio notes and photos and make videos. This meant that I knew the recording would be linked to its approximate geolocation and once completed, would be accessible on a digital map.

Unlike the chapter on GPS data (Chapter 5), which analysed the history of the technology and the inherent qualities of GPS data, this chapter does not examine the apparatus that was used to record the audio-visual documentation. It begins by

transcribing audio-visual data accessed using a computer interface, ignoring the influence of the apparatus on perception. This is not to deny its influence on either the process of documentation or the subsequent representation of the perceived qualities of the data, it is simply the point at which the process of analysis began.

While the analysis focuses on the audio transcription, it also considers a number of elements the transcription shares with other data. For example, I made the decision to document the letterbox (*correio*) and to use the same smart phone, incorporating both a digital sound recording application and a camera, to create the data. Included in the smart phone's hybrid technologies was a GPS receiver, providing both sets of data, audio and visual, with GPS data (as discussed in Chapter 5). The GPS data was an essential part of all three data files. It was automatically integrated into audio and photographic data and presented over a street map of the location in question (figure 20), enabled by the GIS interface.

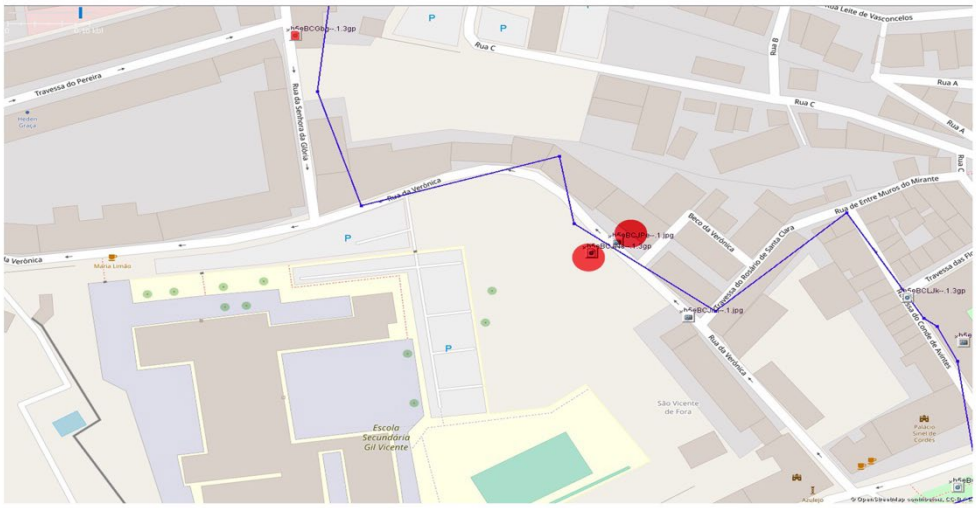

Figure 20: A Street Map of the Location. . © Open Street Map CC-BY-SA

Before coding, the audio data was transcribed into a word document. The fact that a transcript is not in itself the audio data but a 'form of representation' (Gibson &

Brown, 2009, p.109) is a problematic consequence of the need to identify and isolate aspects of the recording for the analysis.[122] There is a recognition in social research that transcription is an essential tool for analysing social phenomena as it enables the researcher to explore the social problems captured by the data. One of the central questions, however, is whether or how the data documents the relationship between matter and memory. The act of transcribing immediately confronts the researcher with the problem of perception. If we consider the transcription as an action and acknowledge that before we begin transcribing a number of potential transcriptions – each with different qualities – will exist, the method we go on to select for our analysis will necessarily then negate all these other qualities that have been documented but not transcribed[123]. Thus, at the point of transcription, there is a danger of the analytical process turning in on itself before it has even begun.

In this case, a justification for opting for a transcription of only spoken words was the use of OSM – a GIS interface discussed in Chapter 6 – to record my thoughts while walking, knowing that this would automatically be referenced to GPS data. As such, the transcription could be considered as a documentation of my conscious thoughts while walking. The productive relationship between thinking and walking was recognised as early as Aristotle's school of philosophy: the term *peripatos* referred to a covered walk, where Aristotle's pupils conducted conversations and philosophical debates as they walked up and down (Macauley, 2000, p.20). Later the philosopher Nietzsche wrote, 'only thoughts that come by walking have any value' (Nietzsche, 1997 [1889], p.10). For Guy Debord in the 1960's this included dérives, wandering under the influence of drink, drugs and fatigue. In relation to the latter, aside from bypassing the need to stop walking to make a note, another advantage of recording

122 In terms of an assessment of the value of the data, the scope of this chapter does not speculate on what might have occurred if a better recording device had been used. One transcription, included in Appendix 5, did begin to identify not just the spoken word but additional sounds. These contribute another level of documentation in terms of triggering memory and as points of reference from which locations could be identified – for example, the sound of a moped engine and its particular resonance indicates the proximity of the recording device to a street.

123 Parallels of this negation of qualities not transcribed has parallels with Bergson's theories of perception being determined by actions.

thoughts is that being too drunk to write usually occurs before being too drunk to talk. I hasten to add, however, that this was not the case when making this particular recording.

8.2 Experiments in Coding

The transcription of the audio recording of my encounter with the letterbox during my walk in Lisbon reads as follows:

'So, I saw this letterbox or *correio*.[124] I walked past it and then I thought, "wait a minute, I would like to go back to that", and wondered why? I felt quite a strong pull and thought it's probably to do with my dad's letter that I have got with me on this journey. Written by Kenneth to my mother; no, yes, no, to my grandmother, from Kenneth to my grandmother about my mother being with Serge. And it was just after his accident. And it talks about his mental health, and I haven't actually looked at the letter yet, but I took it with me to read because I want to and was waiting for the right time' (Brodskis 2018).

This section provides an overview of a series of experiments that apply Bergson's ideas to a classification of qualities identified in the transcription of the audio data (above). While the analysis considers the qualities of words within a sequence of a sentences, it is not informed by literary theory. Instead, in order to analyse the qualities of the data, methods of social sciences were considered (Skjott Linneberg & Korsgaard, 2019; Saldana, 2021) to develop a system of coding – the term 'coding', in this context, refers to a classification system that develops over a number of stages.[125] In essence, the

124 Someone not familiar with the documentation would not immediately identify the connection between the word 'correio' (mail or post) and the letterbox – the spelling of which I only knew because I looked at the photograph.

125 In another, related context (i.e., the digital technology used to document the data), 'coding' refers to the language used by the technological apparatus to interact with and represent the data. This parallel meaning is of interest because a loose criterion for judging the effectiveness of associated codes was whether they would provide a computer with enough information to interpret the data.

first objective was to understand the construction of the transcript in terms of its components.

Social research combines 'top-down' theoretical approaches (described as 'preformulated theoretical and conceptual schema') and 'bottom-up' approaches (defined as 'generating and clarifying concepts through the analysis of data' (Gibson & Brown, 2009, p.25). In this context, Bergson's theories on perception could be considered as a top-down approach since they comprise a set of pre-designed ideas set within a conceptual framework. In this analysis, however, this is combined with a bottom-up approach – an interpretation of the data – which generates a system for defining the data's contribution to the context of the documentation and clarifying how to apply a reading of Bergson's top-down theory to this task.

Firstly, this required identifying the terms Bergson used to describe the process of perception to see how they could fit with the transcription breakdown. Bergson's *Matter and Memory* (1991) is a progressive account of the perceptual process. It begins with the subject of the title, and then proceeds to engage with the complexities of factors, such as action, space and time, that influence perception. The development of an analytical framework for the above transcription follows suit, beginning with the identification of chunks of the transcription under the two terms, 'matter' and 'memory' (stage 1), then progressively adding layers of complexity to the categories of classification (stage 2 through to stage 5).

Using a reading of Bergson's theories as a lens an ad hoc process began to evolve into a method over a number of stages [126]. Each stage's post hoc reflection on outcomes identified objectives for the next stage. This included attempting to separate the qualities of the data from the influence of memory: a fool's errand, since to negate the influence of our individual memories on how we perceive is akin to Bergson's

126 While the analysis of this audio data was not consciously structured around an established framework, it has subsequently been associated with methods used in social research for the analysis of qualitative data.

virtual concept of 'pure perception'. It appears that pure perception is impossible because it includes all that is potentially perceived prior to the negating effect of action when memory 'adds subjectivity to our experience of qualities' (Guerlac, 2006, p.166).

Subsequent stages progressed towards a method of attempting to separate qualities attributed to the data by the perceiver from qualities actually present in the data[127] that would have a common meaning for different people living within a similar cultural context, with no additional information required. The aim of the stages was to

- isolate the data from the memories of the participant.
- identify what was absent from the documentation once isolated.

A key objective was to devise a framework for categorising the audio data that would identify what qualities the transcription contained

- if the data was isolated from the memories of the participant.
- if it was of shared significance for different people living within a similar cultural context.
- if it was broken down and separated from other elements.

This objective progressed in stages, deconstructing the transcription from paragraphs down to individual words. I devised this method in the recognition that by isolating elements and identifying which of them did not have a shared value, I could ascertain what further association with memories, as yet undocumented, was required. This aspect informed the final chapter of the thesis, 'Diagram of a Letterbox'.

If a certain bias is therefore an acceptable factor, a counter to the criticism of the fact that the participant-researcher (myself) is also involved in the analysis could simply be: why should the bias of the participant not be included within a participatory mapping practice? Indeed, in contemporary ethnographic research methods, the act of

127 Although the analysis was achieved through a manual process of entering data into a spreadsheet, the premise was to imagine what instructions a technology such as a computer would need to automatically categorise words within the transcript.

coding data from transcripts is not done ‘by some distant and “removed” ethnographer’ but, as in an example of a participatory mapping project, is *their work*. the participants are considered to be ‘co-developers’ of the map with the ‘transcription and coding of data being a mutually inclusive activity' (Williamson & Connolly, 2009, p.107). Participation does not end at the point of gathering the documentation but continues through to its interpretation and representation.

Within a Bergsonian framework, any truly objective analysis of matter, independent of the effects of memory, would be an experience of what he terms ‘pure perception’ (Bergson, 1991, p.34).[128] Pure perception is a concept in which all potential perceptions of matter are present at the same time. According to Bergson, human perception is a process of negating all other potential perceptions to the point where a defined perception can be associated with the subject. Thus, pure perception is an unattainable experience, due to the influence of our memories on what we perceive of matter. This raises an observation that the first objective of the analysis is based on a false premise because it could be argued that any objective point of view, other than a criterion of shared understanding, is an impossible concept. In terms of the analysis of the data, I was interested in ascertaining what the qualities of an object of data were if they were isolated from states of mind, yet at the same time I accepted that states of mind would influence the perception of these qualities.

128 See also Chapter 4.

8.3 Assigning a Category

Interpretation plays a large role in assigning categories, which raises the question of who is in control of the interpretation and classification. If the data was to be situated independently of memory, it could be categorised as a form of matter. However, according to a reading of Bergson, any perception of matter is informed by memory, and the influence of memory will inevitably involve bias. If the presence of bias is unavoidable, then the further question arose of which bias should inform the coding.

From the point of view of objectivity, the fact that the person who undertook the documentation (myself as participant-researcher) was also the person undertaking the analysis could be considered to diminish the objectivity of the coding, due to the bias of my subjective lived experience. However, for the purposes of this research, the bias was considered not only unavoidable but in fact appropriate, since the autoethnographic research methods accorded with the ethnographic research methods involving GIS interfaces that use a 'grounded theory approach' (Knigge & Cope, 2006).[129] A GIS interface was used for recording the audio data, following which the data appeared as a media icon alongside the GPS trace. A key principle in grounded theory, however, is the need for the researcher to be transparent as to their role across all stages of the research up to presenting the findings (Knigge & Cope, 2006, p. 2026), including acknowledging bias. In this case, my memories of the moment when the data was gathered might hinder an objective evaluation of qualities associated with the data. However this bias also serves to inform what qualities are lacking in terms of documenting lived experience.

In addition, when applying research to participatory mapping, it is argued, if the aims are 'fundamentally [about] transferring power to the researched, the methods of analysis and interpretation of the data, should at the very least involve, if not be

129 The grounded theory approach is a qualitative research methodology that attempts to unravel the meanings of people's interactions, social actions, and experiences. These explanations are 'grounded' in the participants' own interpretations or explanations.

undertaken by participants, prior to the representation of the documentation' (Mosurska & Ford, 2020, p.348; Castleden, Garvin & First Nation, 2008). The outcome of the analysis supports this position by demonstrating that the value of the data depends on the bias of the analysis.

8.4 The Stages of Transcription

The following provides an outline and examples of different attempts to break down the transcript. This leads to a method of "absurd coding'. Examples of the full transcript can be seen in Appendix 5.

Prior to what is described as 'stages of analysis' was an informal unstructured reflection on the content of the transcript:

'So, I saw this letterbox or correio. I walked past it and then I thought, "wait a minute, I would like to go back to that", and wondered why? I felt quite a strong pull...'

This first part of the transcription begins in the past tense and describes a memory. It gives a minimal description of a sensory relationship, an action, a thought and a feeling that all arose at a point in time in relation to a letterbox.

- The first sense described was seeing: '*So, I saw this letterbox'*
- The first action described: *'I walked past'*
- The first thought described: '*then I thought: "wait a minute"'*
- The first feeling described: '*I would like to go back to that*'
- The first question asked: 'and wondered why? I felt quite a strong pull'

From the transcription alone we do not know when I saw this letterbox, but the recall of memory sets up a relationship between a material object (a letterbox), myself and my actions. There is also the relationship between subsequent thought and the

potential action of returning to the letterbox. In the description of the memory of the action of walking there are qualities of space and time. To a certain extent, these are also expressed in the sense of seeing, but it is more ephemeral. The action of walking past involves the material reality of the position in space of the letterbox and of my body, which through the action of walking moves beyond the letterbox. To see, I had to undertake the action of looking and then the process of perceiving what I saw. While the action of looking is described as in the past, I was still in the process of perceiving the letterbox after I had walked past it. Although no longer looking at it, I was remembering it in my 'mind's eye'.

I then revisited what was remembered through reading the transcription of the audio data. The first highlighting of the text was informal and openly subjective, touching on an exploration of Bergson's key terms. What followed was an attempt to construct a framework to code the text from some objective criteria. For the purposes of the thesis, the development towards a coding framework or matrix (see figure 28 pg.242) has been synthesised into five stages. A summary of each of these stages follows. Each stage began with identifying a section of text in order to categorise paragraphs, sentences, even assigning a code to single words. It was a non-linear process, with subsequent stages backtracking to integrate useful categories from previous stages and discarding others.

A full breakdown of all selected stages can be seen in Appendix 5. Below is an outline of stages with some examples.

Stage 1:

In keeping with the Bergsonian framework I adopted, my objective was to highlight sections of text that documented relationships between matter and memory,

using colour coding to identify different objects. In addition to these categories, I identified words whose particular significance could not be grasped without prior knowledge. At this stage, the focus was on memory, and I identified the following kinds of memories:

- Secondary memories (SM): details relating to the letter rather than directly to the relationship (or interaction) between the letterbox and the letter.
- Unsaid influences (UI): things not in the transcription that I was aware of at the time.
- Analysis of memories (AM): memories that arise through the process of analysing the transcription.
- Secondary analysis memories (SAM): memories that arise in response to the analysis of memory.

A stage 1 example, figure 21 below, begins with the opening lines of the transcript; yellow signifies an association with the matter of the letterbox and blue with the matter of the letter.

'So, I saw this letterbox or correio. I walked past it and then I thought, "wait a minute, I would like to go back to that, and wondered why?" I felt quite a strong pull, and thought it is probably to do with my dad's letter that I have got with me on this journey. Written by Kenneth to my mother; no, yes, no, to my grandmother.'

Figure 21: Stage 1 example

Further colours identified other items or material objects throughout the text, as well as sections of text that related to material processes or memories of objects.

Stage 2:

My next objective was to identify differences in the text in relation to time, or the characteristics of the words identifying matter, using a table to separate the sections of highlighted text from stage 1. The division of the transcript into sections, enabling these elements to be isolated, meant that each section could be looked at more closely. This process drew out whether the text documented a direct relationship with an object in the present or an association with something not present, and also showed when it identified an association with a technical device. Although a technical device is an object and therefore matter, I acknowledged the difference between objects such as the letterbox that appeared to be in a fixed state and objects like the smartphone that changed according to the information being transmitted in or onto the interface. This raised the question of whether the data being transmitted was matter or memory. Figure 22 below illustrates the revised key from reflection of stage 1 analysis.

Mat	Relationship to a material
Ass	Association between a memory and material
Tec	Relationship with technologies of documentation
Obs	Observation
Pmem	Relationships of my process/action to memories
	Not able to code at this stage

Mat-2	after doing the cobbles.	2nd reference to material. Presumably encountered previously
Tec-1	And then after it I was trying to get something on the phone, I can't remember and I saw the Gmail envelope thing on my phone	A hybrid of technologies material with data including email logo
Ass-2	and I said I wondered if Sarah has replied and umm…of course hang on I thought that is why. Because you are waiting for this letter to arrive .	Second potential memory association. But is this a different letter?

Figure 22: Stage 2 example

After reflecting on stage 2, and taking into consideration stage 1, I concluded that since Bergson's theory was a method of understanding perception, his key terms could be considered as a category of 'aspects of experience'. Thus, breaking down the text in relation to his key terms could provide an insight into understanding how it documented an experience.

Stage 3:

My objective at this stage was to review stage 1 in relation to stage 2 and insert annotations to identify where the text could be associated with key terms used in Bergson's theories on perception, such as 'action' and 'memory', and in place of 'matter', the word 'material'. As such, the process returned to the highlighted text of stage 1, before it had been integrated into a table. As the annotation of the transcript proceeded, the complexity of relationships between elements of the data became apparent. The annotation of the transcript expanded to encompass the recognition of words signifying different senses, actions and associations with memories not of that particular moment but from a different time. The complexity of the relationships within sections of the text meant that it was not possible to apply a category to some sections.

Letter box material with data Dads letter material with data Cobbles materail Phone material with datEmail from sarah data / material?? Observation about process Janetta Benhavis memoryProcess/action relating to memory of action Street sign material with data

So I saw: ~~memory~~ of sensory experience
this letterbox: material
correio: text
I walked past it: action
and then I thought wait a minute: zone of indeterminacy
I would like to go back to that and wondered why: connecting matter to memory.
and felt quite a strong pull
and thought it is probably to do with : association.
my dad's letter: secondary material
that I have got with me on this journey

Figure 23: Stage 3 example

Stage 4:

The objective of stage 4**,** a linear progression of my reflections on stage 3, which began the dissection of the text, was to accomplish a coding of individual words under categories that I had begun to develop in stage 3, according to the key terms Bergson used to describe the perceptual process. During this stage of the classification, it became apparent that some words either did not fit into the terms drawn from Bergson's theory of perception or could fit into more than one code. An immediate example were words defined by the Cambridge English Dictionary as adverbs, pronouns and conjunctions.

For these words, I devised the code of ‘connector’, which deviated from the terms used by Bergson.

List of memories focus
Memory Sensory
Material
Text
Action/ process
Zone of indeterminancy
Connecting/
accosialtion
Perceiving
Time
Space
Technology Data

Letterbox
Phone material with data
Email from sarah data / material??
Observation about process
Janetta Benhavis memory
Process/action relating to memory of action
Street sign material with data

Figure 24: Stage 4 example of category and beginning of code.

The text was inserted into a table, with the category of each word placed within its own individual cell and identified by the appropriate colour.

phone	technology
I can't remember	memory
Gmail envelope	another form of letter, information
Sarah	introducing another person. Outside of family line. Previous to this the link is with family. Dad, mother and grandfather and grandmother on mothers side. Family heritage , linear

Yes it is so weird the way the **mind overlaps** and changes.

Notes:	
mind	process of remembering
overlaps	where thoughts combine with themselves and the material objects changing perceptions

Figure 25: Stage 4 example of coding

The process of categorising each word emphasised what could be considered the arbitrary nature of classification and the way in which words classified under the same category were often significantly different in quality. For example, in stage 4 the words 'I' and 'letterbox' have been coded yellow, the colour representing the category of 'matter', but they are clearly different in terms of quality. Thus, the process began to demonstrate the limitations of categorising the data in terms of arriving at a 'shared value' of qualities.

Stage 5:

Reflecting on how words with different qualities were assigned to the same category in stage 4, stage 5 adopted the objective of assigning subcategories or what is often called a 'code'. For example, the word 'saw' in the phrase '*I saw this letterbox*' which was associated with the sensory, in stage 4, was now attributed the further code of 'sight' identified by the colour orange (see fig 26).

Words	so	I	saw	this	letterbox	correio	I	walked	past	it
Category										Material
Code		human (1)	sight	pointing	object			physical	beside	object

Figure 26: Stage 5 example of coding.

The stage 5 example demonstrates the role of association between words that would be generally perceived as having a common meaning. For example, the pronoun 'it' has been coded as a material object because it is evident within the context of the sentence that 'it' signifies the letterbox, an inanimate object. This relationship within the sentence also informs the associated coding and category. While obvious in the context of this analysis, it creates a useful analogy between the effect of memories on the perception of matter and the effect of taking a word in isolation from other words, negating the potential influence of other data.

Bergson (1991, p.103) discusses the act of reading in order to describe perception, referencing research by Goldscheider and Muller (1893) which disputed earlier research by Grashey (1880) [130] that claimed we read words 'letter by letter'. Instead, reading is a process of selecting parts of the printed text and combining these with a process similar to autorecognition of what we have stored in our brain. Bergson then describes perception, through reading, as 'a closed circle, in which the perception-'image', going toward the mind, and the memory-image, launched into space, career the one behind the other' (1991, p. 103).

130 I could not locate the original text "Ueber Aphasie und ihre Beziehungen zur Wahrnehmungen," Arch. f Psychiatrie vol. xvi (1880). A translation is 'About aphasia and its relationship to perception'. Aphasia was a central subject for Bergson's research of matter and Memory.

I evaluated the efficacy of the code by comparing two words in the same category; a significant divergence in their qualitative values indicated that I needed to devise a new code to identify their difference. The factor of association was critical in enabling me to attribute a qualitative value to the data. If the necessary components of association were present in the documentation, a greater degree of shared qualitative value was possible; however, this became problematic when the associations went beyond the words in the transcription. For example, in the following extract, the name 'Kenneth' could be categorised as material-human[131] (see figure 27) but additional documentation would be needed to share a significant amount of qualitative value associated with the undocumented knowledge of this human.

Written	by	Kenneth	to	my	mother
Information	ownership	human(3)	pointing	relationship	human (4)

Figure 27: Stage 5 example 2.

8.5 The Coding Matrix

To support the development of the work in progress, I produced a coding matrix from stage 5, (figure 28) importing the outcomes from stage 5 into the categories and the codes. Without the presence of the text, the matrix provided a more neutral position for an evaluation of whether the codes sat comfortably within their categories. The matrix was useful in highlighting inconsistencies, arbitrary decisions and absurd

131 A number following the word 'human', as in figure 26, identifies a different person.

characteristics that could contribute to a critical reflection on the method of analysis as it developed.

Category	**Code** (Sub-categories that identify different qualities of words falling under the same category)						
connector	ownership	additional	pointing	adjustment	reason	consequence	being
material	human (1)	human (3)	object	space	digital	writing	visual
sense	sight	quality	internal	external	mental		
hought	question	association	memory				
action	physical	Time/action	write	read	information	talk	time
space	beside	in	accompany	over	many	above	
time	subsequent	clock	past	awaiting	future	moment	
quantity	singular	force	multiple				
language	Portuguese	English					
indeterminacy							

Figure 28: Chart 5: The Coding Matrix

There is an aspect of the ridiculous in this dissection of the transcript and the alignment of a 'normal' audio recording with a taxonomy associated with Bergson. It is akin to Foucault's references to heterotopia[132] – the association of a normality with a 'different ordering of things' (Beckett, Bagguley & Campbell, 2017, p.171), like Borges' 'imagined Chinese encyclopaedia' (Wilmott, 2020, p.54; Foucault, 1970, p.3; Foucault, 1970, p. 3). As the stages progressed from isolating the sentence through to

132 Foucault uses the term to describe spaces that have more layers of meaning or relationships to other places than is immediately obvious.

the coding of an individual word, the structure of grids, inferring a regularity, was perhaps no more than a smokescreen diverting attention from the absurdity of a method in which an attempt to define meaning through a process of deconstruction could instead undermine the meaning of the data. It was as if analysis had to do a handbrake turn and reconstruct the deconstructed.

On the one hand, in order to reconstruct meaning, the analysis could reconsider the text in terms of its sentence structure, but on the other, the deconstruction had parallels with the surrealist and Dadaist methods of collage adopted by William Burroughs as he sought to 'tak[e] the world apart and reconstruct it in new ways' (Cran, 2013, p.302), as well as Orthodox Jewish practices of Midrash that involve interpreting the Torah through dismantling the text (Izenson, 2023).While the analysis did not scatter the text, isolating it from its context offered an opportunity to take the information in a different direction – an example of this is described in the next chapter.

In fact, adaptations and developments of the taxonomy could have continued beyond stage 5, ad infinitum, to a critical point of absurdity, potentially to where there was a code for each individual letter, or alternatively to a system of cross referencing, as indicated in the matrix where the code 'Portuguese' has the colour yellow and the colour green, yellow signifying the category 'material' and green signifying the category 'space', both being qualities of Portugal. However, at stage 5, the point of deconstruction was at a sufficient level of evolution for the method to be useful for the research. My intention, after the completion of this thesis, is to develop this method further as a tool that can be used to deconstruct a transcript ahead of reconstructing it in a way that will allow for the expansion of its analysis, as demonstrated in the final chapter.

8.6 Evaluation of the Method

If the first part of this chapter described a deconstruction of the transcript, the second part (sections 8.7-11) uses an analytical evaluation that will enable, if not a reconstruction, a representation of my perceptions at the time I produced the audio documentation.

The evaluation began by revisiting examples of the taxonomy and placing them alongside a Bergsonian use of the word, developing a form of glossary that draws on both Guerlac (2006) and Pierson's (2018) readings of Bergson's other works, such as *Creative Evolution* (2000). In addition, the evaluation also invited further interpretation of the selected categories, introducing other theorists such as Henri Lefebvre (*Production of Space*, 1991) who were touched upon in Part 1 concerning CGI landscapes. The category of 'time' was not selected due to the discussions in the previous chapters (notably Ch. 3, 4, 5 and 7) concerning Bergson's concept of durée; however, much of the evaluation of the category of 'space' also relates to the category of time.

In some categories, examples of words coded under that category were used to reflect on similarities to or divergences from their Bergsonian use. When considering examples of particular words in each category, a further breakdown into codes was sometimes included. Further reflection on this breakdown would increase the breadth of the evaluation; however, what was included was considered sufficient to inform both a critique of the framework and also a re-evaluation of what was taking place in terms of perception at the time of the documentation.

8.7 Category of Indeterminacy

Bergsonian use of the term indeterminacy is until a decision has been determined in the moment between perceiving and taking action, there is the implication of a degree of free will in terms of what will be perceived.

Bergson differentiates between the sensory motor system and the nervous system, which is able to 'free itself' from instantaneous reaction. Until an action has been taken, there is an unperceived quality of the virtual, where all perceptions are possible and indeed present. Different organisms are related to a sliding scale of free will that has a relationship to the brain, from the primitive organism to those that have the potential for voluntary activity, which requires the intervention of the brain (Bergson, 1991, p.29), although, as Bergson stresses, this does not mean that thinking can be isolated as solely the function of the brain; 'the thinking being, the free act may be termed a synthesis of feelings and ideas' (1991, p. 185). This issue will be discussed further under the categories of action and thought below.

Indeterminacy thus could be considered as a state of flux, where the subjective has dominion over a reality that can otherwise be stifled by the concept of the absolute truth of quantitative data. Bergson uses an analogy of how the greater the spatial relationship between an object and oneself, the greater the time one has to consider the options prior to making decisions relating to actions. A way of considering the research is that the reflective critical analysis of the qualities of data, in creating a space to consider potential interpretations of the word, creates an intervention of indeterminacy.

As this term is so critical, its use in the analysis does not do it justice, diminishing its value by ascribing words that did not articulate a precise description of a subject. In hindsight, the category 'indeterminacy' could perhaps be better defined as 'a gift to thought', i.e. distinguished from and placed prior to fixing on an action. However, the category of 'thought' is also problematic.

8.8 Category of Action

According to Bergson, our perception is informed by the possible effect we can have on the world around us through our actions. The action draws down memories into the present moment.

Bergson's theory of action is one based on the following model: 'There is a physical stimulus, which can be described in terms of movement, one that returns what has been received and passes it on through a total system of the material world' (Guerlac, 2006, p.107). Using this model, Bergson places the human on what could be considered an outdated hierarchy of organisms. On the one hand, there is the primitive organism, 'where the complete process of perception and of reaction can hardly be distinguished from a mechanical impulsion followed by a necessary movement' (Bergson, 1991, p. 32), and on the other hand, 'the body endowed with a brain' (Guerlac, 2006, p.108), which can consider how to react. The brain is defined by Bergson (1991, p.30) as 'an instrument of analysis with respect to received movement'.

Example of words coded under action:

- *Walked:* One example of quite an arbitrary differentiation is that drawn between the word 'walk', assigned to the category of action, and the verb 'wait', assigned to the category of time. Although walking is a physical action, it also has a spatial relationship involving time. Likewise, waiting (present participle), while being present in action over a period of time, implies the action of restraint or a moment of hesitancy in the brain prior to action, almost a state of indeterminacy, indicating the potential of something about to happen.
- *Looked:* 'Looked' infers a visual sensation and, as such, could be categorised under sense; however, in the context of the phrase 'I haven't actually looked

at the letter yet', it infers the action of 'the gaze' that Ahmed describes as one 'that turns to an object, brings other objects into view, how the way we orientate ourselves affects what can be perceived' (2006, p.88). This relates to Bergson's understanding of perception as being a calculation of 'our possible action upon things, and thereby, inversely, the possible action of things on us' (1991, p. 56).[133]

Reflections on the category: While acknowledging the contradictions, the review illustrates the complexity of action in relation to time and space.

- *Read*: Bergson uses 'reading' as an illustration of the dynamic between matter and memory (1991, p.80). Reading involves what is seen rather than perceived through the senses. To be clear, the action of reading is not the perception, it simply provides a launch pad for memories. The same would apply to all images, in a Bergsonian sense, that are not our own bodies. So too would a map or the technologies of mapping, for example, or cinema and projection, as discussed by Martha Blassnigg in *Time, Memory, Consciousness and the Cinema Experience* (2009), where the audience 'launches' memories relating to the projected image. Every member of the audience has their own individual experience. This quality of 'launching', which describes a relationship between data and memories, is used as a method in the subsequent chapter.

133 The letter referred to in the transcription has not been looked at yet, and will not be until this thesis is completed.

8.9 Category of Sense

Part of the reason for defining this category was to distinguish sense from memory. Bergson criticises philosophers who do not draw a significant distinction between the two, instead 'regarding the difference as a mere difference in degree, and not in kind. In our view the difference is radical' (1991, p. 139). According to Bergson, we situate ourselves in the present through our senses – 'pure perception'. The senses bring us awareness of our present physical bodies; 'situated between matter and that on which it has influence, my body is a centre of the action, the place where the impressions received choose intelligently the path they will follow' (p.138). This refers to a sense without the influence of thought. In relation to the moment I was walking past the letterbox, 'I felt a strong pull', only then followed by the thought of returning to it. If the body is our centre of action – that 'image' that we 'know' both 'from without by perceptions, but within by affection' – then it is the sensations that extend this body into contact with the other images of existence. For myself as the researcher, this was the connection with the 'image' of letters as I walked past the *correio* but also with other images; 'Images', in the vaguest sense of the word, images perceived when my senses are opened to them, unperceived when they are closed' (1991, p. 17).

In terms of the senses, perception does not derive from the 'the sensory vibration' but out of 'a sort of question addressed to motor activity' (Bergson, 1991, p. 46). This question is: what effect will my actions have on the object that I am sensing or indeed what effect will the object that I am sensing have on my body? If we were reflexive beings, whatever we sensed would launch an automatic physical reaction. However, as we are not reflexive beings, how we engage with the world is a choice. It would seem, then, that the sensory is not in itself an action but one that precipitates action and, as such, needs its own category.

Below is an example of a breakdown into codes:

- *Felt and pull:* 'Felt' was coded as internal whereas 'pull' was coded as external. Felt would be sensed 'within by affection' and would therefore relate to memory but would need to be distinguished from it. The coding of 'pull' as external indicates that the relationship to the object is placed outside the body. Yet, the relationship is one of sensation within the body in relation to the letterbox outside the body. The sense of affection is the feeling of being drawn towards an unknown object, or one known only through perception. At this point, an 'education of the senses' (Bergson, 1991, p.49) is taking place.

Reflections on the category: Through the coding of words under this category an understanding of what Bergson refers to as an 'education of the senses' (Bergson, 1991, p.49) was taking place.

By educating the senses we can bring our different sensory relationships to a material into what could be called 'harmony'. Harmony is a certain order in which we sense the reality of that material (Bergson, 1991, p. 128), rather than a situation where absent or discordant information creates an 'image' full of gaps. As such, harmony perhaps provides one answer to the metaphysical question of 'what is reality?' There would seem to be a relationship between the 'harmony of the senses' and the objectives of this analysis; to find a shared value of the data.

8.10 Category of Thought

'Thought' in itself is not a Bergsonian term; rather, a reading of Bergson may influence how someone thinks. In a certain sense, the analysis of the transcript is a process of engaging with Bergson's 'revolution in thought in terms of the goal he lays down for the philosophy of thinking beyond the human condition' (Ansell Pearson, 2018, p. 5). The category of thought is problematic because thinking is generally understood, in relation to perception, as a process of the brain, in ways that Bergson spends much of his time dismantling. This approach to the brain lies behind the dualistic mind/body separation. Although Bergson acknowledges the brain's relationship to thought, he considers it as 'no more than a kind of central telephonic exchange: its office is to allow communication, or to delay it' (Bergson, 1991, p. 30). If the analysis of this transcription is aligned with Bergson's theories on perception, thought can be either somewhere between perception and decision, or it includes the extension of perception into decision and ends at the point at which action is taken. If thought is simply the actions undertaken by the brain as a sort of telephone exchange, perhaps thought should not be a category but instead a code of action.

8.11 Category of Space

Bergson's ideas are often disregarded by social geographers, urban theorists (Soja, 1989; Massey, 2005) and Marxist philosophers like Lefebvre (Shields, 1999). This is because of a misconception that he is an idealist responsible for an 'extraordinary devaluation and subordination of space (relative to time)' (Soja, 1989, p. 123) due to his focus on time as durée.[134] This is to overlook his contribution to understanding space not as an 'homogenous' quantifiable surface or container but rather

134 Time has not been included as a category because previous chapters in the thesis have paid sufficient attention to this quality, and the problems with the category of time are covered in the evaluation of the category of space.

as an experience of 'real extension' (a translation of *étendue*). The way Bergson approaches space is similar to the difference he draws between the qualities of clock time and those of durée (Guerlac, 2006, p. 165), the former homogenous concept of time being similar to approaching space for the purpose of location or identifying a 'point of application'. Instead of a quantifiable concept of space, Bergson proposes the concept of étendue, an experience of qualities not limited to the physical connections of points in space, but rather one in which 'all our senses participate in extensions'(Guerlac, 2006, p.166). He refers to the division of space into quantifiable units as something laid onto experience, yet our experiences cannot be captured in a quantifiable unit.[135] It may be recalled, however, that Bergson is regarded to have lost an argument to Einstein (Kügker, 2021) regarding the latter's reduction of the experience of space to the homogenising technology of clock time. Einstein defined Bergson's theories as philosophical, in terms of the ontological nature of being, as opposed to the quantifiable, lived reality of physics (footnote 91, p.165).

There follow examples of words coded under Space:

- *Journey:* 'Journey' had been allocated to Space on the premise that, in this context, it signifies a collection of spaces strung together through the action of arriving at and from them. At first, this could be seen as considering space as merely a container. However, on reflection, the journey itself is not contained since it signifies a movement or indeed an 'extension' of the senses. The durational quality of a journey has associations with the category of time.
- *Past:* A more problematic coding of a word is the example of 'past' in the sentence 'walking past the letterbox'. This was considered a spatial

135 An analogy could be drawn with stage 5 of the analysis: laying an excel spreadsheet over the experience of extension documented in the transcription.

relationship, but could also be considered one of time. In either case, however, this would be in relation to a homogenised quantitative concept of clock time and container space.

If Bergson is considered as a philosopher who focuses on time, Lefebvre could be considered as a philosopher of space. It may seem odd to refer to Lefebvre when evaluating this category since Lefebvre was a fierce critic of Bergson (Shields, R. 1999. P. 45). However, Fraser (2007), in a paper which appears to consolidate the *rapprochement* this thesis makes between Bergson's theories and Lefebvre's deep understanding of the type of anti-philosophical project Bergson was involved in, reveals the hidden Bergsonian premise of Lefebvre's work. Lefebvre, albeit perhaps unconsciously, applies Bergson's approach, and while Bergson was not overtly political, there is commonality between his theories and the Marxist critique of capitalism as a system that reduces lived experience (even time and space) to a quantifiable product (Fraser, 2008, p. 355). It is this critique that Debord applies to his practice of the dérive and psychogeography.

On reflection, perhaps the category of space and likewise the category of time should be removed in order to avoid falling into the trap of adopting a method of documentation aligned with a homogenised interpretation of space that can be measured, rather than one that sees space as the extension of the senses. However, as the application of this research is to develop an arts practice related to participatory mapping,[136] and if we consider that Lefevre's ideas were a development of Bergsonian theories, it is worth noting that the purpose of Lefebvre's 'spatial triad' was to neither conflate nor separate a material reality that could be measured by the qualities of lived experience.

136 The types of participatory mapping of interest to this thesis are those that give voice to ideas unconstrained by concepts of quantifiable data.

Conclusion

Having made the link between Bergson and Lefebvre concerning 'the social production of space', it is interesting to note that the first chapter of Lefebvre's *The Production of Space* (1991, p. 17) asks the question: '[d]oes language – logically, epistemologically, or genetically speaking – precede, accompany or follow social space?'[137] This is asked in relation to how words like 'room' can identify the allocation of a social function and whether it is an inherent quality within the word or system of coding that needs 'reconstituting'. Lefebvre proposes an investigation of 'concealed relations between space and language', inferring language functions as 'bringing order to the qualitative chaos (the practico-sensory realm) presented by the perception of things' (1991, p. 17).

This chapter has attempted to bring order to inconsistency and arbitrary qualities through use of a spreadsheet. Despite the fact that the method of analysis outlined above has been found to have substantial room for improvement, the process described in the summary of the stages and the reflective evaluation has brought a greater level of depth to an understanding of Bergson's theories as revealed in this research. It could be argued this could be achieved simply through a closer reading of the related texts, but in my case, having read these texts over a number of years, this method of applying the theory to the practice helped consolidate this understanding.

Having justified an analysis of the transcription of the audio, due to it being a document equivalent to a notebook, an important outcome of the stages of analysis was pinpointing the absence from the data, without recourse to memory, of all the unconscious or simply undocumented influences on the perception of the moment. It became evident that not only the value of the single word was missing, but what actually underlies the documentation was not present, in the same way as the line in

137 This analysis has not made any direct reference to linguistic analysis because, initially, I did not consider the understanding of language as an objective of disassociating the text from subjective interpretation.

Chapter 4 was reduced to a network of nodes. The process of evaluation of the coding experiment, that was documented from sections 8.6 to 8.11 began a reconstruction through the association of meanings and interpretations that dwell between words. The main finding of the analysis was the identification of words whose significant qualities reached out beyond the scope of the documented data, in association with other memories and potential actions.

The absurd nature of the deconstruction of this analysis and the potential to obliterate meaning has parallels with surrealist practices, whose intention was, as Lefebvre puts it:

> '…to decode inner space and illuminate the nature of the transition from this subjective space to the material realm of the body and the outside world, and thence to social life. Consequently, surrealism has a theoretical import which was not originally recognized.' (1991, p18).

Hence, the choice was made, informed by the evaluation, to attempt a reconstruction, another act of documentation, which might serve to bring the qualities of representation closer to the actual experience but with the knowledge that, whatever the data, the experience will always lie between the points.

In Rita Cachão's thesis, *An Ontology of Space* (2015), which I was reading during the week of walking in Lisbon when this audio documentation was recorded, there is the acknowledgment of different, often opposed understandings of space. Cachão's stated aim is 'to reconcile the multiple understandings of space, liberating it from the binary thinking that opposes the abstract to the physical' (2015, p. 5). The absurdity of the analysis summarised in this chapter is that it does precisely the opposite in its attempt to use a grid to gain an objective position. And yet, in doing so, it begins a dialogue between the data, matter, memory and a perception of the experience of the

cityscape of Lisbon that goes beyond the city walls with the mapping of a particular letterbox.

During my time in Lisbon, I met Cachão, who lives there, and was able to ask questions arising from reading her thesis and particularly her chapter called 'Mouth of the Monster' (Cachão, 2015, p. 215). The next chapter draws on a diagram of reproductions of symbolically charged artworks which appears in Cachão's chapter, to reconstruct what has been deconstructed in this chapter in a diagram of a letterbox, engaging with virtual qualities of perception.

Chapter 9: Diagram of a Letterbox

In previous chapters, the GIS interface has been used to describe a relationship between the data points of GPS as a line, as well as for introducing other data like the audio data file analysed in Chapter 8. For the research described in this chapter a different interface was used; a pinboard, to enable the creation and understanding of relationships between pinned documents. To engage with these relationships a golden thread was used; the action of unwinding it and winding it round and between the pins to create connections in some way replicating the line produced from the 'network of nodes' described in Chapter 3 - 'Untitled 01'.

However, in contrast to that line, the connection between nodes is not limited to a linear concept of space and time. The purpose of the golden thread in this experiment was to cause memories to unfurl from the network of pins or 'nodes'.

Diagram of a letterbox

Figure 29: Configuration of the Diagram

By using the pinboard as an interface, pins as nodes and a golden thread to engage the reader with a thought experiment, the aim was to contribute to a performance of a diagram of the letterbox which was the material object of significance identified in the subject of the previous chapter. Where chapter 8 identified the absence of qualities, the point of this experiment was to perform the richness of qualities that were absent in the transcript. In so doing the diagram represents not only the significance of this letterbox in relation to memories but proposes how the documentation and representation of this relationship can induce a certain virtual perception of a landscape.

This chapter does not engage with the specifics of any forthcoming performance, installation or workshop, but uses a list of commentaries on the nodes so that the reader can grasp what a performance of the diagram would communicate. Section 9.1 provides a description of the diagram, and how the method used in its creation was inspired by the work of Cachão (2015). This is followed by a descriptive guide to the commentaries that form part of the diagram as well as the different elements that are embedded within it (9.13) . A selection of the commentaries, given in section 9.4, not only serve as examples but also provide the context for the choice of the letterbox as a material object which is associated with my memories as the sole participant of the 'Matter and Memory in Lisbon' project which was the subject of Part 2.

For the participant-researcher (myself), the practice of creating the diagram became the lived experience of a relationship between the two points of the diagram: a shed in Penryn (node 1) and a letterbox in Lisbon (node 2). Between the two, the potential for a different lived experience of locality became apparent, one in which associations with a material object, such as memories triggered by the letterbox, rather than the time I spent in the locality, became a factor in my relationship to the landscape.

If the linear time spent in the landscape is taken out of the equation, there are parallels with how JT's memories in relation to the gate stop (recorded in Chapter 3) offered him a sense of place within the landscape of Penryn.

A diagram can be considered as a way of representing relationships through drawing, be it a rough sketch or a graphic. It is used in different forms and applied to different practices. Examples of a traditional approach include the illustration of relationships through geographical maps, architectural plans or technical (engineering) drawings. In other contexts, the diagram is not used as an illustration but as an abstract tool by artists such as Francis Bacon (Deleuze, 2017, p.11) and philosophers like Gilles Deleuze, Michel Foucault (Zdebik, 2012) and Henri Bergson to engage with ideas that cannot be represented in their wholeness or reduced to a single point. This applies particularly when considering qualities of the virtual.

A problem that arises when considering the virtual is how to present what is beyond that which can be perceived. Some philosophers, such as Deleuze, advocate the diagram, claiming it has the ability to suggest what is present through an absence. Meanwhile, Bacon's approach to painting was to first disrupt the 'figurative givens on the canvas (and in the painter's head), [which are] more or less virtual, more or less actual' (Deleuze, 2003, p.100) – a method that lets ambiguous distortions emerge into spaces of suggestion. Drawing can be a process of suggestion. Of course, not all drawings are diagrams, some simply serve to represent what is already perceived; however, like Deleuze's description of Bacon's painting, it can be a method that shifts aside the drawing maker's assumptions. In the case of this thesis, such an assumption could relate to the idea that the data gathered in the participatory mapping project described at the beginning of this thesis provided a realistic documentation of a certain landscape (see Chapter 1).

As stated in chapter 8, an inspiration for this chapter was a 'speculative experiment' undertaken in 'the ontology of space', in which Rita Cachão created a diagram of reproductions of symbolically charged artworks, followed by an 'encyclopaedia of captions' (Cachão, 2015). Once combined, this created a diagram; 'The Mouth of the Monster and the Hollow Body'. In her preamble, Cachão cites Aby Warburg's *Atlas of the Mesmosyn*[138] as 'a point of departure', drawing parallels between her work and Warburg's experiments in juxtaposing reproductions of Renaissance artworks to draw out their relevance to contemporary issues. However, Cachão, in distancing her work from that specific context, places her diagram within a form of spatial practice where the diagram delineates a space and the connections between reproductions is extended through the diverse interpretations of individuals, thus moving the interpretation beyond the framing of the author.

Cachão's overview of Warburg appears to point to parallels with the theories of Bergson. This is confirmed in a paper by Martha Blassnigg, a specialist in Bergson. Blassnigg, while acknowledging their differences, also provided a clear overview of the parallels between Warburg's method and Bergson's theories in relation to perception.

Although their use of the word 'image' differs they share the idea that what exists is 'always fuller than the perceptual and conscious capacities of cognition,' (Blassnigg, 2011, p. 2). In the action of 'Warburg's mnemonic method' there are parallels with 'Bergson's philosophy, in how far it acknowledges the accessibility of memories beyond a direct indexical relationship with the present perception'(p.2).

Indeed, Bergson situates ideas of 'pure memory' and 'pure perception' beyond perception. He uses these terms, described as 'virtual' (p. 42) to create an incisive conceptual framework for an understanding of reality beyond what can be consciously perceived. This is where the use of a diagram comes into play because

138 For more information about the *Mnemosyne Atlas,* see: https://warburg.library.cornell.edu/about

it uses a dialogue that is not dependant on perceived points but takes place between them. The focus becomes one of potential actions concerning the relationship between points, drawing memory into a relationship with matter and at the same with an extension beyond the frame.

As defined in section 4.2, Bergson calls the type of memory that is drawn into this space '*la memoire qui revoit'* – translated as 'image memory' – which he distinguishes from 'motor memory'. Motor memory is like a reflexive action in that 'it performs the past into the present when it repeats a gesture or action by habit' (Guerlac, 2006, p.126). In contrast, *la memoire qui revoit* is its own entity, and is thought to act independently, without any conscious intention. Every detail of our engagement with the 'aggregate of images' that is our past lived experience is retained in its fullness. As Guerlac says, '[t]he radical feature of Bergson's analysis is that memory has nothing to do with the brain' (2006, p.127). Thus, images of *la memoire qui revoit* exist independently from the mechanism of the 'telephone exchange', the analogy Bergson uses to describe the brain's function in relation to perception.

It is in this distinction that Bergson makes the move to extract 'pure memory' from the body and align it instead with a 'spiritual manifestation' (Bergson, 1991, p. 240). On the one hand, 'pure memory has no material existence. It is pure idea or intention, pure virtuality' (Guerlac, 2006, p.139), it encompasses all memory beyond our perception. On the other hand, 'pure perception would place us quite truly in matter' (p. 156); we would no longer act as the observer, at one remove from matter, with only an exterior perception of it, but would be entirely integrated into its form and content. Both pure memory and pure perception are defined as virtual, not because they are 'almost real' or 'as if real', but because our perception of them, in their totality, is considered beyond our reach. Since, by its very nature, a

virtual experience cannot be contained in or represented by a single point, a diagram is a useful device, allowing us to engage with such qualities.

Similar to Cachão's investigations, the research for this thesis, leading to the diagram of the letterbox (fig. 29), was informed by the experience of both the Transtechnology research group and previous arts practice. As Cachão puts it, the diagram creates 'a framework that is archaeological, self-reflective, aesthetically driven, in which disruptions and jumps are welcomed and that remains in constant formation' (2025, p. 39). This sort of framework offers a device that could draw a reading of Bergson's theories into an arts practice applied to representations of lived experience in a landscape. This chapter describes a stage in its development.[139] Over the course of this research, as the analysis zoomed into the granular detail of examples of data and its representation, the gap between the qualities documented and the qualities experienced increased. This suggests that data, although often useful, may not document the qualities, subjective or objective, that it is said to represent. If this (seemingly obvious) observation is ignored, it could lead to the misrepresentation of the data of individuals, and if representations of reality can have an effect on lived experience, then it could also be useful to find methods of bringing attention to an absence of qualities in the data. Although this critique of data and its representation was demonstrated using examples from an individual (in this case, myself, the researcher), these concerns remain pertinent to the practice of participatory mapping where data is said to represent both the individual and the community.

Whereas, for both Warburg and Cachão, the diagram serves as a device to stimulate other people's readings, the diagram of the letterbox is not intended to be used by others; rather, it is a performance that suggests a method by which individuals can conduct an analysis of their own documentation. The diagram uses the nodes and the

139 A previous experiment, in relation to a bench in Finland, is documented in Appendix 8.

recognition of an absence of information to engage with *la memoire qui revoit*. This draws into the diagram a connection between two points: the material objects in the landscape and additional memories that may not otherwise have been apparent to the individual mapping their relationship to the landscape.

As will be seen in this chapter, the thought experiment of the diagram of a letterbox reveals the potential for a deeper relationship to the landscape through the qualities of perception referred to by Bergson as durée. To some extent, the effect of the diagram is documented in its commentaries, a sample of which are given in section 9.4. The outcome suggests that a diagram is a useful tool for an individual who wishes to engage with the documentation they have mapped, especially with the qualities of the data. It potentially enriches the data, and thus brings about a shift in the perception of a particular relationship to a landscape. Between the points of the diagram there is the possibility to, if not perceive a virtual quality in the lived experience of the landscape, at least understand its potential presence.

9.1 Reconstruction of the Data

The diagram described here is a reconstruction of the deconstructed transcript of Chapter 7. Having identified words that require further information for their qualitative significance to be understood (see circled on figure 30, below), the reconstruction invites us to include (within the obvious limitations of a thesis) qualities that could be considered, from an objective point of view, a diversion and irrelevant to a realistic representation of a landscape.

So I saw this letterbox coreo. I walked past it and then I thought wait a minute I would like to go back to that and wondered why? and felt quite a strong pull and thought it is probably to do with my dad's letter that I have got with me on this journey. Written by Kenneth to my mother; no, yes, no, to my grandmother, from Kennith to my grand mother about my mother being with serge. And it was just after his accident .And it talks about his mental health and I haven't actually looked at the letter yet but I took it with me to read because I want to and was waiting for the right time. And umm , yearh. So that is why I thought I would go back to it. So I did, took loads of pictures in the hope that I could take some photogrammetry from it , after doing the cobbles.

And then after it I was trying to get something on the phone,I can't remember and I saw the Gmail envelope thing on my phone and I said I wondered if Sarah has replied and umm...of course hang on I thought that is why. Because you are waiting for this letter to arrive . Umm is it number 35 . You are waiting for this letter to arrive. Yes it is so weird the way the mind overlaps and changes. So then thinking back to actually why did it actually make me think of serge's letter? Well just a few moments ago I was reminded of Janetta and Benhavis and all that. Of course it all links. These are obvious statements but there is something about the beauty of when your walking, mapping and being open. This is what my dad does. Oh my god, this is what I.. As I said that I looked up and saw the street sign Traversa de Piera . And I read that as Traversa de Pere. Pere, mon pere . Fucking hell this is just like a re . I'm just being my dad . Mon Pere..

Ok dad....fuck wha...

Figure 30: The Transcription as a Number of Nodes.

Like Cachão's 'Mouth of the Monster' (2015), the diagram is presented in two forms: a photograph of the pinboard (figure 29) and a visual reference document with elements, or 'Nodes', numbered for ease of association with the accompanying written commentaries (figure 31).

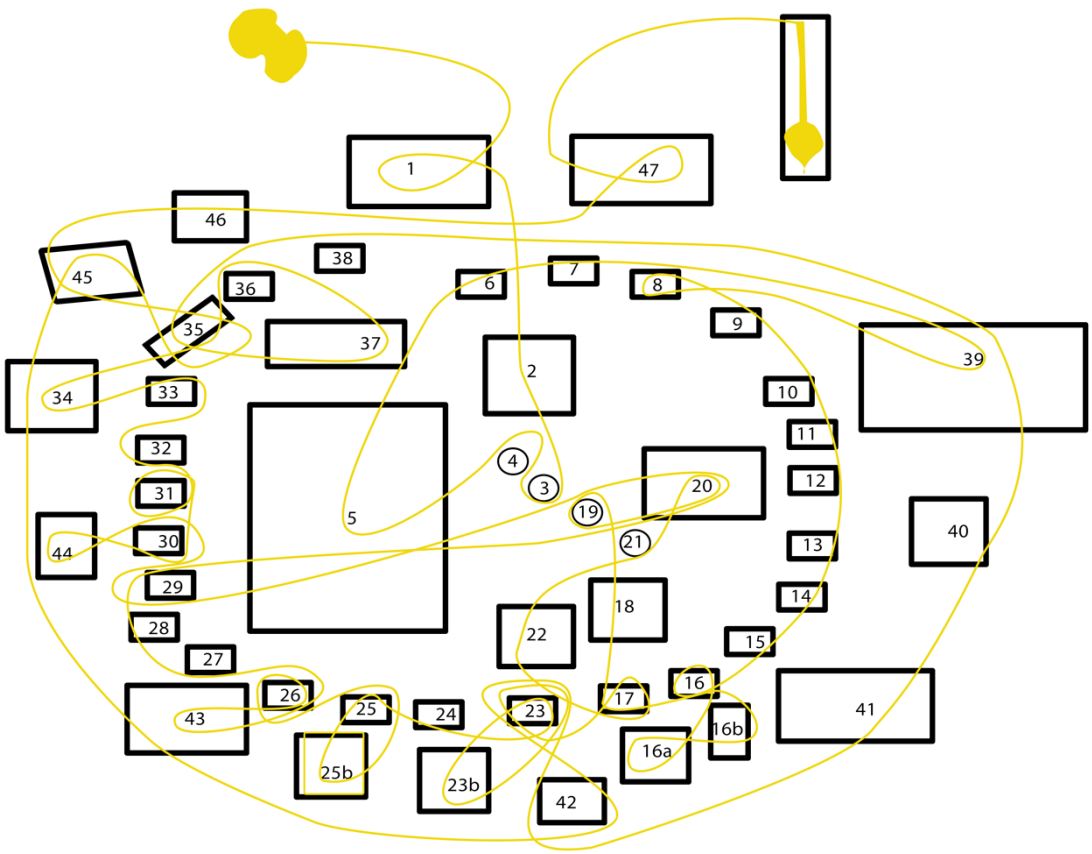

Figure 31: Annotation of the Diagram

The use of commentaries or, in Cachão's case, captions, acknowledges that the visual information is not sufficient to communicate the fullness of what can be potentially perceived. However, neither the commentaries nor the visual representation of data in isolation is the diagram. The diagram is made not by any single point but by what arises between the points and is open to unfolding interpretations. The fact that a numbered list is used should not be considered as an indication that the commentaries need to be read in order.

9.2 The Commentaries: A Guide to Reading

The selection of commentaries that are given in this chapter have been extracted from notes about the nodes written at the time of my submersion in the process of the diagram. As such these should be read as examples, forming part of the arts practice method used to formulate this experiment. The nodes selected for presentation in section 9.4 have a closer relationship to the significance of the letterbox and illustrate the richness of this method of mapping. A full set of the nodes, including those which were either of a more tangential nature or that contained more technical information are available in the appendices (appendix 12).

In order to communicate some of the qualities experienced when performing the diagram, the editing of these notes into commentaries focused on untangling rather than editing out repetition and unresolved theories, and, in keeping with the autoethnographic methodology that runs through this thesis, retained some autobiographical information. Although the entangled character of the nodes is closer to the nature of the diagram, for the ease of the reader, four categories were developed from the edit, described in the key below. These are 'imperfect' containers, which include some additional text where clarification may be required. They are 'imperfect' categories because, having established from the absurd coding experiment described in chapter 8 that data loses its qualities once isolated, it seemed preferable to construct a permeable membrane for the text to slip through and thus allow for the repetition of ideas. The purpose of the categories is not to separate the text but rather to assist the reader in locating the relationships between different nodes, especially when nodes are not read sequentially or in their entirety. It should be noted that as the category headings are simply provided for ease of navigating the commentaries not all of them are relevant to, or used in the commentary of every node.

Key to the Commentaries

Descriptor – a simple description, avoiding subjective information.

Technical process – clarifies the descriptor with additional information relating to either the technologies involved in the process or information that could be obtained from other related documentation or would be observable if present at the time of documentation. It is distinguishable from the next category, the technical contextual paradigm, in that it attempts to distance itself from subjective observations or philosophical discussion.

The technical contextual paradigm – an enriched observation of context relating to the nodes and the connections between them. This section allows a more entangled approach, drawing on an autoethnographic method of research, and includes theory related to method, subjective experience and additional (technical) elements.

Golden thread – writing about observations that are drawn specifically from connections made within the diagram – that is, from the process of drawing the golden thread between points or re-engaging with it.

9.3 A Guide to Reading the Diagram

The Portal

Descriptor: The portal, which is not visible, is the abstract device to aid thought used to construct the diagram.

Technical process: The portal is configured through the use of tools that are not strictly speaking a part of the diagram but are used to create it i.e. the pinboard, the pendulum and the bobbin of golden thread. Each aspect of the portal[140] and all the nodes are described in the commentary.

140 The tools used for the portal are not numbered.

Technical contextual paradigm: The portal is a placeholder for the virtual concepts of pure perception and pure memory and can be engaged with through the construction of the diagram. I dismantled the diagram when I moved from the shed in which it was constructed, and since January 2022 all the pieces of the diagram have been kept in a wooden box on a shelf in the house I moved into, which, according to Google Maps, is approximately 800 metres (or nine minutes' walk) up the road. My intention is to reconstruct the diagram, using the tools of the portal, as a performance of relationships between matter and memory. The abstract concept of the portal is constructed from the relationship of my body with the network of images: the diagram continues to be part of my lived experience, filtering memories of experiences in Lisbon into perceptions experienced over a year later in a shed in Cornwall. It is an experience, akin to Bergson's concept of durée, where the actions of writing and analysing the representation of data, using different interfaces, have continued to inform the perception of the material objects documented.

The Pinboard and Pins

Descriptor: A pinboard is a surface soft enough to easily push pins into. In this case, it was an 8ft x 4ft sheet of Sundeala, painted white. The pins were thin 10mm x 1mm lengths of metal ending in a point at one end and protruding out from a larger shape at the other.

Technical process: The pinboard and pins are part of the interface for the diagram. The term interface does not only apply to the surface on which the data is viewed (glass, paper, wall or pinboard), but extends to the mechanism used to interact with the interface. A key mechanism is the pin, designed so it can be held comfortably between a thumb and finger when pushing the pointed metal into the pinboard. The pins

act as cogs for a golden thread (described below) to run through, while the pinboard began as a clear surface ready for representations, printed or drawn on paper, to be fixed to it with a pin. These pins can be removed, or repositioned around the board in relation to one another, thus organising what data is visible, and where on the interface.

Technical contextual paradigm: The influence of the pinboard on the design of the GIS interface, is demonstrated by an adoption of the graphic symbol of a pin to identify points of interest. To a certain extent, the GIS interface has an advantage in terms of the scope of documentation that can be 'pinned', and the connections that can be made and shared[141] anywhere in the world with an internet connection. However, as demonstrated in previous chapters, information on a computer screen is displayed within a framework that is orientated towards a certain perspective of the space and time we live in. In this respect, GIS has adopted the colonial implications of the prime meridian. This '[imaginary] line that divides the West from the East as ''two sides'' of the globe' (Ahmed, 2006, p.14), is a key component in the grid of longitude and latitude structuring where qualitative data is placed with in a representation of landscape.

In terms of the cultural implications of both the development and the integration of technology, points can be drawn from *Early Cinema and the Technological Imaginary* (Punt, 2000). For example, Punt's observation that 'forces must be satisfactorily stabilised and integrated before a technology (whether at the level of the individual artefact or the general system) can arrive at an acceptable cultural meaning, which, in turn, is one of the preconditions for its social and economic success' (2000, p.8) can equally be applied to the integration of GPS and GIS into daily practice.

In a subsequent paper, Punt (2000b) invites researchers of digital technologies to consider 'softer deterministic accounts' of their development, by engaging with research of the technologies of the 19th century. At the same time, he cautions that 'the

141 There is a question of what is actually shared. This thesis has engaged with this question in terms of what qualities are contained within the data that can be shared.

mapping of the history of one technology onto another' (2000b, p. 74) may be 'no more than a rhetorical strategy'. In the case of this thesis' research into GPS and GIS, investigating beyond a gloss of military or cartographic history was inspired by the scope of Punt's and Blassnigg's (2009) research. It led to reading a mixture of accounts from the happenstance of meetings between people to socio-economic concerns, leading to a narrative where a combination of both micro and macro affairs influenced the development of an interactive projection of both a representation of landscape, and movement within it. In this sense a relationship to the experience of cinema is clear.

Citing Nye's work (1990) on the development of the technology of electrification, Punt considers the emergence of each new technology in terms of 'an extension of human lives' (Punt, 2000b, p.69). This extension[142] is sought by both developers and participants in GIS. It is also a reason why people might choose to extend into a landscape without a device, and a reason why artists and programmers are making interventions to create alternative interfaces. For example, the diagram representing period of wandering in Lisbon described in this chapter.

An interesting intersection with this action of wandering is Punt's citation of Belloï, (1995), describing how flâneurs influenced the craft of the cameraman. To illustrate why, Belloi quotes Baudelaire's description of what lay behind the flaneurs' motivation: 'To see the world, to be at the centre of the world and to remain hidden from it are some of the tiny pleasures... that language can but poorly define.' (Baudelaire & Mayne, 1964, p.9). The actions and concerns of flâneurs' were developed by surrealists into the dérive, and the actions of the cameraman are present within works of artists using GIS. An example of this coming together is in the work of Rafman's

142 Different inflections of the word extension are used in Matter and Memory to describe a relationship to space, see Chapter 8. For example, a moment of perception is described as: 'My present consists in the consciousness I have of my body. Extended in space, my body experiences sensations and at the same time executes movements' (Bergson, 1991, p. 138). It is interesting to note this use of the word in relation to the 'extension' of the GIS interface and to contrast it using the pinboard.

(2009), both wandering in GSV and grabbing screen grabs. These acts of wandering were adopted within the methodology of this research, culminating in using a pinboard to understand the extension of the technologies of GPS and GIS through the application of a diagram.

The pinboard influenced the interface design of GIS. Then this illusion of qualities of pinning, within the digital interface, demoted the pinboard's position in society. However, until such time as haptic feedback progresses, the tactile, tangible, kinetic qualities, experienced in the simple action of pushing pins through a surface, and moving objects in relation to the parameters of the board and the golden thread, are notably different to the digital projection. This difference undoubtedly has an effect on the connections that are made between the objective data and the subjective memories of the participant engaged in the pinning, potentially evoking a different relationship between matter and memory than the GIS interface – as it certainly did during the construction of this diagram.

Pinboards have become familiar tropes used for narratives involving an act of detection, research, or planning. How the information is laid out on this surface can portray a tension between objective and subjective points of view. An ordered pinboard is often maintained by reducing points of interest to what is considered key to the subject of interest. For example, in the TV drama *Homeland*, (Fox 21 Television Studios, 2013) the episode *Tin Man Down* uses a pinboard to represent the research methods of bipolar CIA agent Carrie Mathison: when the information expands beyond the parameters of the pinboard, it becomes a trope for inspired madness. In fact, the plot of *Homeland* is underpinned by a narrative tension between whether the chaos of the pinboard represents an inspired insight or the confusion of madness, or something that lies in between.

The Golden Thread

Ahmed (2006) talks about the effect of writing on different tables and her use and approach to them 'which orientate [her] in different ways, or which come to ''matter'' as effects of different orientations. On the tables, different objects gather. Making a place feel like home, or becoming at home' (Ahmed, 2006).

In my shed, when I faced the pinboard, my back was towards the garden. I was literally orientated by two points; the pinboard and the wall of my shed (node 1). I had to decide what to pin down (literally on the pinboard) and what to discard in order to arrive at a synthesis. This necessitated the negation of certain factors, with the acknowledgement that what remained pinned was not representative of the full experience. Nevertheless, although the pinning was limited by the parameters of the board and its relationship between points was narrowed down to the path of the golden thread that had been passed between the pins, the resonance of the pins extended beyond the boundaries of the frame. Sometimes I removed a pin, but the paper remained because the pin, as it pierced the paper, pushed some of it into the hole made in the pinboard, giving it enough purchase to remain there even when the pin was withdrawn. There is a similar effect when it comes to memories of the different configurations of the diagram and their relationship to the lived experience between the letterbox (node 2) and where I was at the time of creating the diagram, the shed (node 1).

Descriptor: A bobbin of golden thread attached to the top of the pinboard by a screw through its centre so that it can be unwound.

Technical process: The bobbin was the first item to be attached to this pinboard. In the performance of the diagram, the golden thread is used as a device to construct a conductive coil of subjective associations between matter and memory. This is done by unwinding the thread from one node (pin) to another. In so doing, a connection between the nodes is created. Often, it was aesthetic considerations relating to the line of golden

thread that instigated the reconfiguration of the nodes – a significant number of different pinnings of nodes took place before arriving at the diagram pictured in figure 29.

Technical contextual paradigm: This process, through the action of unwinding the golden thread, from one pin or node to another, is part of determining the position of a significant object (represented by a photograph, drawing, or piece of writing) and its connection with another node or memory.

One memory is that this bobbin of golden thread was purchased many years ago at a French flea market. It also reminds me of a documentary, *Aluna* (2014), which follows members of the Kogi tribe on their quest to bring attention to the interconnectedness of critical points on Earth. To demonstrate this, a Kogi shaman collects 400km of golden thread from the UK, and then proceeds to unwind it between specific sites in Columbia. In doing so, he uses the thread to illustrate how a 'metaphysical plane intersects with the physical world along identifiable geographic lines that are spread out across the Earth' (*They want to show us a thinking, feeling Earth*, 2013.

Seen holistically, the line of golden thread could also be thought of as concentric circles, radiating out from or into a central point like a spiral. A spiral, seen from above, could also be conceived of as a cone.

Bergson's Cone

As has already been established, Bergson uses a drawing of a cone to represent his theory of *durée* (see Ch. 1. figure 1 p. 64). Durée does not describe a linear relationship to time but one that could be considered as the implosion of multiple experiences and memories into a moment of present experience. The point S represents action on the plane of the present moment, filtering memories into perception (Bergson, 1991, p.162). The relationship of the cone to perception is described in more detail in section 3.2.

Technical contextual paradigm: The act of configuring the diagram (figure 29) was a process of durée. Each pin symbolised the tip of a cone, point S, filtering memories through the action of pinning (a representation of memory) into the moment of pinning. Although each pin became a node in a diagram of a network of nodes, unlike the GPS trace, which represents a linear relationship to time and space, the relationship between the nodes of a diagram is not linear.

'Bergson's Pendulum'

Descriptor: The pendulum is made of metal. The words, '*MAISON DE RADIETHESIE DEPOSEE PARIS*',[143] are engraved around its diameter and attached to its top is a metal chain.

Technical process: The pendulum was the second object to be attached to the pinboard. '*Radiesthesia*' is the French world for dowsing, a method of finding answers to a question through observing signals transmitted by the swing or rotation of a pendulum.[144] The question can relate to any number of concerns: for example, the

143 Entering these words into a search engine leads to: https://www.maisondelaradiesthesie.fr/notre-histoire/

144 Forked metal rods or sticks can also be used.

location of a spring, the diagnosis of an illness, a route of travel, or even an emotional matter. Empirical studies indicate methods of dowsing are effective (Pérez-Carrascal & García-Guarín, 2021)[145] however more research is needed for this to be verified.

Technical contextual paradigm: At first, it seemed that the pendulum was gate-crashing the empty space of the pinboard at the beginning of a story in which it had originally played no part. I had only become aware of it pinned there when I began to clear the pinboard to create space for this diagram. But the action of removing it caused memories of the lover who gave it to me to be drawn into the moment of hesitation over where to place it. It was during this moment that I noticed that the top of the pendulum could be unscrewed to reveal a small cavity that may have been meant to hold a small piece of material relating to what was being dowsed, thus creating a kind of circuit. Allowing this thought to continue, I focused on the cavity, remembering a discussion I had with a miner, who mines for the fun of it, 'to create spaces that did not exist before'. In some respects, what is placed on the pinboard has a similar effect in that, as a map of interconnected thoughts, it will inform the spaces that are created for thoughts in this chapter. In this moment of hesitation, memories of different love stories, spaces left empty, became associated with different memories. While these stories are not expanded on in any detail, they were enough to broker the position of the pendulum on the pinboard.

145 Debates over its success as a tool of water detection in South West Africa describe Kalb, M. (2020) 'The Dowsing Debate: Water, Science and Colonialism in German Southwest Africa*'. *German History*, 38(4). pp 568-593. Available at: 10.1093/gerhis/ghaa084. German occupiers importing and claiming success for the ancient folk tradition of water witching denying the existing indigenousness expertise.

Developing his diagram of a cone, Bergson uses a diagram of a pendulum to

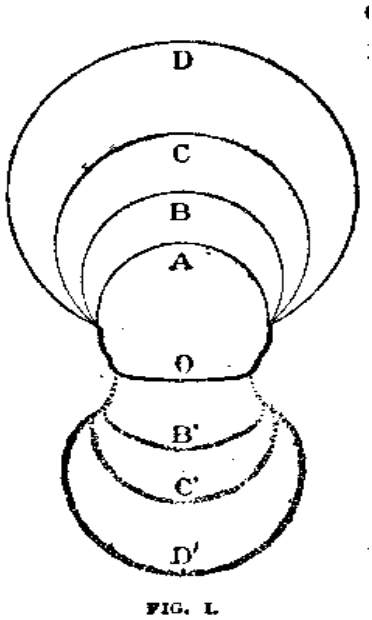

Figure 32: Progress of Attention and Widening Expansion of Memory (Bergson, 1991).

demonstrate how perception expands out from memories that are drawn into the initial point of perception, A, in relation to the object, O. 'Behind it the larger and larger circles B, C, D correspond to growing efforts at intellectual expansion' (Bergson, 1991, p.104). He uses the concept of a pendulum to illustrate how perception expands outwards to draw in other memories that then focus back in on the subject.

9.4 A Sample of Nodes

In this section, a small sample from the list of nodes found on the pinboard diagram provides the reader with a flavour of the nodes and related commentaries. The following were selected because they either document content described in previous chapters of the thesis or demonstrate how the diagram produces an alternative outcome according to their relationship between data, matter, and memory. For a further reading of the nodes refer to Appendix 12.

Node 1: Photograph of a Shed

Descriptor: Photograph of a shed (node 1) printed on paper.

Technical process: This photograph was printed from a printer connected to a computer, both of which are in the shed. Two cables are connected to this computer, one for electricity, the other for digital data, and both run out of the shed into the house and out again to join a network of cables distributing electrical energy and digital data across the UK, and beyond. In effect, the shed has the potential, through the computer sitting on the desk, to connect to any hard drive on Earth that is also connected to the internet, and to whatever digital information is stored on these hard drives.

Technical contextual paradigm: The shed is the place where the majority of this research has been written up. The computer is on a desk that is placed so that, when I am sitting at it, I have a view of the garden and neighbouring houses.

In effect, the shed has become part of the meta interface for a network of computers. Within this meta interface a digital file stored on a Google drive somewhere on Earth was used to print the photograph of the shed (node 1). The file was taken using a mobile phone that was set to transfer any digital photographs to a Google drive. Embedded in the digital file along with the photographic data are the GPS coordinates corresponding to where and when the photograph was taken. Using the computer in the shed and the software applications provided by Google, the photograph of the shed is displayed alongside a Google map. On this map is a graphic icon, representing a pin on a pinboard, identifying the approximate location of where the photograph was taken and thus the location of the shed.

Golden thread: If we zoomed into the photograph and looked through the windows of the shed, we would see a pinboard and the same photograph of the shed. By looking or thinking about this photograph (node 1), I engage with memories of seeing it, and also other memories that arose when I first saw it. At the time of incorporating these

notes into the thesis, I no longer lived in the house with that shed, although my new house also has a shed.

Node 2: Correio

Descriptor: A photograph printed on paper, which includes the raised letters on the letterbox that spell the word, 'correio', the Portuguese for 'post'.

Technical process: Like the photograph of the shed (node 1), this photograph was printed from a data file that has embedded in it the GPS coordinates of the position of the phone that captured it. From the GPS data, it is also possible to work out the time past between the photographs. Thus, we have a quantitative measurement of space and time that could be considered an objective relationship between data. This linear relationship applied to time and space can be reproduced on any computer accessing the same data points.

One action could be to retrieve these data files using a computer interface. For example, if the data of the letterbox (node 2) and the shed (node 1) are retrieved using a GIS interface, such as Google Maps, we can identify their location as two pins on a Google map by using the corresponding embedded GPS coordinates. One pin will be in Cornwall and the other, representing the letterbox, will be in Lisbon.

Technical contextual paradigm: Memories are sometimes conflated with photographs; however, they are distinctly different. A memory, unlike a photograph, is clearly not a material object. Through our actions, our memories engage with photographs to create a perception. Whichever interface is used, be it the blank canvas of JOSM, the Google Map underlay, or the pinboard, when two isolated points are identified, there is the potential to find a relationship between them. The relationship between the two points, one representing the shed (node 1) and the other the letterbox

(node 2), is inferred rather than intrinsic, but from an objective point of view, following Euclid's first postulate, a straight line could be drawn between them. In contrast, the two nodes on the pinboard, which represent the same shed and letterbox with a golden thread drawn (also applying Euclid's first postulate) between them, relates to a distinctly different perception of time and space: that of durée.

Golden thread: When looking at the relationship between the two nodes, memories of the letterbox (node 2) filter through the actions undertaken in the shed (node 1) – pinning material objects to the pinboard. Thus, the thought experiment uses the actions on the pinboard to project a perception of the letterbox.

Node 3: GPS Data Point – 'Untitled 01'

Descriptor: Node 3 identifies a point on a line. The point is on a printout of a section of 'Untitled 01': a line representing a GPS trace.

Technical process: This particular node identifies where the photograph of the correio described in node 2 was taken. The point, identified by the golden thread meeting node 3, is one of five other pins pushed through printed dots on the paper. Each dot represents a GPS node – in this case, the GPS of Lat 38:43 0.5830000. These are placed alongside the line of the GPS trace and identify the audio-visual media captured along the route of the trace.

Technical contextual paradigm: The pins identify a point on this line representing GPS points. Just as Euclid's first postulate is used to connect memories of the shed with the letterbox, a GPS trace is created by a network of nodes (GPS points) comprising a series of lines running from one point to another.

Golden thread: This will touch on all points; however, unlike the GPS trace which follows a network of nodes – 'absolute co-ordinates' – according to a linear

model of time, the path the golden thread travels is dictated by the memories drawn into its coils as they come into contact though action with matter. As such, it is not an absolute path but an unfolding qualitative relationship with a multitude of impressions.

Node 8: Letter

Descriptor: Letter: a word printed on paper.

Technical contextual paradigm: This letter, referred to as my dad's letter, has been on this pinboard in different positions since I returned[146] from Lisbon over two-and-a-half years ago. The research was motivated by an interest in documenting different perceptions of matter – in this case, by an increasing awareness of the many ways that I could engage with this letter. Bergson calls this an awareness of 'zones of indeterminacy', which refers to a moment prior to any action being taken where different potential actions are considered. The address identifies the approximate location of where the letter is now pinned. In this moment of hesitation, however, there is an expansion of attention to the actions of pinning, writing and reading, involving both space and time.

What I know about this letter will become apparent as we proceed along the golden thread, through the nodes, each one a memory relating back and forth in an undetermined relationship with this letter and the network of nodes. When an action is taken, the network of nodes defines the memories that come into the present moment – that is, both the moment in which I write this description and the moment projected into the future in which I will perform this diagram.

Golden thread: On the pinboard, I see a white envelope with an address. I recognise the handwriting and picture my mother's hand and her face while writing the

146 I returned from Lisbon in September 2018. The notes were written in April 2021.

letters. The envelope contains a letter about my dad, which at the time of documenting the letterbox, was in the backpack on my back.

Node 9: Journey

Descriptor: Journey: a word printed on paper.

Technical contextual paradigm: A journey can indicate a movement through space or a physiological transition. At the time of recording, the journey is referred to as 'leaving Cornwall and arriving in Lisbon, and all the points in between'. When I revisited the transcript, I found that the word 'journey' now also included points before and after the journey I took. Taking the first meaning of the word, a GIS interface could represent the departure point as the shed (node 1) and, at the point of recording, the destination could be the letterbox (node 2). In between certain choices were made – for example, flying from Newquay to Faro and then on to Lisbon, rather than flying from London to Lisbon. This had the effect of making the journey longer but, from my point of view, more enjoyable. It also meant that while both ways of travelling to Lisbon would mean arriving at the same destination, the qualities of the experience would be very different. This difference of where the start and end are defined would be reflected in the various shapes of the GPS trace; however, their qualitative difference would not be expressed.

Conclusion

In this chapter a very different approach to the digital interface of GIS to link qualitative and quantitative data has been described; a diagram and set of commentaries derived from winding thread around pins on a physical pinboard to create a different representation of lived experience of landscape. Taking the data from the audio file transcription of the stage in the dérive in Lisbon where a letterbox (correio) provoked a memory, which was deconstructed in chapter 8, a diagram inspired by Cachão's Mouth of the Monster (2015) was created as a way of documenting memories provoked during experiences in the lived landscape.

A digital file of the shed (node 1) exists within the 'meta interface', stored somewhere on Earth. Another digital file of the letterbox (node 2) is also stored somewhere on Earth. Embedded in the digital file, along with the photographic data, are the GPS coordinates corresponding to the location. From among the many potential actions that could have been taken using the computer in the shed (node 1) and related technologies, the decision was taken to print photographs of the letterbox (node 2) and the shed (node 1), and then used drawing pins to locate them on a pinboard. These nodes of quantitative data were connected by a golden thread, representing the qualitative experience of durée between two points. This echoes Bergson's theory concerning the relationship between action, matter and memory, an experience that is impossible to contain in any one representation because it cannot be reduced to a single point. This autoethnographic experiment has demonstrated how a journey can be represented in another way, one in this case which allows for non-linear perceptions to be documented.

This thesis has argued that the database of the meta interface does not offer a solution, only a powerful illusion that negates the richness of the experience. The golden thread, however, represents the virtual experience of a relationship with the

landscape. This chapter proposes a method (grounded in theory that applies to arts practice) that, rather than discard the quantitative and qualitative data due to the limitations of the technology, incorporates them into a different kind of network (a diagram) of nodes. Each node is a subjective memory drawn out through an engagement, not with the node itself, but with the ephemeral qualities of the individual's embodied experience between the nodes. It engages with a relationship between 'the intimacy of bodies and their dwelling places' (Ahmed, 2006, p. 9).

It should be noted that the parameters of the pinboard are used not to negate subjective or intuitive elements or to limit the extension of the subject, but to introduce a pause so that the objective of completing this thesis can be accomplished. My intention, following the completion of this doctoral research, is to develop a participatory mapping workshop to enable individuals to engage in making their own diagrams of objects in a landscape. They will deconstruct and reconstruct the data they document in the form of a diagram through the application of a reading of Bergson's theories on perception. In so doing, they will engage with a spatial practice that involves the virtual qualities of lived experience. The diagram engaged with in this chapter is as an extraction of the lived experience of a reality. The extraction extended from the action of documentation through to a critical analysis of the data and the lived experience of its performance, expressed for the time being as a thought experiment and described as a list of nodes.

Conclusion

This thesis was an inquiry into how technologies used for mobile mapping and digital simulations of space can be used for participatory mapping without the lived experience of landscape being negated or limited in terms of what qualities can be represented.

I begin this conclusion with the trope of the crossroads. This derives from the first seminar series I participated in at the Transtechnology Research forum, 'Tropes of Affect: Devices, Narrative and Illusion' (2016/17) where I selected the crossroads, representing a pivotal moment in a journey, as my topic.

The research journey documented in this thesis was born out of my reflection on a substantive participatory arts project, Reimagine Your Town (RIYT), which I facilitated in a small town called Penryn in Cornwall prior to commencing my PhD. The first crossroads I arrived at emerged from my encounter with the Transtechnology Research forum where a decision needed to be made to either continue to research RIYT as a method for community engagement in participatory mapping or cross a threshold and enter what felt like more dangerous territory: the 'less good idea' (Kentridge) [147] of a critical analysis of the qualities inherent in the representation of landscape. This latter road left behind what was, it became increasingly clear, a naive premise that the geo-spatial technologies of representation used in RIYT could provide a method with which to visualise subjective and idealistic ideas, placing them on an equal footing with those deemed 'realistic', and proceeds to question the objectivity of 'realist' representations of landscape.

147 This statement originates from a Tswana proverb 'If the good doctor can't cure you, find the less good doctor'. William Kentridge adopted it for a series of typographic "blue Rubik" works and the name for an "incubator space', founded in 2016, where collaborative exchanges between interdisciplinary artists are held. They are described as 'draw[ing] out the seemingly disparate lines of thought that are necessary agitators and animators for the particular kinds of work that take shape in the mixed-media terrain of the space.' I find parallels in the forum of transtechnology as well as the richness of what comes out of what at first appeared as a "less interesting idea" Kentridge, W. (no date) *The Centre for the Less Good Idea*. [Online]. Available at: https://lessgoodidea.com/william-kentridge-3.

If the thesis was simply the leaving of utopia, with a counterargument of the illusion of reality, there would be nothing new, but this is not the case. The premise is to suggest a way of engaging with a reading of Bergson, where a diagram represents the 'image' of a landscape[148]. To understand this 'image', I left the direct concerns of participatory mapping for a solo walk in Lisbon. Nevertheless, the questions the research asks of the data are consistent with the concerns of participatory mapping. Through a series of critical encounters with the data and methods of representation, several layers of complexity within the objective and subjective frameworks of representation were unveiled. By undertaking a critical analysis of the tools of production, further light was shed on the conflation between the objectivity of quantitative data and the subjectivity of its representation. These findings contribute to current debates in the fields of critical geography and qualitative GIS concerning the notion of 'neutral' representation, showing instead that everything, including the seemingly inconsequential dot or GPS node, has qualitative dimensions. The negation of such qualities, whether it be in the data or in the aesthetics of representation, although acknowledged in theory is often overlooked in practice, particularly in participatory mapping projects.

Thus, the artist-led participatory project, RIYT, introduced in the opening chapter, provided a context for this critical inquiry into the qualities of data and the politics of participation in the creation of representations of landscape. It introduced my position as the researcher who, at the time of initiating the project, was viewed as an outsider (or 'incomer') in the local community of Penryn. This position to a certain extent underlined the motivation for the research and – on reflection – steered it not only towards an autoethnographic methodology but also towards its potential application.

148 As mentioned at the outset of this thesis, the term 'image', in a Bergsonian sense, means 'a certain existence which is more than what the idealist calls a representation, but less than that which the realist calls a thing'.

Conclusion Chapter by Chapter

The thesis, throughout its three parts, is interwoven with Bergson's theories of perception. These were introduced in Part 1, chapter 1 both as a method of understanding the aims of RIYT, which sought to bridge the divide between realism and idealism, and as a way of critiquing the project's premise that a technological interface could provide a neutral plane on which residents' subjective responses to their lived experiences of a landscape, unconstrained by realism, could be reconciled with the objectives of local authority town planning. The level of resolution when examining this subject could have been finer, but it was sufficient to begin an inquiry (which continued into chapter 2) deconstructing the idea of the CGI mesh as a neutral, non-qualitative representation of landscape. In doing so, the chapter highlighted the ways in which the technological processes involved in using a games engine and LIDAR data, which appeared to offer so much versatility, actually constrained participation within the confines of a certain relationship to quantitative data and imposed an aesthetic of supposed realism. The strategy of providing a close description of a technology that had now become so familiar that it is almost intuitive was applied in greater detail to the technologies of GPS in chapter 5 and GIS in chapter 6.

If chapter 1 questioned the premise of RIYT's utopian aims, chapter 2 contextualised the intentions behind RIYT's invitation to residents to participate in populating a CGI representation of their landscape by referring to research by Jukes (2017) an animator, and Denham and Spokes (2021) digital games scholars, that questions the distinction between the space of a CGI representation and the space we live in. This does not suggest that a CGI representation can be considered in any way a real space, it simply establishes a basis on which there can be a relationship between the two. Jukes believes there can be a 'blurring' effect, in which illusion and reality start overlapping. This overlap extends beyond simple binary definitions of real and digital

space; rather, he suggests that our perceptions and experiences inherently merge the differences between the illusion of the representation, our subjective internal space and the reality of external space. This idea of blurring was then developed, using Denham and Spokes' application of Henri Lefebvre's (Shields, 1999) concept of a 'spatial triad', to conduct a further exploration of the dialogic interrelationship of internal and external space. As gamers or (in the case of RIYT) participants are part of this dialectic, the implication is that the perception and interpretation of any space is dependent on individual engagement and experiential involvement, suggesting a more interactive and dynamic view of lived versus represented space. Symbols of everyday life also play a role within this dialectic. The chapter proposed that these symbols or 'assets' could be considered vehicles for a similarly symbolic relationship between the interface and the landscape.

By introducing this interpretation of assets, Chapter 2 provided a theoretical basis for the participatory objective of RIYT. Despite the discrediting of the notion of a 'blank canvas', it could be argued that a participatory process facilitated by arts practice can still decide which concepts, in the form of assets, populate the plane. A key difference between the assets that populate the 'open world' landscapes of a game such as *Red Dead Redemption* (RDR) and those of RIYT, however, is that the latter were placed by residents in relation to a landscape in which they live. As such, there was a direct relationship between RIYT, as an archive of memories, and the lived experience of durée within the landscape.

By introducing not only Bergson's (1991) concept of durée but also Lefebvre's (1991) ideas of space, the research was able to consider an asset placed within the CGI representation through the lens of the 'production of space' as well as that of time. Hence, this chapter suggested a relationship between two philosophers who are often placed in opposition to one another (Fraser, 2007). Having established the potential for

the interface and the subject being represented to, if not share the same space, at least partake in a dialogue, the chapter concluded with questions regarding the position and effect of an asset when it is placed into the RIYT-conceived landscape by residents participating in the mapping project.

The ideas raised in chapter 2 relating to the symbolic position of an asset within Lefebvre's spatial triad were taken forward in Chapter 3 by applying an interpretation of Bergson's concept of durée to the task of engaging with the question of how perceptions of landscape are influenced by the relationship between matter, or material objects, and memories. Thus, it drew out the phenomenological aspect of this research by focusing on an object of significance to Penryn resident JT's relationship to his landscape: i.e., a gate stop. It did so by comparing encounters with this gate stop, including a walk I took with JT to this object, and representations of it within RIYT's CGI landscape and on Google Street View (GSV). These encounters resulted in a reflective analysis of the qualities of the data, and the lived experience was then contrasted with the form of their representation. This also included the ways in which the object, the data and its representation were considered by both JT and myself as the researcher.

In keeping with the autoethnographic methodology of the thesis, the research used the gate stop to highlight the differences in the relationship, in terms of perception, between a resident participating in RIYT, myself as the producer of the project, and a potential viewer of GSV. This touched upon Sara Ahmed's (2006) use of the term 'orientation' 'as being as much about a sense of belonging or home as it is about navigating around a landscape. In this respect, the gate stop could be considered a 'homing device' (p. 9)', for JT to orient himself within his locality. This focus on the asset of the gate stop provided the basis of why an application of Bergson's durée could be useful when considering representations, if not evoking, perceptions of landscape. It also demonstrated the advantage of the concept of the 'blank canvas', in that it

highlights assets of participation such as the gate stop. Whilst recognising the problematic colonial undertones of RIYT's representation of the landscape of Penryn, an alternative reading of the underlying motivation of RIYT considers my diasporic heritage sense of always being an 'incomer', with no recognisable 'homing device' in contrast to JT's relationship to the gate stop. The process of producing RIYT as a participatory arts practice invited a familiarity with a landscape through the location of memories of residents who feel at home in theirs.

In ending the chapter with a description of my return to this gate stop seven years later, the focus of the research returned to a concern with the qualities of documentation, questioning the tangible differences between reality and representation. The example of the gate stop and its relationship to both JT and myself as the researcher exposed the impersonal nature of the equivalent example of documenting the gate stop on GSV.

The contrast with the intimacy of a mapping practice oriented around the interests of participants was then taken forward in Part 2, Matter and Memory in Lisbon, which introduced an autoethnographic element into the research, with data collected from a dérive inspired project that began with the 'blank canvas' of a GIS interface. Chapter 4 used the problem of describing the line, 'Untitled 01', otherwise known as the GPS trace of the research experiment, to further unpack Bergson's theoretical model of perception. It did so by experimenting with isolating the description of 'Untitled 01', preventing further memories from adhering to the materiality of the documentation. This experiment, which explored the absence of qualities in the documentation, introduced the thesis' ontological adoption of the word 'virtual' – a definition that is distinct from a digital simulation of reality but instead refers to the representation of a perception that is real but can never be recognised in all its fullness. This absence of qualities was pursued by analysing Tim Ingold's (2007,

p.72) critique of the technological construction of an equivalent line. Ingold looks at how a network of GPS nodes fails to represent the qualities of inhabiting a landscape. In this case, he uses the term 'inhabit' as opposed to 'occupy' in order to avoid associations with colonial histories (Ahmed, 2006, p.126). The difference between a representation of dwelling and that of occupation is congruent with links to my autoethnographic position as an incomer seeking a place of dwelling in all the landscapes of the research.

The chapter followed Ingold's deconstruction of the line with a description of the outcomes obtained by taking his suggested thought experiment – cutting up a 'line' printed in his book – literally. This description illustrated an important difference between the qualities of an imagined action and those of an action that has been taken. The results and correspondence with Ingold indicate how even a dedicated and fastidious scholar like Ingold, who critiques the fallacy of certain methods of representation, can get caught up in the illusion, or the practice of disavowing the gulf between description and experience. This served as a reminder that the objectives of this thesis are not related to abstract idealism but to research that can be applied to the practical context of perceptions of landscape.

Once 'Untitled 01' had been unravelled, chapters 5 and 6 analysed its qualities and their representation from a technological perspective. These two chapters demonstrated the conflation between the objectivity of GPS with the representation of data in GIS, exposing how the word 'data' is often used in a political context to portray a point of view as fact rather than opinion. With a focus on GPS, Chapter 5 covered how this profound shift in navigation methods, initially developed with a Cold War-focused intent, was integrated into civilian use to both document and coordinate lived experience. By taking a consideration of the qualities of this data type and the infrastructure that allows its harvesting beyond the basic description of a system of

satellites circumnavigating the planet, the chapter expanded a purely historical account of GPS's military development to encompass a critique of the type of data that is gathered and the control of it. The outcome alluded to the fact that the data does not represent a purely quantitative, accurate measurement of a point in time and space. In an alignment with a Marxist-feminist critique (Smith & Katz, 1993), it identified the overarching technological systems as part of a preconceived and controlled space that negates the data's other qualities.

The practice of reducing subjective qualities to absolute factors of precision, as exhibited in GPS data, underlined the earlier distinction between inhabiting or dwelling in a landscape and observing it from a distant perspective, reminiscent of an imperialist stance. The death of Rufina the Cow was introduced into the narrative as an example of a history of technological development that often negates other qualities of lived experience. This can have the effect of potentially influencing the way we orient our lives. This chapter, significantly, framed the use of the word 'orient' with reference to Ahmed's *Queer Phenomenology* (2006), a text that increasingly influenced my reflections on the outcomes and applications of the research.

The subsequent analysis of the GIS interface in chapter 6 had three objectives. The first was a critical reflection on the idea that when documenting the dérive in Lisbon, I began with a bird's eye view of a two-dimensional stack of blank layers. The second was to draw attention to the conflation between the qualities of GPS and GIS's layers of representation. The third was to identify how a system of layers integrates qualitative data while maintaining a framing that accords with a linear concept of space and time. In its attempt to meet the first objective, the chapter provided an overview of the interface's development and the colonial bias underpinning its system of referencing space. As such, the notion of a 'blank canvas', as found in chapters 1 and 2 when considering RIYT's 3D plane, was again discredited. The second objective drew

attention to qualities of representation that were not inherent in the GPS data itself by observing those qualities the GIS interface ascribed to it when representing a network of GPS nodes as a line. The third pointed towards how a certain framing of the qualitative data, within a system of layers, is part of the meta interface (Andersen, 2018), with political implications of being orientated in relation to the megastructure and the underlying concept of the 'Stack' (Bratton, 2016).

The chapter reiterated that the point was not to undermine GIS but to affirm how a conflation of the empirical objectivity of GPS with the aesthetic qualities of GIS denies the subjectivity of the interface. As such, it contributed to discussions of qualitative GIS (Elwood & Cope, 2009) through its demonstration of why, even without any qualitative data, GIS is a qualitative research tool. At the same time, informed by both feminist and Marxist critiques and an examination of the framing of additional layers of quantitative data, it also described any participation in populating the 'blank canvas' of GIS with the qualitative documentation of everyday life is structured around a linear concept of time and space (Shields, 2018) or a division of landscape based on the Greenwich meridian, which negates qualities of durée; the subjective lived experience of reality.

Part 3 of the thesis, *Diagram of a Letterbox,* was introduced in chapter 7, marking the point at which arts practice took the lead and steered the research methodology towards an approach that aligns more directly with the central concern of this thesis questioning how certain technologies used for mobile mapping and digital simulations of space can be used for participatory mapping without the qualities of experiential dimension of landscape being, if not entirely negated, then severely limited in terms of their representation.

Developing the concerns raised in Chapter 6 relating to the aesthetic qualities of both the line and the framing of data, Part 3 turned to the analysis and representation of

data, considering different approaches informed by arts practice. In doing so, chapter 7 served as a reminder that this thesis is not one of abstract philosophical concerns but rather socially engaged arts practice that draws upon philosophical ideas to inform methods of participatory mapping concerned with representing individual perceptions of a landscape. Having provided an overview of the layered quantitative interface and bias of GIS in Chapter 6, Chapter 7 illustrated the point that 'very different kinds of GIS could have been developed under different socio-political interactions' (Kwan, 2002, p.648) through giving examples of other artists who incorporate technologies of GPS and GIS into their work. Needless to say, as time passes, different examples of artists to those mentioned in this thesis will come to the fore. However, the general intention of this chapter was to relate the critical engagement of the research to the future development of art practices and point towards how this could relate to participatory mapping. This is important because, although the conflation between the quantitative and qualitative, subjective and objective qualities of data is a recognised fact, the critical subtleties are nevertheless often forgotten by producers, artists and indeed government-backed funding bodies. This risks the negation of certain qualities of experience that could have implications for the politics of participation.

The negation of qualities exposed in chapter 7, observed by zooming into the line on the GIS interface, was next applied to examples of qualitative data documenting the dérive in Lisbon that was integrated into the layers of the GIS interface. This was demonstrated in chapter 8 where an analysis of audio data, codifying each individual word of the transcript of the documentation, took the criterion of 'objectivity' to a level of absurdity in the attempt to exclude the subjective memories of the participant (myself). This action was preceded by questions raised in the conclusion to Chapter 3, where a return to the gate stop seven years later prompted me (as researcher) to look at the qualities apparent in the material object in the absence of any associations with the

documentation, data or lived experience. As such, this chapter was an example of the way in which the thesis expanded chapter 3's application of Bergson's durée from a perception of landscape to a perception of data. The relationship of actions drawing down memories in connection to a digital asset and its material counterpart in the landscape, a gate stop, was applied in the coding of chapter 8. The analysis developed a number of key terms, taken from Bergson's *Matter and Memory*, (1991) into categories for the qualitative coding of words. This process of qualitative coding treats the data as matter and attempts to isolate it from memories, effectively a method of bracketing[149], mirroring Bergson's method of illustrating the complexity of his theories.

The reflective methodology of the research then returned to a critique of categories that both developed an understanding of Bergson's use of the words and referenced the work of other artist-researchers (Cachão, 2015) and theorists (Ahmed, 2006; Lefebvre, 1991) in order to deepen the critique of the categories and associated coding, for example, Ahmed's use of the word 'gaze', as in the gaze that turns to an object, brings other objects into view, [and] the way we orientate ourselves affects what can be perceived' (2006, p.88). This was then related to Bergson's understanding of perception as a calculation of the results of 'our possible action upon things, and thereby, inversely, the possible action of things on us' (1991, p.56) – affirming why the word 'looked' could be categorised under the key term of action.

The actions that attempted to isolate memories from the interpretation of data put the qualitative richness of the data into question. As such, this thesis advocates that qualitative data should not be disregarded but that its analysis should be integral to the participation in mapping projects. Following this deconstruction of qualitative data, the final chapter then suggested a reconstruction of the data that would include its missing

149 Bracketing is linked to Husserl phenomenological method of epoché. Where preconceived ideas are put to the side through a process of reduction in order to isolate perception of an object to what is 'given purely in consciousness' (Moran and Mooney, 2002, p.62)

qualities. Chapter 9 was framed as a thought experiment in the acknowledgement that it is not yet a method and awaits further research before it can be developed for practical application. The experiment evolved from the research described in the previous chapters: as the research developed, the scope of the granular analysis of the subject expanded from the central question of which qualities of data or mode of representation were actually documented to a concern with the inadequacy of describing the subject in writing. Reading the text, the gap between what was perceived and what the writing communicated or described became clearer. Like the placeholder in chapter 4, 'Untitled 01', the writing in this thesis could in fact be presented as a good placeholder, on the understanding that many other qualities have been disregarded for the sake of arriving at a description that will stand as a conclusion.

However, the concept of a diagram seemed to provide a solution to this gap between description and experience through its invitation to extend beyond the frame of representation. Yet, when it came to writing the commentaries on the nodes, it appeared that the strengths of the diagram could be undermined through being contained by the text, in much the same way as the absurd analysis of chapter 8 both undermined the meaning of the transcript and demonstrated how an extension beyond the boundaries of the frame, to incorporate additional memories, was needed if the full meaning was to become apparent.

Nevertheless, once chapters 1, 2, 5 and 6 had demonstrated the fallacy of the technological 'blank canvas', the flaws in the idea of objective qualities and, in chapter 8, the absence of the content of qualitative data, chapter 9 attempted a restoration of the experience being mapped. Rather than discard the quantitative and qualitative data due to the limitations of the technology, the chapter incorporated it into a different kind of network (a diagram) of nodes. Each node was a subjective memory drawn from an engagement, not with the node itself, but with the ephemeral qualities of the

individual's embodied experience between the nodes. Thus, the chapter described an action that reflected what the research experiment in Lisbon sought to document: 'the intimacy of bodies and their dwelling places' (Ahmed, 2006, p.8). By identifying connections between matter and memory, 'homing devices' such as the letterbox in Lisbon were brought into view and interconnected, for example, with the cobbles in the street, associated through memory with social discontent, and then threaded through to other objects in Penryn of significance to me, the 'outsider', like the shed and the gate stop. The intention was for this thought experiment to encapsulate the research, grounded in theory and art practice, and provide the basis for potential postdoctoral research.

The Research Process

Throughout this thesis, arts practice and a reading of Bergson have been fundamental to informing the approach to the analysis of the data and the application of other, related theories such as Lefebvre's concept of the production of space. As well as the arts practice mentioned in the text, during the last 7 years other relevant arts practice as research included documenting a bench in Finland (Appendix 8), facilitating community mapping projects in Bodmin (see appendix 10) and producing a community zine (appendix 11) in Penryn.

The work of Ahmed, referenced throughout the thesis, was used to support the conclusions of the research and inform the thought experiment in chapter 9 that is, using a phenomenological lens to view objects within the landscape to orientate a sense of 'inhabiting' it. It was through the research process, the analytical relationship to the data and the autoethnographic methodology that I began to understand that the production of both RIYT and the research experiment in Lisbon were in part motivated

by my diasporic ancestry, which has meant that I am always seeking a sense of inhabiting, of belonging in a landscape, or inquiring through participatory arts practice how other people find their sense of belonging or home (see appendix 10 and 11). What qualifies as 'having a place' is a question of interest to the politics of participation. One criterion is the cultural or individual history related to a landscape. In terms of individual narratives, the thesis identifies myself as the researcher and 'incomer' in the production of RIYT. Later, in chapter 4, I describe the setting of the research experiment, Lisbon, as 'a city I had not visited before'. This position is presented in stark contrast to local resident JT, introduced in chapter 3, whose memories of a gate stop established his ancestral connection to Penryn.

However, an alternative perception of belonging to a landscape began to emerge through the research process[150] during which I engaged with the data gathered in Lisbon, documenting the relationships between matter and memory, and applying an understanding of durée. This theoretical work, alongside repeated walks to the gate stop or the use of GSV updates for voyeuristic visits to the letterbox in Lisbon (see appendix 7), began to yield different points of reference from which to stake a claim of belonging. The research therefore suggests that the 'orientation' of a 'virtual' (in Bergson's sense of the word) place is particularly relevant to the primary objective of those forms of participatory mapping that aim to help an individual represent their sense of belonging to a location and a community. The use of orientation in this sense is connected to Ahmed's (2006) phenomenological approach that, although not directly related to Bergson, does relate to my position of not belonging.

It is widely recognised that the way in which relationships to spatial-temporal realities are documented and represented affects which qualities of relationship are considered crucial to defining a claim to a place (Corbett, 2009, p. 75). Without denying

150 which was often carried out in a shed in Cornwall.

the advantages of using technological interfaces, this thesis has been concerned with the question of how participation can avoid contributing to or being consumed by the 'spectacle' (Debord, 1994)). This spectacle masks its hegemonic aims by presenting its technological apparatus as serving to widen participation rather than using it to construct a limited reality presented as 'objective'. Taking an ethical position in relation to mapping and the 'right to belong', this research shares with Ahmed a critique of how the straight lines of Euclidean geometry when applied to geography infer a certain perspective. Ahmed, who identifies as a lesbian immigrant 'indebted to generations of feminist writers' (2006, p.5), traces the provenance of these lines to a culture dominated by a white male heterosexual narrative. In view of the autoethnographic methodology of this thesis, I have to acknowledge a hesitancy in drawing too deeply from Ahmed's contribution to phenomenology, since I am – from a certain perspective – a beneficiary of that straight white history.

Nevertheless, Ahmed's queer phenomenology and her use of orientation also draws from and is applied to her identification as a 'migrant subject'. This is a quality that, according to Ahmed's criteria, I share by virtue of my diasporic heritage. As such, through my family's history, I recognise the commonality of the lived experience of a migrant and the orienting effect of objects and the memories they evoke. Thus, by using the autobiographical to engage in an analysis of both the theory and the data, I chose research methodology which deviated from the straight lines of interpretation by using an interdisciplinary framework. Whereas Ahmed's focus is an interpretation of phenomenology, the method of orientation put forward in this thesis applies a reading of Bergson's *Matter and Memory*, and his concept of durée to a practice related to mapping. Perhaps it could be called a *queer* durée.

The Contribution of this Thesis – An Application of Bergson's Theory of Durée to Spatial Practice.

By applying a reading of Bergson's *Matter and Memory* to the concerns of space (Williams, 2016; Shields, 2018), this thesis runs contrary to the opinions of many respected social geographers who, perhaps under the influence of Lefebvre, consider Bergson's concern with time as, at best, missing the nuances of space (Massey, 2005) and at worst, devaluing space as little more than a container for time (Soja, 1989, p.123). This thesis, however, suggests that such critiques of Bergson's notions of space have not grasped how his theory fixes neither space nor time. Indeed, the thesis itself makes a minor contribution to the scholarship calling for a rapprochement between Bergson and Lefebvre, or at least an acknowledgement that 'Lefebvre's facile explicit dismissal of Bergson's philosophy is at odds with his texts' implicit and uneasy relationship with Bergsonism's tenets' (Fraser, 2007, p.339). A reason Fraser gives for this posthumous recognition is 'because it reinforces both thinkers' own emphases on interdisciplinarity and on reconciling theories of knowledge with theories of life' (2007, p.338). As an arts practitioner, I applied my reading of Bergson's philosophy to research that was related to the use of geo-spatial technologies to represent landscape. Thus, aspects of this reconciliation were evident in my application of Bergson's theories to my autoethnographic research, in which I developed a form of spatial practice that both relates to and informs lived experience.

A paper that is some ways validates the critique of technologies and data related to the spatial concerns of mapping is Rob Shield's 'Bergson GIS: Experience, Time and Memory in Geographical Information Systems' (2018). Although he does not cite Lefebvre, the author is an authority on his work (Shields, 1999). While the title, 'Bergson's GIS', intimates a more in-depth consideration of Bergson's philosophies than the scope the paper allowed, Shields' application of durée to a critique of GIS

raises a challenge for further research into 'digital media such as GIS and games to support memory as a process rather than another fixed object to be geolocated, pinned down with latitude and longitude coordinates' (Shields, 2018). The research of this thesis responded to this challenge, not in terms of changing the interface of GIS, but in ways of using it that support memory as a process of present lived experience.

In doing so, another contribution this thesis makes is in answering Kim's 2015 call for new visualisations in the area of participatory mapping as its research moved from combining 3D CGI and game engine technology in participatory arts practice that incorporated participatory mapping in part 1 through a close investigation of GPS and the GIS interface in Part 2 to the experimental use of a diagram in Part 3 which explores alternative relationships to landscape. It is envisaged that this research will open up new opportunities for community arts practitioners working with participatory mapping to explore community needs with more awareness of the multi-faceted dimensions that are at play when a participant engages with a mapping interface.

A Bridge Between Idealism, Realism, Iconoclasm and the Virtual

Prior to developing a 'Bergsonian analysis of data', this research was mainly influenced by political activist Guy Debord. This is evident in the reference to the 'spectacle' when considering the meta interface of digital technologies and the creation of psychogeographies in both Penryn and Lisbon. However, while the application of Bergson to the concerns of geography is increasing (Shields, 2018; Williams, 2016), the association of Debord with Bergson is rare.

The concept informing the research experiment in Lisbon, drawing on Debord's method of mapping the dérive and Bergson's work, *Matter and Memory*, does not ignore the fact that Debord shared with his intellectual colleague Lefebvre a disdain for

what they considered the idealist philosophers of the academic bourgeoisie who diverted attention away from 'the underlying class conflicts concerning economic power' (Shields, 1999, p.52). It does, however, create a bridge in terms of its methodology across the perceived divide between metaphysical philosophers concerned with time, such as Bergson, theorists concerned with space, like Lefebvre, and political action, like Debord, (Pinder, 1996). In this respect, this research presents an original application that combines supposedly opposing ideologies.

In terms of a related opposition between quantitative and qualitative data, this research also contributes to the concerns of qualitative GIS through its demonstration of why GIS is a qualitative research tool and contributes to the vigilant awareness – which all producers of participatory mapping should have – of the aesthetic framing of digital interfaces like GIS and the language used to describe representations.

The bridge between these two opposed camps is carried forward into the analysis of the data. The coding of data is an aspect of mapping that often excludes participation. In this thesis, however, it is presented as a critical stage in producing a diagram for the orientation of virtual experience. The data, considered as matter, and its relationship with memory produces, through the action of an analysis informed by durée, a wider scope for potential perception. The proposal of this research is that using such a lens can help bring about a détournement (Debord), or 'hijacking' (Pinder, 1996, p. 419) of the technologies of the spectacle, and in doing so loosen the constraints of a dualist conception of reality and orient towards a lived experience of the virtual qualities of landscape.

Responding to Blassnigg's Call

This thesis has delivered (at least in part) a response to Martha Blassnigg's call to employ Bergson as a device for research relating to 'processes of interaction' within 'media environments' (2014). It did so by applying Bergson's theories to the objective of participatory mapping, using technologies that – as noted by Shields (2018) – do not consider durée. Blassnigg's concern is the role of the spectator in relation to cinema: the more intensely the spectator engages with a film, the more 'real' the perception of it becomes in the actualisation of the 'virtual'. In other words, 'reality' in the cinema exists in so far as the spectators enable an actualisation of the virtual (Blassnigg, 2009, p.183). This thesis, however, is concerned with the role of individuals participating in creative mapping practices, using technologies to harvest data and create representations of landscapes that are said to represent their lived experience. When these representations - the maps - were subjected to close scrutiny, it was apparent that the form of documentation did not illustrate the lived experience. So, I reversed the process and used an application of Bergson's theories of perception to both reflect on the lived experience and develop models to critique the absence of certain qualities within the representation.

Thus, through the methods of analysis suggested in this thesis, the undocumented qualities essential to the experience of durée began to emerge. It became apparent that if the objective of participatory mapping is to represent the lived experience of landscape there needs to be fuller participation in the analysis of not only the data but also the aesthetics of representation:

> An awareness of the embedded transformative processes of the mind rather provides, in their extension in duration through aesthetic or philosophical intuition, the grasp of pure memory and pure perception, which exceed subjectivity and the personal by an experience that is, at least partially,

> unencumbered by the cognitive constructedness of reality. (Blassnigg, 2009, p. 179).

The concern of this research has been the socio-political implications of the use of digital technologies for the representation of individual perspectives of landscape. Its contemporary relevance lies in its context of applied arts and mapping practices that are concerned with the politics of participation and how the use of technologies for 3D and 2D simulations of landscape determine relationships to these landscapes according to a particular perception of reality. What the thesis has clearly demonstrated is how the technologies used to represent this version of reality operate within a framework that conflates qualities of data in such a way as to deny the subjectivity of their conceived representation of the lived experience of space.

Rather than be floored by a dystopian horror of the technologies of the 'society of the spectacle', this research offers a method of embracing the contradictions through an engagement with the data in the form of a diagram. The thesis concludes with a suggestion for an alternative theoretical framework, aligned with Bergson's theories of perception: one that can inform if not the future development of related technologies, then the methods of critically engaging with the data produced, and is designed to orient relationships to landscape according to 'virtual' perceptions of reality.

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Appendices

Appendix 1: Re-imagine Your Town (RIYT)

'Revisiting ideoplasticity: contingency, action, and imagination'

Note: Section with JT Gate stop inserted into RIYT landscape is at 14:00

A video presentation reflecting on RIYT, made post delivering paper at the Trans technology Research Seminar Series (2017/18).

Rather than writing a paper, I produced the video, which combines images of practice with audio of me reading the text from the paper:

https://www.youtube.com/watch?v=x9EgZouAeiQ

1.2 Re-Imagine Your Town Website

Website to further images and https://reimagineyourtown.org/

Figure 33: RIYT GAme Engine Interface

Re-Imagine Your Town is a project to co-create a 3D interactive map of Penryn, inspired, remembered, and dreamed up by local people. Artist led, participatory workshops will engage local residents in re-imagining the place in which they live by exploring the past, present and future of the town, capturing individual and collective memory, observing the current state of things, and imagining sustainable futures. Outputs from the workshops will be integrated into a digital map to create an interactive archive of ideas, exhibited in a temporary 'ReImagine Shop' as part of the town's 800-year celebrations and shared through a publication.

Figure 34: Viewing RIYT in Virtual Reality

Excerpt from Funding application to the Arts Council England - Local Context

Penryn town centre is among the 20% most deprived areas in England according to the Indices of Multiple Deprivation (IMD) data from 2015. This project takes a creative approach to mapping the area: through memories, present experiences, hopes, fears and ideas for the future.

Penryn is 800 years old and it's rich, layered history makes it an exciting, inspiring and often surprising place to explore. This project seeks to unpick, interweave and add new layers to this historic town. Its history is being celebrated by many local groups. This project complements other activities already planned by giving a voice to the everyday, personal memories, experiences and hopes of the people who live here now.

Figure 35: RIYT Elevation of Penryn Produced from 3D Diagram Model

Penryn faces many challenges including housing shortages, resistance to planned developments, empty shops in the town centre and a growing yet un-catered for student population. This project is an opportunity to explore these issues as well as identifying and exploring others that are important to the local community.

The group of artists who will be involved in the project all live and work in Penryn and are therefore well placed to explore the town and invite others to join them, ensuring that the project is run by local people.

The town is looking to undertake the process of writing a Neighbourhood Plan. Re-Imagine Your Town is therefore well placed to engage with, reflect on and contribute to that process.

1.3 RIYT Arts Council England Evaluation Report 25 July 2017

Project information

Applicant name: InterAnima

Project title: re-imagine your town 02

Project number: GFTA-00022774

Amount awarded (£):

£14,977

Report type: Final activity report.

Evaluation

An outline of the activity delivered - what you achieved, compared with the original aims of the activity:

No more than 3000 characters.

We succeeded in our primary aim of combining diverse participatory arts practices to initiate co-creation of a 3D CGI interactive map of a town by residents of the town across demographics. The project has been recognised to be an innovative response to local challenges, for example through integration into the local neighbourhood planning consultation.

Engagement exceeded our live audience targets (the 5000 online audience was a mistake in the application thinking it referred to press & online interaction not direct participation). The vacant shop on the high street became a vibrant 'pop up' Community Arts Centre. The professional curation of the space allowed the six artists to operate effectively, displayed their work appropriately and at the same time enabled a welcoming space where people could engage on a 'drop-in' basis and facilitate existing groups to interact with the project as intended. Participants ranged from 4 to 97, some of whom

openly commented on how they had not done 'anything like this' before.

The range of workshops varied in success. The collage workshop was an immediate way into the themes of the project for all ages. The 'mis-guide' of the local pubs past and presentplaced the role of 'expert' in the hands of local residents animating their stories. Both workshops produced art works easily integrated into the 3D model with the Vive giving people their first experience of VR. However, participants in the sound mapping and flag making workshops did not develop the work independently. The most disappointing workshop was archiving a selection of the museum's collection with their volunteers. The enthusiasm at the workshop was matched by a strong negative response which we have yet to fully understand.

Developing opportunities for transferability between participatory arts practice and community planning was a strong aspect. However, this public engagement tool, whilst recognized by the CEO of Cornwall council as a great asset, has yet to be fully taken advantage of locally. The resignation of the council clerk,an advocate for the project, is one reason. The library temporary closure of the library also means we lost ongoing public access. Our legacy aims of establishing a community media studio to facilitate ongoing access to the archive and creation of the map remains a goal we are working towards.

We intend to use the over 200 evaluations and over 300 signatures in support of the project to encourage local councilors to push forward alternatives.

The high volunteer engagement was great but the project needed further resources to manage this, in particular the aim of training the digital scribes became difficult without adequate coordination of limited hardware and space that could not train more than two people at a time.

Although ongoing evaluation occurred through critical reflection on all activity, we had to abandon the concept of evaluating each aspect of the project on the map due to being under resourced.

What you learned, and how the activity has helped you or your organisation to develop:

No more than 3000 characters.

As a relatively new CIC, Re-Imagine Your Town has been InterAnima's flagship project. The ambitions of the project in terms of budget were unrealistic. We achieved our aims by considerably overextending ouelves in a way that is not sustainable. However, it has significantly raised our profile, demonstrated our capabilities and we now have a prototype to showcase a trulyinnovative method of participatory arts community mapping.

The complexity of the project, crossing disciplines and using both digital and hands on technologies makes it stand out. The ambition to address the whole parish with the 3D tool raised interest but a more focused area would have been more viable and allowed us to develop the weaker aspects.

Wanting to be inclusive and respond to demand required flexibility and a lot more co-ordination - more emphasis in planning needed to be given to this and built into the budget from the outset. We wanted to allow a responsive approach but it overextended us. Similarly, we needed a budget for developing the website post completion which remains a priority and does not reflect the project.

A key factor in the success of the project was the location of the shop on the high street. On completing the first phase, RIYT moved into a studio offering good public access but less visibility. The rising engagement dropped off once it was no longer clearly visible on the high street.

Aspects that related to local governance and the innovative inclusive approach seemed to lead some local councilors or indeed individuals in positions of power to undermine the project. We learnt that even more dissemination of the idea and personal interactions prior to the start of an event can help avoid some of the perceived conflicts of interest. This could also be why the idea is gaining ground outside Penryn itself where local invested interests are less of an issue.

Combining arts practice and cutting-edge technology requires specific strategies. We began training people (digital scribes) to facilitate the general public's interactions with this but needed more time and resources to be more flexible, effective and maintain long term accessibility to the work. Furthermore, the fact that some of the volunteers were specifically recruited from a pool of people who were unemployed meant they did not always have the necessary skills at the moment when they were needed. The organisation will develop to encompass this learning into our next project and have volunteer training more embedded in the plan of work. However, InterAnima now has a significant number of stakeholders in the form of volunteers and artists who are keen to support and be involved with further initiatives and have worked to develop the organization through social media presence, participatory art works and production skills amongst others. The relationships between stakeholders and the organisation have been mutually beneficial as detailed in the following section.

Any longer term impact the activity has had:

No more than 3000 characters.

RIYT engendered a sense of place and community pride through creative engagement in a co-created archive. It also operated as a catalyst for crossing social boundaries generating new ideas.

The project became a forum for different groups to come together and to begin ongoing dialogues. One example in particular being staff members from the job center meeting with a career's advisor from the local secondary school to discuss the project in terms of employability and future careers. Of the volunteers on the project, six were long term unemployed and referred from the job-center, and a further four have long term mental health issues that hinder them in conventional employment but through skill sharing in the context of RIYT they developed confidence and continue to have a relationship with InterAnima and its directors with a view to raising employability.

Since the official completion of the project, and the re-presentation of the 3D map with all the data archived in it, RIYT has received numerous invitations to events such as Truro Knowledge Spa VR showcase. The potential applications of the methods we used have generated interest from the University of Exeter with regard to a research project on housing and health with a potential £20 000 to develop the RIYT further.

Through this project InterAnima has acquired some state-of-the-art equipment, now available for use by the local community who would not otherwise have access to this technology. RIYT participants and interested parties are invited to take part in a monthly meet up using this equipment and logging ideas and developments in the archive. This is the beginning of InterAnima's Community Media Studio – for which we gathered 300 people names in support. In addition, the ongoing dialogue with the neighborhood plan and their recognition of how we have extended residents' engagement in town & community planning may lead to a joint venture.

Further impact can be seen in the development of art works originally commissioned for RIYT. Etheridge and Persighetti have been commissioned to take their 'mis guide' 'round the public houses' to the Leeds Compass festival. Another artist, choreographer Ruth Pethybridge is developing the 'Mini-Disco' a volunteer led initiative at RIYT into a proposal for socially engaged dancing in rural communities.

The methodologies of the Re-imagine project and wider social application need an online interface to widen participation and consider developing a viable social enterprise. To assist us in developing appropriate strategies Cultivator, a local business support service, are providing funds and expertise to fully evaluate the project to date and model a sustainable plan for the next stage in our organisation's and the projects development.

Activity Location

Type of activity: Non-touring

Is the non-touring activity taking place in one or more specific locations or venues?

Non-touring

Name of the venue	Local authority
Vacant shop, 70 lower market st, Penryn	Cornwall
InterAnima Studio	Cornwall
st gluvias hall	Cornwall
Penryn Town	Cornwall
Penryn College	Cornwall
howls studio	Cornwall
stuart stevens hall	Cornwall
Draceana centre	Cornwall
knowledge Spar	Cornwall
the warehouse	Cornwall

Activity beneficiaries

Tell us how many people have engaged with your activity. The first column below shows what you estimated in your application. Please use the second column to show the actual numbers achieved.

People who will benefit from your activity

Beneficiary Type	Number of people who will be benefiting from this activity	Actual activity

Artists	6	10
Participants	220	226
Audience (live)	750	825
Audience (broadcast, online, in writing)	5,200	0
Total	6,176	1,061

Results of your activity:

The first column shows what you estimated in your application. Please use the second column to show the actual numbers achieved. Enter '0' (zero) to any item that is not relevant.

Activity Results	**Estimated**	**Actual**
Number of new products or commissions	10	11
Period of employment for artists (in days)	38	39
Number of performance or exhibition days	40	40
Number of sessions for education, training or participation	38	50

Activity income

We require you to complete an income and expenditure statement for your activity. The first column below shows what you estimated in your application. Please use the second column to show the actual figures for your activity. Please enter full pounds only and check your figures carefully.

Income summary

If this is an interim report, please give 'Actual' amounts to date.

If this is a final Activity Report Form, please give 'Actual' amounts to reflect the full final income.

Income heading	Budgeted income (£)	Actual income (£)
Earned income	£0	£0
Local authority funding	£0	£0
Other public funding	£3,500	£3,500
Private income	£0	£0
Income total (cash)	£3,500	£3,500
Support in kind	£16,603	£20,701
Arts Council England funding	£14,977	£14,977
Income total	£35,080	£39,178

Income heading	Description	Budgeted income	Actual income
Other public funding	FEAST	£3,500	£3,500
Support in kind	brodskis waiver % of fee	£6,024	£8,505
Support in kind	InterAnima hardware/software	£5,300	£5,300
Support in kind	Falmouth University hardware	£3,000	£0
Support in kind	Plymouth University hardware	£2,279	£4,279
Private income	Brodskis	£0	£0
Support in kind	Fee waiver for digital build	£0	£667
Support in kind	Source equipment loan	£0	£1,000
Support in kind	Robot mother studio space	£0	£950

Activity expenditure

Spending (expenditure) summary

If this is an Interim Report, please give 'Actual' amounts to date.

If this is a final Activity Report Form, please give 'Actual' amounts to reflect the full final expenditure.

Expenditure heading	Budgeted expenditure (£)	Actual expenditure (£)
Artistic spending	£7,152	£7,845
Making your work accessible	£3,972	£4,456
Developing your organisation and people	£3,376	£1,798
Marketing and developing audiences	£1,270	£1,580
Overheads	£1,200	£623
Assets - buildings, equipment, instruments and vehicles	£1,157	£1,677
Other	£0	£148
Personal access costs	£350	£350
Expenditure total (cash)	£18,477	£18,477
Support in kind	£16,603	£20,701
Expenditure total	£35,080	£39,178

Please click the 'ADD' button above the table at the bottom of the page to add items of expenditure.

Expenditure	Description	Budgeted expenditure	Actual expenditu re
Personal access costs	dyslexia support for coordinator	£350	£350

Artistic spending	lead artis fees	£5,652	£6,123
Making your work accessible	additional insurance	£750	£406
Artistic spending	materials for artist projects	£1,500	£1,722
Making your work accessible	pop up shop overheads	£1,060	£1,805
Making your work accessible	volunteer subsistence	£900	£955
Making your work accessible	widening participation co-ordinator	£1,262	£1,290
Developing your organisation and people	project coordinator	£1,256	£581
Developing your organisation and people	digital trainer fees	£1,884	£1,217
Marketing and developing audiences	Marketing design fees	£471	£471
Marketing and developing audiences	Marketing print and hosting costs	£799	£1,109
Developing your organisation and people	Evaluation assistance fee	£236	£0
Overheads	admin & studio contribution to bills and rent	£1,200	£623
Assets - buildings, equipment, instruments, and vehicles	Kinect	£257	£0

Assets - buildings, equipment, instruments and vehicles	vive virtual goggles and tilt brush	£650	£810
Assets - buildings, equipment, instruments and vehicles	Naz box components for archive storage	£250	£332
Assets - buildings, equipment, instruments and vehicles	large potable monitor	£0	£305

Assets - buildings, equipment, instruments and vehicles	360 console	£0	£20
Assets - buildings, equipment, instruments and vehicles	VR mobile glasses	£0	£15
Other	SD cards	£0	£148
Assets - buildings, equipment, instruments and vehicles	flash drive	£0	£80
Assets - buildings, equipment, instruments and vehicles	display tablet	£0	£115
Other	mistake entry	£0	£0
Other	mistake entry	£0	£0
Other	mistake entry	£0	£0
Other	mistake entry	£0	£0

To meet the participatory aims of the project and respond to participants requests we increased provision of access. This incurred increased expenditure in areas of 'artistic spending', 'making your work accessible', 'marketing' and 'developing audiences' and necessary additional "hardware'. To facilitate this, we reduced expenditure on the fees 'developing your organization' and the share of overheads. This was made possible by significant fee waivers and a reduction in the contribution to InterAnima studio overheads.

Under artist spending we allocated 1 more day for artist fees and additional budgets for materials. Because residents expressed a desire for the project to continue beyond the date for us to vacate the pop-up shop, we took up an offer of a short-term subsidized studio more easily assessable than the InterAnima production studio. Whilst subsidized it raised the budgeted costs for 'making your work accessible' in rent and a slight rise in subsistence for volunteers. At the same time, we reduced the amount budgeted for a 'contribution to overheads' for the InterAnima studio and the insurance costs by joining BECTU and the fact that the rented studio was purpose built for public access.

The main reason for the increase in hardware expenditure was that borrowing a large monitor and tablet from the universities involved proved problematic for the periods required. Purchasing our own proved invaluable. It enabled us to respond to demand and run add hock workshops at short notice. It also meant the monitors, being used by the digital scribing volunteers, were still available for use and for a similar reason we purchased an additional 360 console. The other factor, in relation to hardware, was we had not budgeted for SD cards for the cameras we borrowed or enough flash drives for participants to use for collecting archive material. In view of the increase in hardware expenditure and what we were able to do with the Vive, we decided not to buy a kinect.

'Marketing' and 'developing your audience' had been estimated on a smaller print run than in practice. As the project developed additional information was required. We had envisaged more activity on the web, but it became clear that certain demographics needed to have information in their hands. Despite subsequent runs getting a reduced-price printing cost almost 40% more than we had budgeted for, it was key in achieving our aims.

We were able to stay in budget by waiving fees associated with 'developing your organisation' and as already mentioned reducing the contribution to InterAnima overheads. This did have the negative factor of an unpaid workload and delaying certain elements, like the evaluation and website updates.
However, due to the project's relationship to the long-term goals of InterAnima CIC and the personal goals of the people waiving their fees it was judged to be justifiable.

Support in kind:

You should explain any differences between the actual figures and the original figures in this space using the relevant budget heading.

The increase in budget of £4098 and reallocation of cash expenditure was enabled by an increase in support in kind. The main aspect was the lead producer/artist Becalelis Brodskis increasing his waived fees from £6024 to £8505. Another unforeseen lead role came from a volunteer from the job centre who turned out to be an experienced digital 3D modeler also adept in Unity Game Engine software. He contributed a significant amount, over and above what we had in the budget, reducing the overall costs of digital development and participant training.

In terms of resources, we were able to extend the duration of the project in terms of public accessibility through a subsidised studio space. A projector on a long-term loan was also lent to us from a local radio station, Source FM, following a profile of the project on a number of their shows.

We were due to borrow equipment from both Plymouth and Falmouth Universities however because Plymouth University proved more flexible, we did not involve Falmouth University in this particular project.

Re-Imagine Your Town Comments.

Random Sample of comments from participants and visitors to pop up shop October 2016 – June 2017.

Y/N	M/F	Age	Comment	Residence
Y	F	36-65	Valuable to find people's views of the town	Cornwall
Y	F	36-65	It is a brilliant idea and with the help of locals and visitors to the town it is a great opportunity to create a town for all	Cornwall
Y	F	36-65	An imaginative way of obtaining feedback from residents regarding their aspirations for Penryn. Local involvement in action though important to reach all age groups	Cornwall
Y	F	12y-16	Great experience of the Re-Imagine your town	Penryn
Y	F	66+	Lovely sense of community. Thanks for the cake! Nice to see memories but also ideas about the future- inclusive	Penryn
Y	F	66+		Penryn
Y	F	36-65	Really inspiring and educational. Love the map/virtual reality and other interactive elements. Very creative! The disco was great fun	Penryn

			and cake delicious. Thank You	
Y	F	36-65	Great map of Penryn! And interesting interactive video project will put Penryn on the Map	Penryn
Y	F	36-65	This is good for all. Keeping history real and up to date	Cornwall
Y	F			Penryn
Y	F	36-65	I enjoyed and am now hoping to see allotments everywhere	Cornwall
Y	F	12y-16	Very good I would come again	Penryn
	F		Fab cake lovely atmosphere, great baby	Penryn
Y	F	6y-11	I had fun	Cornwall
	F	36-65	Creative, dynamic, happy, bohemian, Penryn	Penryn
Y	F	36-65	I find your project very interesting and hope it leads to a positive outcome for Penryn	Penryn
Y	F	36-65	Interesting looking at the memories on the large map of Penryn, makes you think!	Penryn
Y	F	36-65	Very insightful project	Penryn
	F	66+	Penryn is a lovely town. But not enough shops i.e., fruit & veg, butchers, it would bring more folk into town as Falmouth only has supermarkets	Cornwall
Y	F	36-65	Fabulous, great work. Love it	
Y	F	26-35	What fun! A lovely, spontaneous moment of joy!	Penryn
Y	F	36-65	A fantastic workshop. With a little imagination this town will be re-invented I hope	Penryn
Y	F	26-35	Great, friendly, fun workshop. Lovely to meet other residents of the town and get creative in a friendly and stimulating environment. I'm very much looking forward to seeing how the project progresses	Penryn
Y	F	26-35	Wonderful!! A beautiful space for the community and creativity. Just what is needed, a place to gather and talk and create and build	Cornwall
Y	F	36-65	It was an amazing experience to come here with creative people and make some art. I hope we can continue the experience	Penryn

Y	F	66+	Very interesting project! Worthy of maintaining the history of the town and how it can be in the future. It is also therapeutic and motivating creativity for all ages. Celeste from Puerto Rico	Puerto Rico
Y	F	36-65	It is great to be involved in a local art/historic project that gives power to the people that live and work and are part of the Penryn community to create Penryn through its past and present and future bringing memories from0-90+ yrs	Cornwall
Y	F	26-35	Great! I wish I got here earlier and so great to have fun creative positive culture bringing Penryn together! Yay!	Penryn
Y	F	36-65	Would love to do this more often, Was very inspiring. Maria was very inspiring	Penryn
Y	F	36-65	I think this project as spectacular potential and unlimited possibilities. I would love this project to be implemented in urban design in my hometown. WOW! Bravo, Brilliant	
Y	F	36-65	What a wonderful project to connect and place Penryn in the past, present and future. I wish I had more time to spend here but will email memories and photos	Penryn
Y	F	66+	Enjoyed my afternoon- hope my comments have helped	Penryn
Y	F	36-65	Great fun- fired my imagination for more fun in public spaces- less cars, more space for people and community	Penryn
Y	F	36-65	Thank you for an inspiring and brilliantly creative workshop	
Y	F	26=35	Really impressed by the initial project space, would like to have this as a permanent community space and bring our town into the future…great drop-in and a wonderful insight and addition to Penryn's growing dynamism	Penryn

Y	F	66+		Penryn
Y	M	26-35		Penryn
			Great fun, good idea, could choose your own music. We had a good	

Y	F +M	36-65	laugh and enjoyed Ourselves	Penryn
Y	F+M	66+	Lovely project we may come back with some more info	Penryn
Y	F	36-65	Great ideas! Disco fun	Penryn
Y	F	36-65	Penryn has always had a special place in my heart, and I have been a resident 3 times. It has been an interesting challenge to ask myself why? I feel this project encourages and celebrates that thought process. I hope it will feed back into the progression of the town as a community	Cornwall
Y	F	66+	I think this project is amazing- the more I look at it the more I am fascinated	
Y	F	36-65	Learning to use the virtual map was fun and a new skill for me	Penryn
Y	F	36-65	Lovely workshop for people attending with relevance to the wider community too	Other
Y	F	6y-11	I think it shood be done quicker	Penryn
Y	F	36-65	Very good I would come again	Other
Y	F	36-65	A fascinating project- ambitious and I shall be keeping an eye on your progress	other
Y	F	26-35	Fab-great to see such a mix of people coming in, and the resulting breadth of memories and ideas. I hope you find a way to make some of the ideas happen- hopefully the council will see the enormous value in this project	Penryn
Y	F	36-65		Penryn
Y	F	36-65	Amazing opportunity to experience new technology. Very interesting to learn more about Penryn	other
Y	F	17-25	Please continue this project I want to send everybody I know to see it. Playing with the Tilt Brush is NEXT LEVEL. Thank you so much and all in the name of Penryn- AMAZING"	Penryn
Y	F	36-65	Fantastic outhere experience, thank you	Penryn
Y	F	36-65	Really great project bringing the whole community together. Listening to their opinions, new ideas and planning Penryn future, Fab.	Cornwall

Y	F	36-65	Exciting project, love the inclusive bit. Hope this forward thinking idea can be continued.	Penryn
Y	F	66+		Penryn
Y	F	36-65	Very cool tech which lots of people should be able to have a go at!	Penryn
Y	F	36-65	Fantastic-inspiring-amazing curation of Penryn past and present. Looking forward to the next stage.	Cornwall
Y	F	12y-16	It is really fun and exciting and it is great for all ages, I would like this to be an ongoing thing/project! I love it! Thanks	Penryn
Y	F	36-65		Penryn
Y	F	36-65	Mind blowing. Brilliant- more!	Cornwall
Y	F	26-35	Great! Wonderful to see the technology and people so passionate about future of our Town	Penryn
Y	F	6y-11	Drawing	Cornwall
Y	F	26-35	A project with incredible vision! Looking forward to seeing how it progresses	Cornwall
Y	F	36-65	Great but would be good if it continued and we kept conversation project going post Oct	Penryn
Y	F	36-65	Really useful tool with unlimited potential	Cornwall
			ot sure- but very infor mati ve	
N	F	66+	Very futuristic. Love the ideas of the engagement you have done not sure how it will benefit the wider community. Would like the idea for planning, but all about budget	Penryn
Y	F	36-65	Really interesting way of potentially engaging communities in vision/ownership of own area. Like reclaiming of empty shops for other interactive/community purposes- ways of reinvigorating high streets. Like mix of media that feed project.	Cornwall
Y	F	0y-5	Drawing	Penryn
Y	F	36-65	Very kind welcome! So interesting. Thank you from France.	France

Y	F	36-65	Had an excellent night with the pop up disco, what a fantastic idea. The whole project has been wonderful for people to record past and present and to make the town better	Penryn
Y	F	66+	Excellent introduction to the project. Made the group think of ways to involve the Museum	Penryn
Y	F	36-65	Love the idea is great for Penryn	Penryn
Y	F	66+	I think it's a good idea, hope it gets going	Penryn
Y	F	36-65	Looking forward to next session. Unfortunately we had a power cut today which cut this morning short	Penryn
Y	F	66+	No electric coming back again on Fri 21st Oct	Penryn
Y	F	36-65	Due to a power cut unable to do workshop	Penryn
Y	F	36-65	I think this is going to be interesting it's a bit quirky but I think it is something that is of interest to people	Cornwall
Y	F	36-65	This project seems a good way of recording ideas for future use! And recording the past, present and future of Penryn	other
Y	F	66+	Very interesting project that the Museum can be actually involved with	Penryn
Y	F	66+	No electricity but rebooked another date. Modern technology for us oldies- excellent to give us an understanding	Cornwall
Y	F	36-65	Fascinating concept will need to think more about my ideas for Penryn future	
Y	F	36-65	Very exciting and innovative	Penryn
Y	F	36-65	I absolutely love this project and its positive energy. Its so great that a ground-breaking project like this has started in Penryn! I think initiatives like this really help bring the community together and help the different generations have a greater understanding of each other	Penryn
Y	F	36-65	I think this project is great. It builds a community, and brings people together. It gives ownership back to the residents of the town. It reminds of the importance of dreams. First you dream, then you think, then you speak out, then you find like minded people, then you plan and then you	Penryn

			build a new reality based on your dreams.	
Y	F	36-65	Fantastic! So much to read, see and think about. Hope workshops continue and some ideas are our future	Penryn
Y	F	17-25	Fun'n'free keep it up!	Penryn
Y	F	36-65	Great to explore the meaning of pubs	Penryn
Y	F	36-65	I've had fun and have met new people	Penryn
Y	F	36-65	Best disco I've ever been to	Cornwall
Y	F	36-65	An incredible project- I love the exciting combination of heritage community narratives hopes and dreams. Thrilling new technologies	Penryn
Y	F	66+	Even the effect of the screen is fantastic in 2D. It was really strange going into a sketch and seeing the curves and effects in 3D- felts as if I was going to bump my head. Takes time to learn which tools to use to create a sketch, all I saw were abstract	other
Y	F	6y-11	Amazing, fascinating I was mind blown	other
Y	F	36-65	I think this is a very worthwhile workshop. And everybody has different ideas. We need to keep up with the times. But also realise that Penryn is a old town in which we don’t want to chance it too much	Penryn
Y	M	36-65	All towns planning offices should be like this. All Arts Council funded projects should have to contribute to local planning	Penryn
Y	M	17-25	Amazing seems to real very interesting Fun!	Penryn
Y	M	26-35	Great idea more areas should do also	Cornwall
Y	M	36-65	Should try to carry on. Might improve the discussion about the future of Penryn and more people get to know the history of Penryn	Penryn
Y	M	36-65	Going to have so much information	other
Y	M	36-65	Good fun	Penryn
Y	M	66+	It’s a good job that people are trying to protect the borough of Penryn and its Heritage	Penryn

Y	M	17-25		Penryn

Appendix 2: JT Gate Stop

Link to video of JT talking about the gate stop: https://youtu.be/Wci_3xM71JQ

Figure 36: JT's Gate Stop

Transcriptions of the audio from video

JT: Here... this here land there, that used to be my father's nurseries, he, he, he used to rent the fields up there and that belongs to the Blainies and this here was big gardens.

They asked, when their gardener retired, they asked if he would take over their gardens.

And then a few years later they asked my father if he wanted to buy it, so he bought all the fields.

BB: did he?.....

JT: the fields and the nursery.

So, all this land used to be owned by your dad.[151]

JT: Yeah.

Laughter.

BB: you could have been Lord of the manor.

Laughter.

or maybe you are Lord of the manor.

151 Ownership of land

Laughter.

JT: Used to be the entrance up here.

BB: Ok what this was a gate?

JT: Yeah you can see where…
sound of tapping,
Laughter.
There was a bolt used to be…

BB: Really is that...do you reckon that was the bolt for the gate.

JT: Well, used to come up against that.

(note edit in image and sound).

BB: Can you remember the sound of that?

JT: Yeah used to spring out here....out in the road.

BB: Spring out into the road.

Voices of two women talking and car running.

JT: The road wasn't there then there was a building.

Appendix 3: Email to Ingold

Full copy of the email correspondence with Tim Ingold (Chapter 4), consisting of two emails.

Jul 18, 2020, 7:27 PM

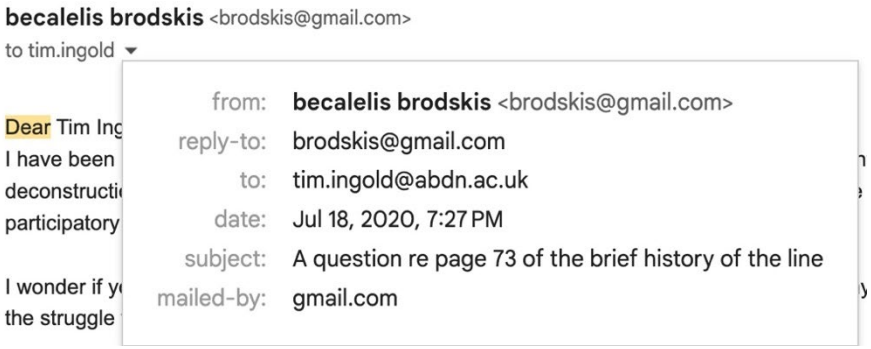


Figure 37: Screen Grab of Email to Tim.

Dear Tim Ingold,

I have been reading your book the history of lines and have been undertaking the experiment you suggested, on page 73 of A brief history of the line, that results in the deconstruction of a line into a 'a scatter of dots'. I have found it a brilliant illustration of durée and I'm using it to support my critical engagement with GPS as a participatory form of mapping.

I wonder if you could answer a few questions, I relation to the text.? I am writing about it in my attempt to write a PhD thesis. Writing letters to people is part of my process in the struggle with how to write the thesis.

So, the questions

Was your intention, for the text on page 73, to trigger the imagined enactment of taking the line in order to cut it rather than instigate an actual action of cutting? I presume you didn't mean it to be taken literally but I wanted to check.

I decided to take your suggestion literally. To actually take the line and cut it

up, having undertaken the experiment, through actions rather than imaginings, I also wonder whether you undertook the experiment in the form of a physical action or did you imagine it?

If you did physically 'take this line' how did you do it? And if you did, didn't you encounter any problems in ' taking the line'. I'm particularly interested in a problem that arises when you came to the crossroads. That point, the intersection, where the line loops over itself. Where the past crosses over its future.

These questions are not intended to undermine your experiment. As an imagined process your experiment illustrates Bergson's concepts of Durée beautifully, perhaps better than his diagram of the cone. The questions raised, by what happens if the process is not imagined, are interesting. They engage in the questions you raise, the difference between representations that become fragmentations rather than expressions of the 'embodied experience' of inhabiting and dwelling in a landscape. I'm also hoping the experiment I have continued with will build on your suggestion and describe an investigation into the difference between the imagined and the enacted. This will then lead on to qualities of virtual relationships to landscape (virtual in the philosophical, not digital sense.

I would be very grateful for an answer to my questions. They could be Yes and no answers. Thank you for your writing it’s so very inspiring.

All the best

Becalelis

July 19, 2020, 8:51 PM

From Tim Ingold to Becalelis Brodskis

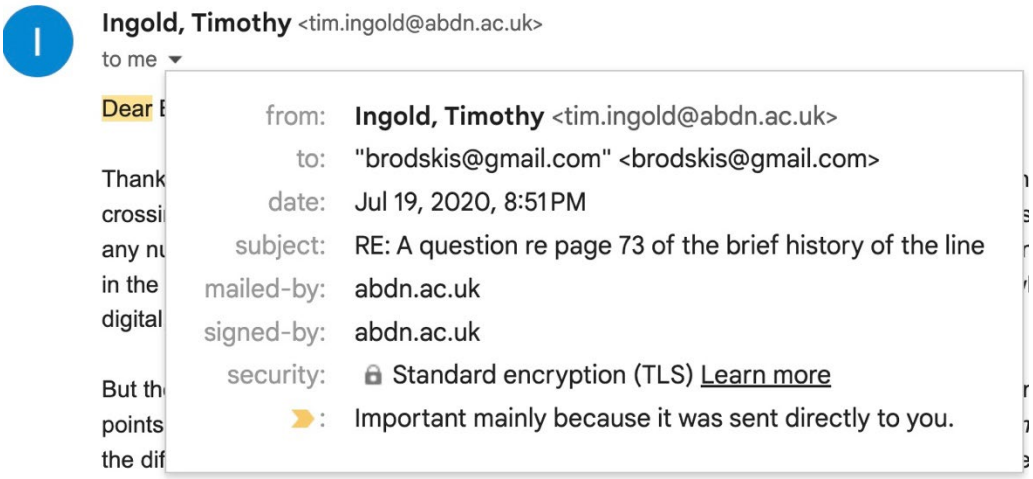


Figure 38: Screen Grab of Reply from Tim Ingold.

Thank you so much for your mail. The answer to your question is that I have carried out the experiment physically only with a much simpler line, with fewer dots and no crossing over, so that the problem of intersection didn't arise. The intersection itself throws up an interesting problem, namely, that a scatter of dots could be connected in any number of different ways, which may or may not cross over one another. That's why in a child's 'join-the-dots' puzzle, the dots must be numbered – so that you join them in the correct sequence. The problem then is how to understand a numerical sequence, which immediately leads on to tricky questions of number theory, analogue versus digital, and so on. And to be honest, I have not thought these questions out at all!

But the dots themselves are also interesting. Someone once suggested that having written a book about the history of lines, I should write another about the history of dots, or points – perhaps taking inspiration from Kandinsky's famous essay, Point and Line to Plane. I'm afraid I shall never get around to it, but were I ever to do so, I would start from the difference between what it actually feels like to draw a dot (it is like making a miniature vortex, funnelling all the energy down to the tip of the pencil) and the dot of the dotted line, in printed notation, which is completely static and inert, and from which the energy is completely drained away. I have been thinking about that a

bit, in relation to dots in classical musical notation.

Anyway, I hope this helps. Good luck with the PhD.

With best regards,

Tim

Appendix 4: Take This Line

Documentation of research experiment responding to Tim Ingold's suggestion:

'[L]et me suggest a simple experiment. Take this line, and cut it up into short segments of roughly equal length.' (Ingold, 2007, pg 73)

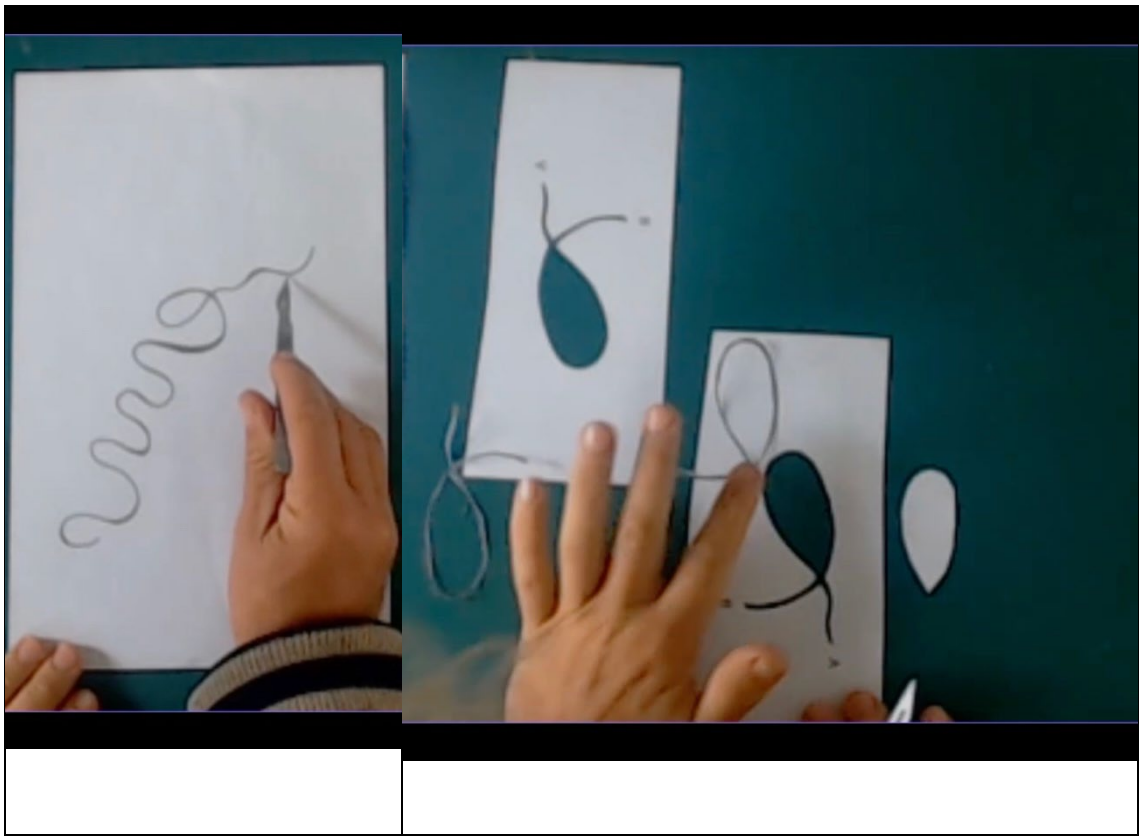


Figure 39: The Line 01 Screen Grab.

The figure above is taken from 3 videos documenting the cutting of the line. The line is a scan from Ingold's book *Lines: a brief history*. Then printed out to be able to cut out. The focus became on where the line crosses over. Because this creates a problem of how to cut at the point of intersection.

Links to Video documentation

https://www.youtube.com/watch?v=gmSKpf4Kfi0&list=PLxgL58lEtHcJOjvu6vNzYfB1wTdgZpLn5

Appendix 5: Analysis of Transcription

Transcription of Audio documentation of letterbox in Lisbon and 5 stages of analysis

These are draft working documents from experiments.

1st Transcription

This was undertaken prior to consciously engaging in a process of analysis. It included background sound descriptions. Which in reflection would have been good to keep

Sound of deep throb of motor (probably a van/truck)

So I saw this letterbox correo. I walked past it and then I thought wait a minute I would like to go back to that and wondered why? and felt quite a strong pull and thought it is probably to do with my dad's letter that I have got with me on this journey. Written by Kenneth (sound of voices, female) to my mother; (sound of probably moped) no, yes, no, to my grandmother, from Kenneth to my grandmother about my mother being with serge. And it was just after his accident. And it talks about his

mental health and I haven't actually looked at the letter yet but I took it with me to read because I want to and was waiting for the right time. (possibly same moped accelerating possibly on aturn)

And umm, yeah. So that is why I thought I would go back to it. (music bass disco /funk) So I did, took loads of pictures in the hope (male voice) that I could take some photogrammetry from it, after doing the cobbles And …and then after (distant

calling) it I was trying (sound of shutter) to get something on the phone, I can't remember …

and I saw the Gmail (voices background) envelope thing on my phone and I said I wondered if Sarah has replied and umm…of course hang on (voices have got closer) I thought that is why. Because you are waiting for this letter to arrive.

Umm is it number 35. You are waiting for this letter to arrive.

(motor coming towards getting louder)

Yes it is so weird the way the mind overlaps and changes.

So then thinking back to actually why did it actually make me think of serge's letter? Well just

a few moments ago I was reminded of Janetta and Benhavis and all that. Of course it all links.

These are obvious statements but there is something about the beauty of when your walking, (wind gets stronger) mapping and being open. This is what my dad does. Oh my god, this is what I.. as I said that I looked up and saw the street sign, Traversa de Piera. (wind dies out and voices)And I read that as

Traversa de Piere. Piere, mon pere. (wind) Fucking hell this is just like a re.. I'm just being my dad. Mon Pere.. Ok dad….fuck wha…

Stage 01 Analysis of transcription:

Highlighting text to identify the subject of focus.

Key to relationship between recording and memories.

Letter box material with data Dad's letter material with data Cobbles material

Phone material with data Email from Sarah data / material?? Observation about process Janetta Benhavis memory Process/action relating to memory of action Street sign material with data

So I saw this letterbox correo. I walked past it and then I thought wait a minute I would like to go back to that and wondered why? and felt quite a strong pull

and thought it is probably to do with my dad's letter that I have got with me on this journey. Written by Kenneth to my mother; no, yes, no, to my grandmother, from Kenneth to my grandmother about my mother being with serge. And it was just after his accident. And it talks about his mental health, and I haven't actually looked at the letter yet, but I took it with me to read because I want to and was waiting for the right time.

And umm, yearh. So that is why I thought I would go back to it. So I did, took loads of pictures in the hope that I could take some photogrammetry from it, after doing the cobbles. And then after it I was trying to get something on the phone, I can't remember, and I saw the Gmail envelope thing on my phone, and I said I wondered if Sarah has replied and umm…of course hang on I thought that is why. Because you are waiting for this letter to arrive. Umm is it number 35. You are waiting for this letter to arrive.

Yes it is so weird the way the mind overlaps and changes.

So then thinking back to actually why did it actually make me think of serge's letter? Well just a few moments ago I was reminded of Janetta and Benhavis and all that. Of course it all links.

These are obvious statements but there is something about the beauty of when you're walking, mapping and being open. This is what my dad does. Oh my god, this is what I.. As I said that I looked up and saw the street sign, Traversa de Piera. And I read that as Traversa de Piere. Piere, mon pere. Fucking hell this is just like a re.. I'm just being my dad. Mon Pere.. Ok dad….fuck wha…

Stage 2 Analysis of Transcription

Analysis of Transcription stage 02

		“I” and non human
	and thought it is probably to do with my dad’s	

Tec-1	took loads of pictures in the hope that I could take some photogrammetry from it	Pictures as documentation
Mat-2	after doing the cobbles.	2nd reference to material. Presumably encountered previously
Tec-1	And then after it I was trying to get something on the phone, I can't remember and I saw the Gmail envelope thing on my phone	A hybrid of technologies material with data including email logo
Ass-2	and I said I wondered if Sarah has replied and umm…of course hang on I thought that is why. Because you are waiting for this letter to arrive .	Second potential memory association. But is this a different letter?
	Umm is it number 35?	At this stage can not code
Ass-2	You are waiting for this letter to arrive.	Can not define which letter?
Ob-1	Yes it is so weird the way the mind overlaps and changes.	Observation about process
Ass-1	then thinking back to actually why did it actually make me think of serge's letter?	
Ass -3	So Well just a few moments ago I was reminded of Janetta and Benhavis and all that.	3rd potential memory association Janetta and Benhavis
Ob-2	Of course it all links. These are obvious statements but there is something about the beauty of when your walking, mapping and being open.	Observation about process
Pmem-1	This is what my dad does. Oh my god, this is what I	Observation about process relating to memory
Mat-3	.. As I said that I looked up and saw the street sign , Traversa de Piera	3nd relationship with non human material of street sign
Ass -4	And I read that as Traversa de Piere. Piere, mon pere	
Pmem-2	Fucking hell this is just like a re .. I'm just being my dad . Mon Pere.. Ok dad….fuck wha…	

Stage 3 Analysis of Transcription

Returning to stage 1 post stage 2 to notice dependencies on other information

Key to relationship between recording and memories

Letter box material with data
Dads letter material with data
Cobbles materail
Phone material with data
Email from sarah data / material??
Observation about process
Janetta Benhavis memory
Process/action relating to memory of action
Street sign material with data

So I saw this letterbox coreo. I walked past it and then I thought wait a minute I would like to go back to that and wondered why? and felt quite a strong pull and thought it is probably to do with my dad's letter that I have got with me on this journey.

Written by Kenneth to my mother; **no, yes, no,** to my grandmother, from Kennith to my grandmother about **my mother being with serge**. And it was just after his accident . And it talks about his **mental health** and I haven't actually looked at the letter yet but I took it with me to read because I want to and **was waiting for the right time.**

Notes from paragraph above
"Written by Kenneth " is connected to another memory
"no, yes, no" Clarification of memory of an action of another
"my mother being with serge". Relationship between the couple relates to a kiss
'mental health 'question of reality , what is madness relates to perception
"was waiting for the right time." Note I have still not read it

And umm , yearh. So that is why I thought I would go back to it. So I did, took loads of pictures in the hope that I could take some photogrammetry from it , after doing the cobbles. And then after it I was trying to get something on the phone, I can't remember and I saw the Gmail envelope thing on my phone and I said I wondered if Sarah has replied and umm…of course hang on I thought that is why. Because you are waiting for this letter to arrive . Umm is it number 35 . You are waiting for this letter to arrive.
Yes it is so weird the way the mind overlaps and changes.

So then thinking back to actually why did it actually make me think of serge's letter? Well just a few moments ago I was reminded of Janetta and Benhavis and all that. Of course it all links.

These are obvious statements but there is something about the beauty of when your walking, mapping and being open. This is what my dad does. Oh my god, this is what I . As I said that I looked up and saw the street sign , Traversa de Piera . And I read that as Traversa de Piere, Piere, mon pere . Fucking hell this is just like a re .. I'm just being my dad . Mon Pere.. Ok dad….fuck wha…

NOTES

", Traversa de Piera . And I read that Remembering a memory as I move on and then associate it with other materials. the technology allows the documentation of the memory as I walk on. Writing would require static.

What the recording allows

Stage 4 Analysis of Transcription

Reflecting on stages so far, 1,2,3

Amending highlights in with a focus on memory and modes related to

Annotating some of the text as notes in tables

Notes
The recording is one memory. The transcription is a further memory relating to the matter of the transcription and the memory

Phone material with data
Email from sarah data / material??
Observation about process
Janetta Benhavis memory
Process/action relating to memory of action
Street sign material with data

Memory
Sensory
Material
Text
Action/ process
Zone of indeterminancy
Connecting/accosialtion
Perceiving
Time
Space
Technology
Data

Notes: How many memories occur ?

So **I saw** this letterbox **coreo.**

Notes:	
Saw	Memory of sensory
coreo.	Text

I walked past it

Notes:	
walked	action

and then I **thought wait** a minute I would like to go back to that and wondered why? and felt quite a strong pull

Notes:	
thought wait	zone of indeterminancy
wondered why?	Thought of connecting material with

	memory

and thought it is probably **to do with** my **dad's letter** that I have got with me on this journey. **Written by Kenneth** to my mother; no, yes, no, to my grandmother, from Kennith to my grandmother about **my mother being with serge.** And it was just after his accident . And it talks about his **mental health** and I haven't actually looked at the letter yet but I took it with me to read because I want to and was waiting for the right time.

Notes:	
to do with	accociation
dad's letter	2nd materail
Written by Kenneth	connecting to another memory
no, yes, no	clarification of memory of an action of another
my mother being with serge.	relationship between couple relates to kiss
mental health	question of reality , what is madness relates to perception

And umm , yearh. So that is why I thought I would **go back to it.** So I did, took loads of pictures in the hope that I could take **some photogrammetry** from it , after doing **the cobbles**. And then after it I was trying to get something on the **phone**. I can't remember and I saw the **Gmail envelope** thing on my phone and I said I wondered if **Sarah** has replied and umm…of course hang on I thought that is why. Because you are waiting for this letter to arrive . Umm is it number 35 . You are waiting for this letter to arrive.

Notes:	
go back to it.	going back to a specific location (memory relating to a location) of a meterail object realting to a memory of another material object. This material object connects to a memory of my father
some photogrammetry	Wanted to create a 3D object so that I could visualise the multiple perspectives in a multidimensional space
the cobbles.	Cobbles accociation with riots 68 paris , my birth debord

phone	technology
I can't remember	memory
Gmail envelope	another form of letter, information
Sarah	introducing another person. Outside of family line. Previous to this the link is with family. Dad, mother and grandfather and grandmother on mothers side. Family heritage , linear

Yes it is so weird the way the **mind overlaps** and changes.

Notes:	
mind	process of remembering
overlaps	where thoughts combine with thmesleves and the material objects changing prerceptions

So then thinking back to actually why did it actually make me think of serge's letter? Well just a few moments ago I was **reminded of Janetta and Benhavis** and all that. Of course it all links.

Notes:	
reminded of Janetta	A previous thought had arisen connecting to another character in the letter. The previous thought triggered by materails

These are obvious statements but there is something about the beauty of when your walking, mapping and **being open**. This is **what my dad** does. Oh my god, this is what I.. As I said that I looked up and saw the **street sign** , Traversa de Piera . And I read that as Traversa de Piere. Piere, mon pere . Fucking hell this is just like a re .. I'm just being my dad . **Mon Pere.. Ok dad….fuck wha…**

Notes:	
being open	Being open or not habitual
what my dad	An action being like a material, kinethetic habitual
street sign	Text and interpretation of text. Liks back to cobbles and association with cobbles.
I'm just being my dad	Being as in accociated with dad.

	Memoriesof him, learnt methods of engaging that are not habitual but accoiative

Stage 5 Analysis of Transcription next page

Stage 5 Analysis of Transcription

Catogory		connector	Materail	sense	thought	action	space	time	quantaty	language	in in
		ownership?	Human (1)	sight	question	physical	beside	subsequent	singular		
		additional	human (3)	quality	association	time/action	in	clock	force		
		pointing	object	internal	memory	write	accompany	past	multiple		
		adjustment	space	external		read	over	awaiting			
		reason	digital	mental		information	many	future			
		consequence	writing			talk	above	moment			
		being	visual rep			time					
Key											

Section
Mat-1 So I saw this letterbox coreo. I walked past it and then I thought wait a minute I would like to go back to that and wonde why? and felt quite a strong pull

		1	2	3	4	5	6	7	8	9	1(
1	**words**	so	I	saw	this	letterbox	coreo	I	walked	past	it
	catogory										
	code		human (1)	sight	pointing	object			physical	beside	ob
2	**words**	and	then	I	thought	wait	a	minute	I	would	lik
	catogory									?????	

code	additional	subsequent	human (1)		time	singular	clock	human (1)	??	??

words	to	go	back	to	that	and	wondered	why	and	felt
category										
code	??	physical	??	pointing	space	additional	question	question	additional	int

words	quite	a	strong	pull						
catogory		quantaty								
code	force	singular	force	external						

words	written	by	kennith	to	my	mother	no	yes	no	to
catogory										
code	information	ownership	H(3)	pointing	relationship	H (3)	-	+	-	po

words	my	grandmother	to	my	grandmother	about	my	mother	being	
catogory									??	
code	Belonging	human	pointing	Belonging	H (3)	pointing	Belonging	H(3)	??	

9

words	with	serge	and	it	was	just	after	his	accider
catogory	?								
code	?	H (3)	additio nal	pointig	past		subsequen t	ownership	physica

10

words	and	it	talks	about	his	mental	health	and	I
catogory						??	??		
code	additional	writing	inform ation	pointing	ownership				H(1)

11

words	haven't	actually	looked	at	the	letter	yet	but	i
catogory									
code	ownersip	?	sight	pointing	singualr	writing	? Awaiting	adjustment	H(1)

12

words	took	it	with	me	to	read	because	I	want
catogory			?						
code	physical	writing	accom pany	H(1)	reason	info	reason	H(1)	?

13

words	to	and	was	waiting	for	the	right	time	
catogory	?								
code		addition al	past	time	pointing	pointing	quality	awaiting	

Mat -1 And umm , yearh. So that is why I thought I would go back to it. So I did,

14

words	and	umm	yearh	so	that	is	why	I	thou
catogory									
code	additional		+	reason	pointing		reason	H(1)	

5

words	I	would	go	back	to	it	so	I	did
catogory									
code	H(1)	future ?	physic al	?	point	object	consequen ce	H(1)	phys

Tech-1

took loads of pictures in the hope that I could take some photogrammetry from it

16

words	Took	loads	of	pictures	in	the	hope	that	I
catogory									
code	physcial	multiple	pointin g	visual rep	ownership	pointing	mental	consequenc es	H(1)

17

words	could	take	some	photogra metry					
catogory									
code	future	physcial	multipl e	visual rep					

Mat-2

after doing the cobbles.

18	**words**	after	doing	the	cobbles				
	catogory								
	code	subsequent	physical	pointin g	object				

Tech-2

And then after it I was trying to get something on the phone, I can't remember and I saw the Gmail envelope th

		1	2	3	4	5	6	7	8	9
19	**words**	and	then	after	I	was	trying	to	get	someth
	catogory									
	code	additional	subsequ ent		H(1)	past	pysical	pointing	?	

20	**words**	on	the	phone	I	can't	rememb er	and	I	saw
	catogory									
	code	in	pointing	digital	H(1)	?		connector	H(1)	sight

21	**words**	the	gmail	envelo pe						
	catogory									
	code	pointing	digital	digital						

Ass 2 0r 1

and I said I wondered if Sarah has replied and umm...of course hang on I thought that is why. Because you are w
letter to arrive

		1	2	3	4	5	6	7	8	9
22	**words**	and	said	I	wondere d	if	sarah	has	replied	and
	catogory									
	code	additional	talk	H(1)	question	?	H(3)	past	write	additio

23	**words**	umm	of	course	hang	on	I	thought	that	is
	catogory									
	code		associati on		??	??	H(1)	associatio n	pointing	reason

24	**words**	because	you	are	waiting	for	this	letter	to	arrive
	catogory									?
	code	cosequence	H(2)	being	time action	reason	pointing	writing	consequenc e	?

uncode d

Umm is it number 35?

		1	2	3	4	5	6	7	8	9
25	**words**	ummm	is	it	number	35				
	catogory									
	code		questio n	?						

Ass 1 0r 2

You are waiting for this letter to arrive

		1	2	3	4	5	6	7	8	9
26	**words**	you	are	waitin g	for	this	letter	to	arrive	
	catogory									
	code		being	time action	reason	pointing	writing	future	physical	

Obs 1

Yes it is so weird the way the mind overlaps and changes.

		1	2	3	4	5	6	7	8	9
27	**words**	yes	it	is	so	weird	the	way	the	mind
	catogory							?		
	code	+	pointing	being	quantaty	quality	pointing	?	pininting	human

28	**words**	overlaps	and	change s						
	catogory									
	code	over	addition al	quality						

Ass 1

then thinking back to actually why did it actually make me think of serge's letter?

		1	2	3	4	5	6	7	8	9
29	**words**	then	thinking	back	to	actually	why	did	it	a
	catogory									
	code	subsequent		past	pointing	?	question	consequen ce	object ?	?

30	**words**	make	me	think	of	serge	s	letter		
	catogory									
	code	internal	H(1)		pointing	H(3)	belongin g	writing		

Ass -3

So Well just a few moments ago I was reminded of Janetta and Benhavis and all that.

		1	2	3	4	5	6	7	8	9
31	**words**	so	well	just	a	few	moment s	ago	I	w
	catogory	reason	?							
	code				singular	multiply	?	past	h(1)	p

32	**words**	reminded	of	janetta	and	benhavis	and	all	that	
	catogory									
	code	memory	pointing	H(3)	dditional	?	dditional	multiple	pointing	

Ob-2	1	2	3	4	5	6	7	8	9
	Of course it all links. These are obvious statements but there is something about the beauty of when your w being open.								
33 words	of	course	it	all	links	these	are	all	ob
catogory									
code			?		?	multiple	being	multipl	
34 words	statements	but	there	is	something	about	the	beuty	of
catogory									
code	?	adjust	?	being	quality	?	pointing	quality	ow
35 words	when	your	walkin g	mapping	and	being	open		
catogory						?			
code	moment	ownersh ip	physic al	?	additional	quality	quality		

The coding matrix was created from stage 5

Category	**Code** (Sub-categories that identify different qualities of words falling under the same category)						
connector	ownership	additional	pointing	adjustme nt	reason	consequence	being
material	human (1)	human (3)	object	space	digital	writing	visual
sense	sight	quality	internal	external	mental		
hought	question	association	memory				
action	physical	Time/action	write	read	information	talk	time
space	beside	in	accompany	over	many	above	
time	subsequent	clock	past	awaiting	future	moment	
quantity	singular	force	multiple				
language	Portuguese	English					
indeterminacy							

Appendix 6: Photograph of a Letterbox

A visual Analysis of qualities present in a digital photograph of the letterbox.

The original photograph was taken in Lisbon in 2018 on a smartphone using Open Street map (OSM) app. Then the Photograph was adjusted using Adobe Photoshop.

Figure 40: Original Digital Photograph of Letterbox in Lisbon

The attempt to describe what is seen without drawing from prior knowledge brings up the point that even the method of analysis is subject to prior experience. The photograph can be dissected in multiple ways, influenced by the observer's preconceptions.

<u>What is the purpose of my analysis?</u>

What information does the photograph provide independently from my memories?

<u>Why? What is the application of this analysis and evaluation?</u>

The aim is to assess the qualities of documentation and critique the process of documentation in terms of what information it contains.

<u>Methods of Analysis</u>

As with the transcript I was interested in a staged analysis that begins with exploring what can be deduced from the data without the aid of memories.

The analysis outcomes align with an understanding that perceptions of documentation, in this case, a photograph are context dependent.

Memories influencing the analysis.

The photograph not only represents the subject but also triggers memories. Which memories depend on personal associations and experiences. The photograph of a letterbox, for instance, evokes memories of other doors, streets, and experiences, with different boundaries for interpretation. Memories can also be influenced by details such as lighting and colour.

Begin by Breaking down the visual representation,

Deconstructing the photograph in terms of form, tone, and line.

Figure 41: Mezzotint Effect of the Letterbox Photograph

I deconstructed the photograph by drawing out details or decreasing its form and tone, considering aspects like lines, edges, shapes, and tonal relationships.

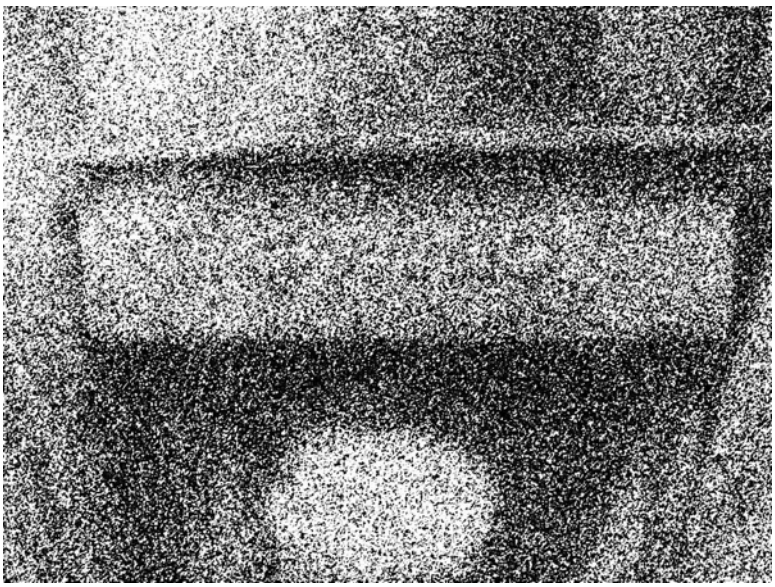


Figure 42: B7W Mezzotint Effect of the Letterbox Photograph

At the extreme end, particularly concerning tone and line qualities, the image could lose all recognition. For instance, numerous tones might condense into just three, and intricate adjoining lines could merge into uniform lines or dots.

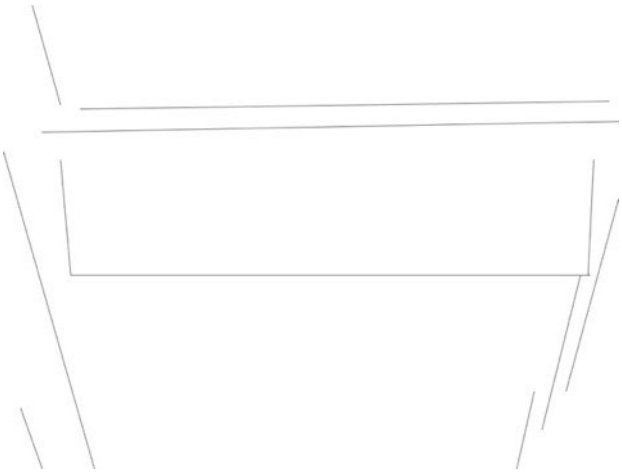


Figure 43: Edges of the Letterbox Photograph

Picking out information that can be conceived as a line.

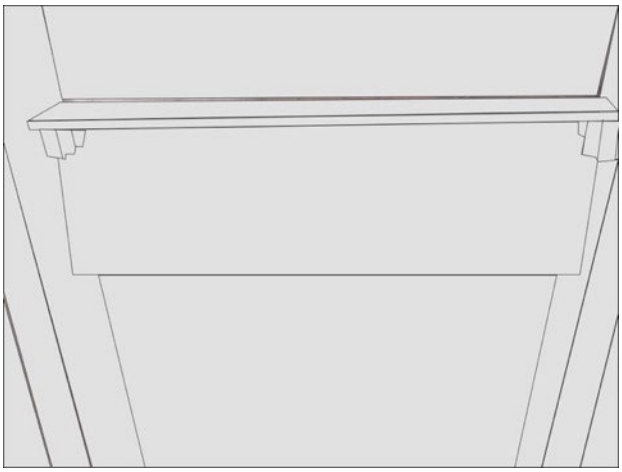


Figure 44: Lines of the Letterbox Photograph

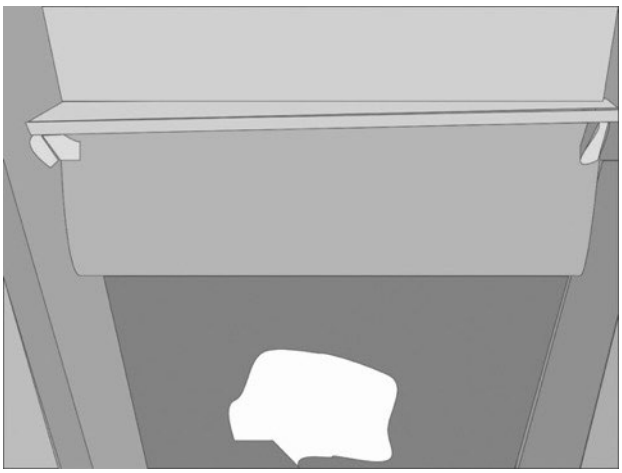


Figure 45: Grey Scale Areas of the Letterbox Photograph

These lines begin to infer areas. When considering perspective, the two-dimensional image transforms into a representation of a three-dimensional object. Perspective provides a sense of depth and layers, changing the way we perceive the image.

Figure 46: Mezzotint & Areas of the Letterbox Photograph

Symbols

Details like the raised typography play a crucial role in defining the subject of the photograph, but this interpretation is culturally dependent. For example, without understanding the language on the typography, the letterbox might be mistaken for something else.

<u>Experiment of taking the text out of the photograph</u>

Figure 47: Typography of CORREIO Extracted

Figure 48: Extraction of Typography from Letterbox

<u>Showing it to a human without knowledge of what it is</u>

The answer was a lintel to fireplace. Or a shelf or lid which opens up with a box.

Is it metal? Then thought probably wood.

Definitely not a lintel because it's too narrow.

In terms of size, he thought it might be a meter wide.

He then described the two round things demonstrating with his hand a kind of swivel action. This possibility of movement engaged with memories of fold-up ledges like you have on desks.

When shown the image with the text He immediately knew it was a letterbox.

Figure 49: Hinge on Letterbox

Google image recognition

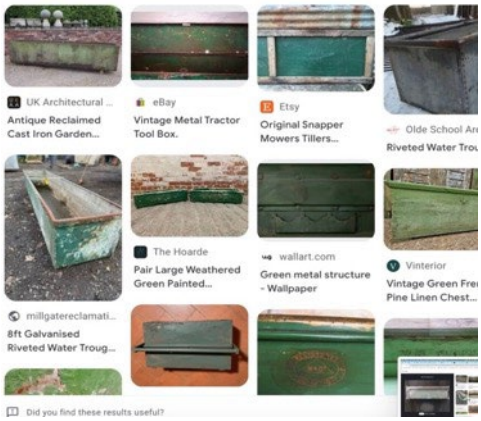


Figure 50: Google Image Search without Typography

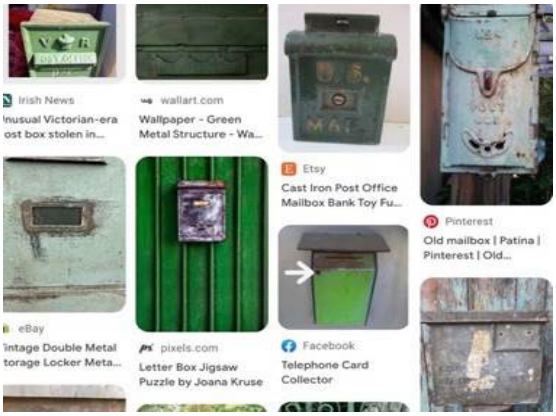


Figure 51: Google Image Search with Typography

Texture Features

The photograph contains qualitative features like texture which are perceived differently based on cultural backgrounds and personal experiences. Peeling paint and weathered surfaces, for instance, can signify disrepair or aesthetic beauty, depending on one's values. The textural elements, which suggest the passing of time, are perceived differently depending on individual memories.

Figure 52: Peeling Paint on Door

Quantitative data

The GPS information embedded in the digital file provides specific coordinates, altitude, device details, and camera settings. These coordinates pinpoint a location, forming a line

when connected with others. The photograph marks a unique point of interest, whereas the GPS data complements this by placing it within the context of a larger map.

Figure 53: Screen Grab from Google Earth/GSV September 2018. © Google 2022

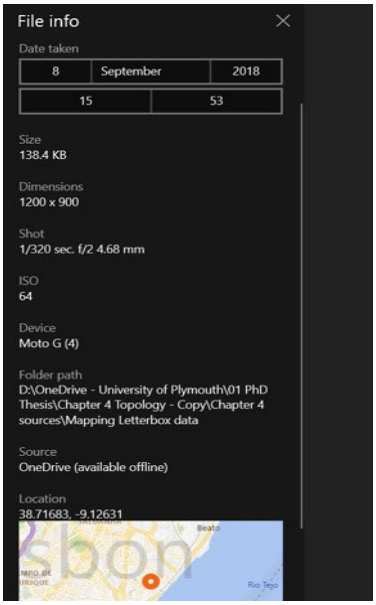


Figure 54: Data Integrated into Digital File

Appendix 7: GSV

Appendix 7 Google Street view (GSV)

Voyeurism / Surveillance of letterbox box using Google Street View and Google Earth.

I have revisited GSV documentation of the Letterbox many times over the years. It was from these visits to Google's Archive of data that I discovered the letterbox has been removed from that specific location. On my last visit to Google Maps, I saw that the door has also been replaced.

Google Street View Screen Grabs Over Time

Once letters would have been posted through this letterbox. It bought to mind the letter I had in my bag, about Serge, that I have still not read.

Figure 55: Close-up of Letterbox from GSV 2018. © Google 2022

And then the letterbox had gone. And I have still not read the letter.

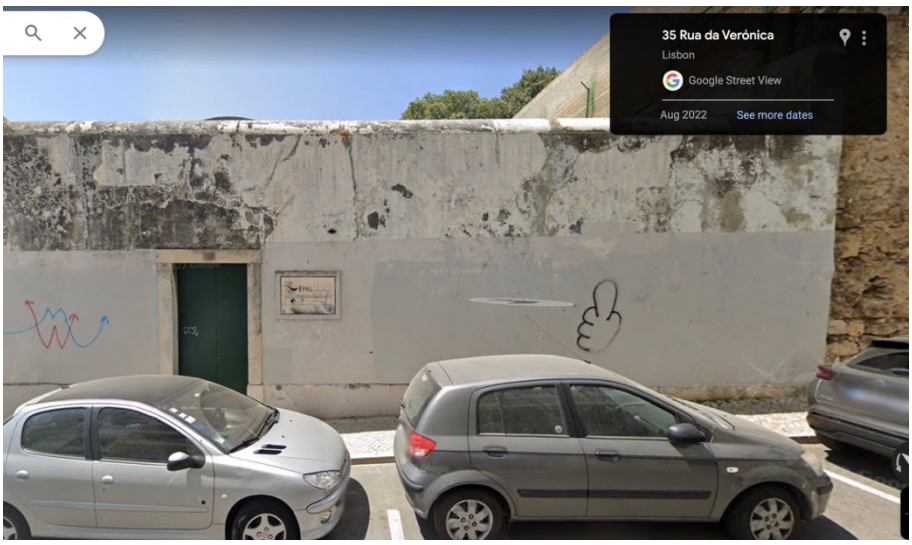


Figure 56: GSV 2022 Letterbox and Door has been replaced. © Google 2022

A link to GSV and documentation of the letterbox that is no longer there:

https://maps.app.goo.gl/6WuqjnULZVDaMkGc9

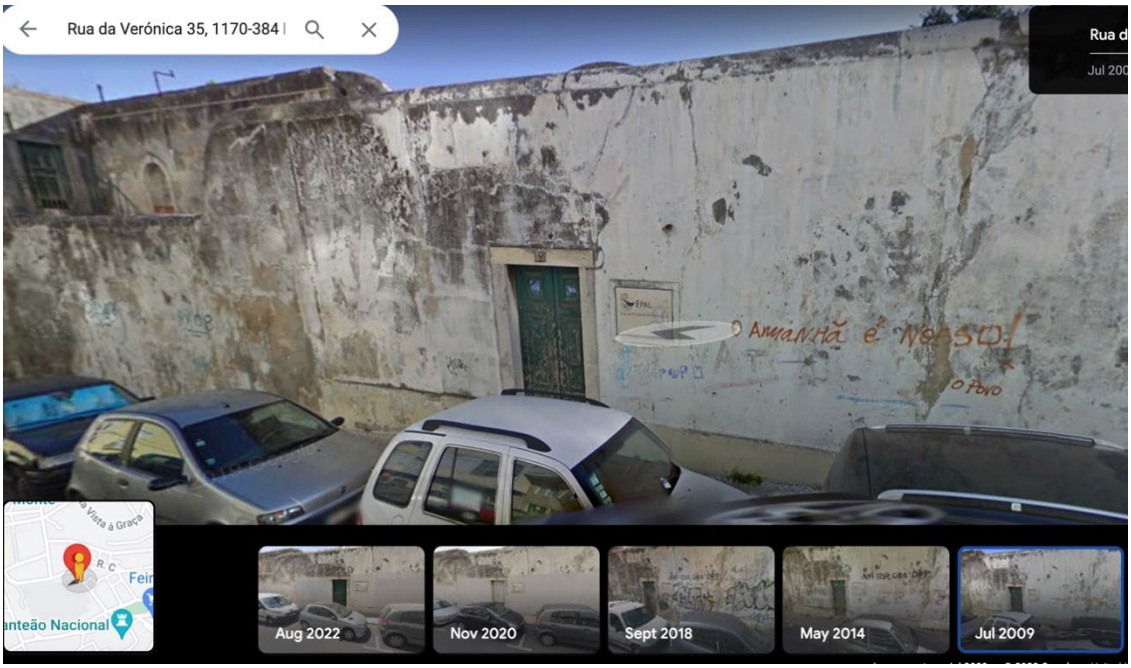


Figure 57: Letterbox Over Time. © Google 2022

A link to GSV and documentation of the letterbox over time from 2009 to August2022:

https://maps.app.goo.gl/82qBczbzYMJryGjZ9

GSV in Google Earth

The letterbox is gone, but the door is still there. Google Earth integrates the GSV documentation of 2020 with the GPS Trace, documenting the dérive in Lisbon, in 2018.

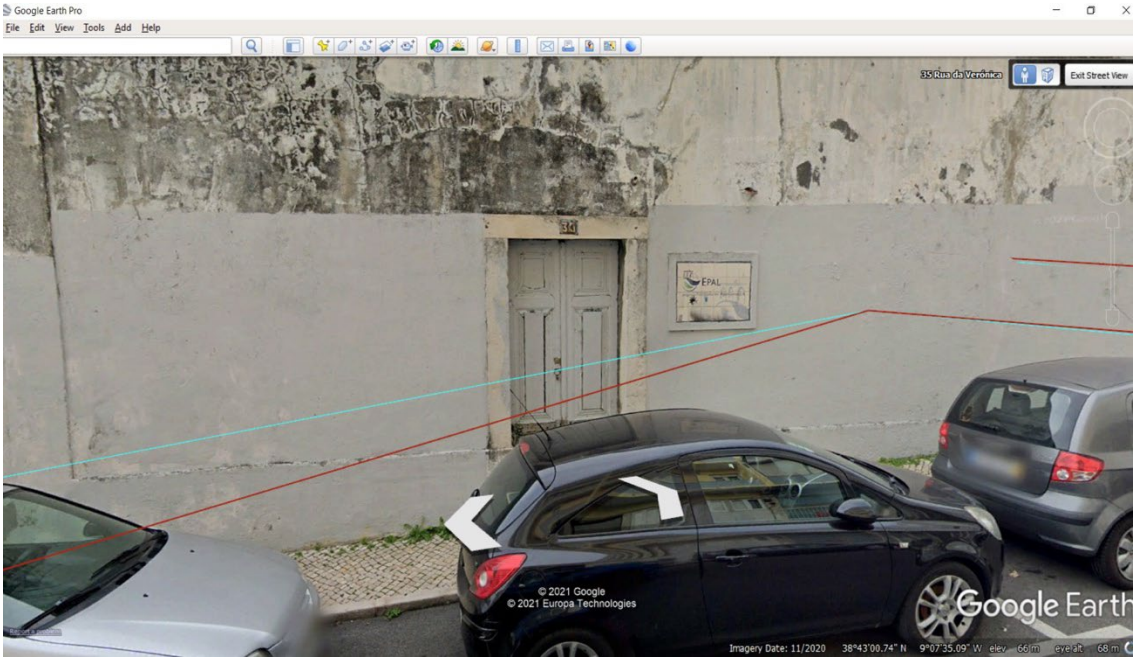


Figure 58: Letterbox Removed. PS Trace of 2018. © Google 2022

Google Earth's Photogrammetry

This documentation from Google Earth's Photogrammetry of Lisbon also integrates the tracking data of the dérive in Lisbon and Pin icons to identify the location of media taken at the time. See appendix 5 for the audio recording and appendix 6 for the photograph of the letterbox.

Figure 59: Google Earth's Photogrammetry with GPS Trace. © 2018 Google

Within the 3D photogrammetry, it is possible to take a look at what is behind and under the letterbox. It appears that if you go behind the letterbox you enter a zone of indeterminacy where the mesh gives way to the stars.

Figure 60: Google Earth's Photogrammetry behind the Letterbox. © 2018 Google

My intention post thesis is to return to the location in Lisbon and see for myself where this letterbox has gone. Because as far as my experience is concerned the letterbox is very much there. It also has become connected, through the diagram in chapter 9 to the shed in Penryn and the Gate stop in Cornwall.

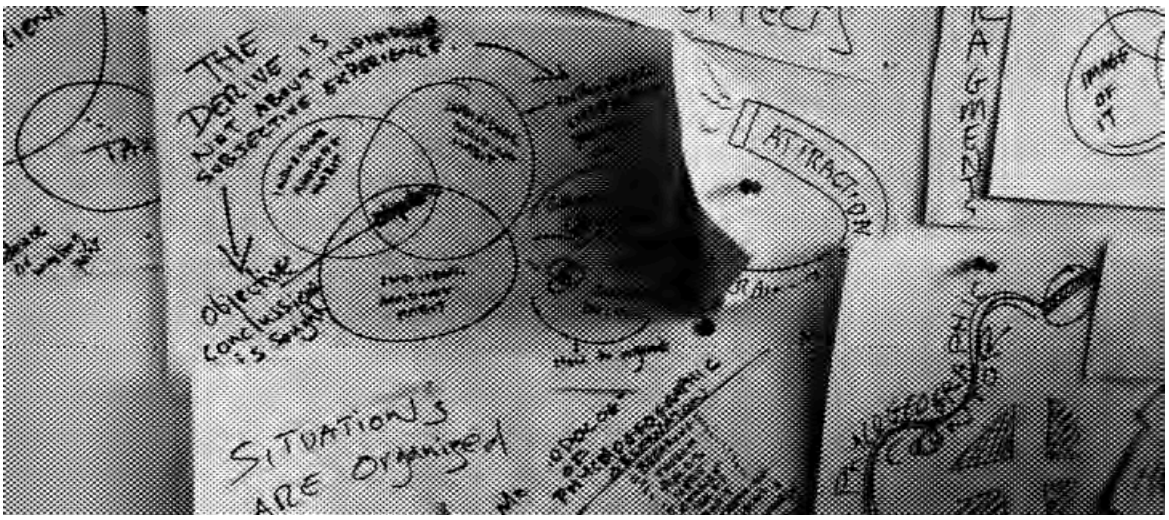
Appendix 8: Bench in Birdwatching Hut

Draft proposal for paper following 3D3, Centre for Doctoral Training, Residency in Rovaniemi

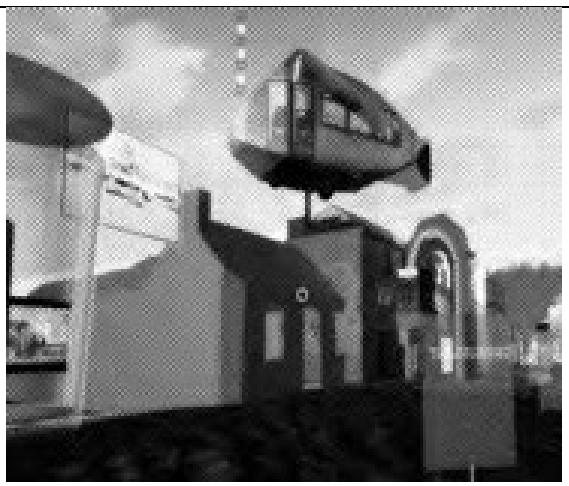
The next few pages propose two relationships. The first, expressed in writing and increasingly underpinning my research, is between the philosopher Henri Bergson's concept of durée (born Paris 1859) and the political activist guy Debord's action of the dérive (born Paris 1931). The next relationship is laid out, rather than expressed, in images. It is among a Cornish community mapping project in VR, a bench I came across in Finland with a swastika carved deeply into it, elements of my own life, and perhaps the experience of the reader as they engage with the montage of images.

By engaging with these images, I refer to a sense of active reading and participation in imagining what these images could mean beyond their immediate representation and how and why they might connect. Here on these pages, the images are laid out on a 2D surface. In this form, the images are more an illustration of an inquiry with text to give some context rather than an invitation to participate. In terms of my aims this aspect of the presentation thus fails in that the significance of the images and their relationship to time and space remains limited to me.

The words time, space and image are central to both Bergson's writing in his book *Matter and Memory* 1896 and Debord's *Society of the Spectacle* (1967). Their association because of these words alone would indicate an extremely shallow reading of either text. In the context of their work, these words take on different meanings, particularly in the case of the word image.

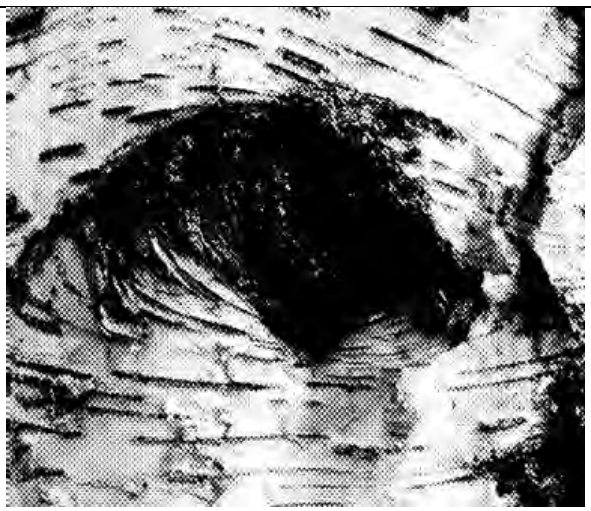


It is the different perspectives that they bring to the word image and its relationship to how we experience and can affect our life that I wish to bring to bear in the development of a method of presenting images for engaged popular participation independent of written description or narrative tradition.

	A crossroads in the virtual reality environment of Re-Imagine Your Town. A community mapping project in Cornwall. The project combines participatory arts with digital technology to enable residents to co-create an immersive map of their town's real or imagined past, present and future.

	A screen grab of a google map of Penryn.

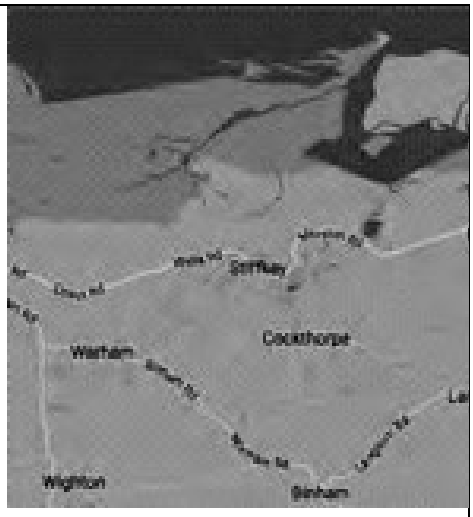
	The only prohibition to participating in Re-imagine Your Town was that images or comments could not single out an individual for criticism. At this Crossroads a Twitter feed was inserted into the map revealing the owner of this Twitter feed's racist sentiments. This was censored.

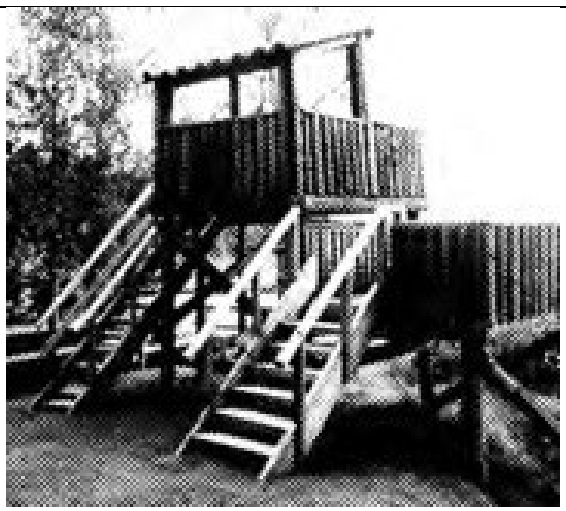


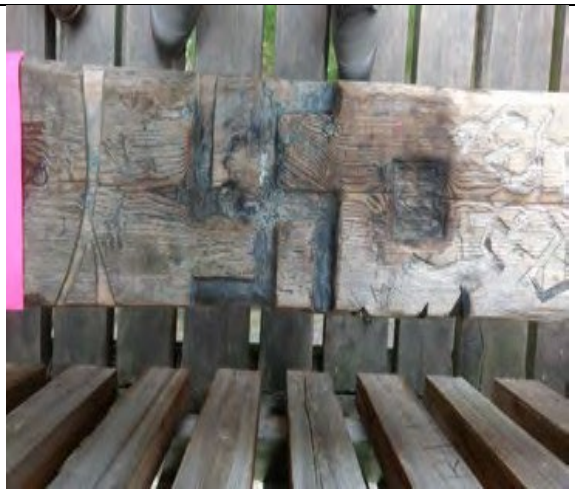
I wondered why I was in Lapland, Finland. In the forest of silver birch and pine, the main group of academics picked blueberries. A few of us left the track in search of mushrooms and found crystals.

Leyla was our guide to what mushrooms were poisonous or edible.

Tula had blueberry-stained fingers. She was half Sami and her bone structure reminded me of my mother. In Norfolk. My mother just found out she was not as she had thought part Inuit. Perhaps she was part Sami.	

	A shack overlooking Rovaniemi was a place to hang out overlooking the city and a lake.

	On a bench in the shack. there was a swastika. We debated what it meant. I Am reminded of the Swastika back in the town of my birth. And the one in the bus stop in Penryn.

	In the shack, I take a rubbing of the bench. Some lads arrive on a motorbike. I wonder whether they carved the Swastika. They didn't. They are from St Petersburg. I fell in love in St Petersburg and got married to a Russian woman. I had to be in hiding in a block of flats, from her lover, overlooking the Baltic.

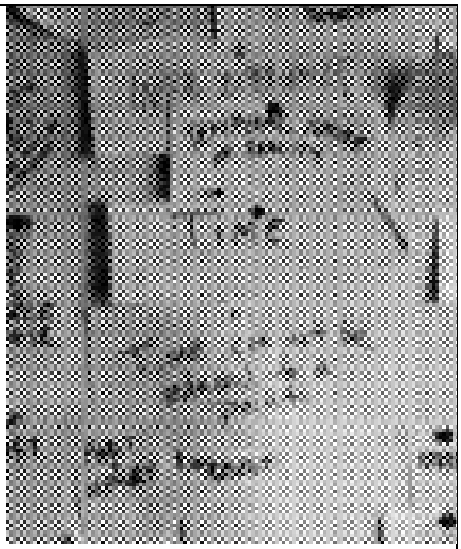
	I tell the Russian lads that my grandfather was a Lithuanian who being Jewish had to escape and went to live in Morocco where my dad was born and met my mother.

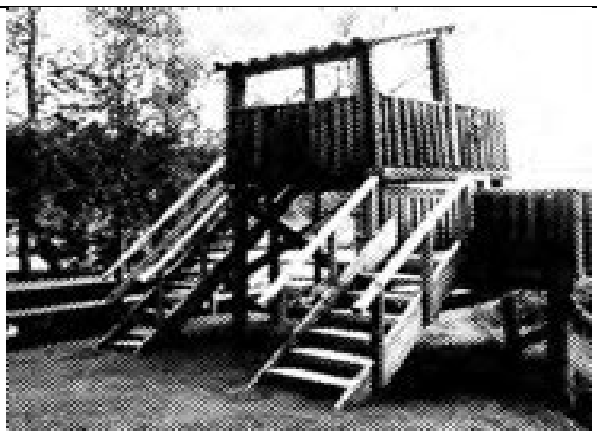
	A man from the council responsible for the upkeep of the shack. He does not object to the graffiti that covers the shack but does not like the depth at which the swastika is carved so deep. I tell him what the Swastika means to me. He tells me about what the Nazi did to Rovaniemi.

The image above are of Penryn and Rovaniemi after being bombed by the Germans in World war II. The man editing reminds me of my father who introduced me to a Steinbeck for the first time in Paris where we lived.

The mind map below is unpicking Bergson to understand durée.





People started to congregate around the shack.

I was upstairs taking a rubbing of the bench.

As the group increased in size I realised they were there collecting Pokémon.

That night I spent I was given 24-hour access to the print room at the University of Lapland. I spent many hours working with rubbing and other related images.

	On my last morning in Rovaniemi, I noticed an anti-fascist sticker on the back of the bathroom door. I returned to Penryn thinking about how I could be this unicorn at home.

Brodskis, B. (2017) digital photographs for Bench in Rovaniemi.

Bergson, H. (2011) *Matter and memory.* Mansfield Centre, CT: Martino Publishing.

Debord, G. (1994) *The society of the spectacle.* New York: Zone Books.

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Appendix 9: Masked Selfie in VR

Documenting an absence of presence in immersive computer simulations and the presence of the virtual.

Delivered as part of the Transtechnology Research Seminar Series 2018/19. 'Gravity, Epistemology, and Representation: A Weightless Exploration'. University of Plymouth, Plymouth, UK, 7th November 2018.

The following writing relates to the paper above. It has been edited back to the description of the process for this appendix.

The Masked Selfie in VR is a self-portrait I drew whilst wearing a virtual reality headset, in the simulated computer-generated space often referred to as Virtual Reality (VR). Perceptions of this image will be quite different however it is likely that you will perceive, within the image, a face. I also perceive, in this image, the absence of documenting my experience of taking a selfie of myself. That is because although I undertook the actions of taking a selfie I was. wearing a VR headset.

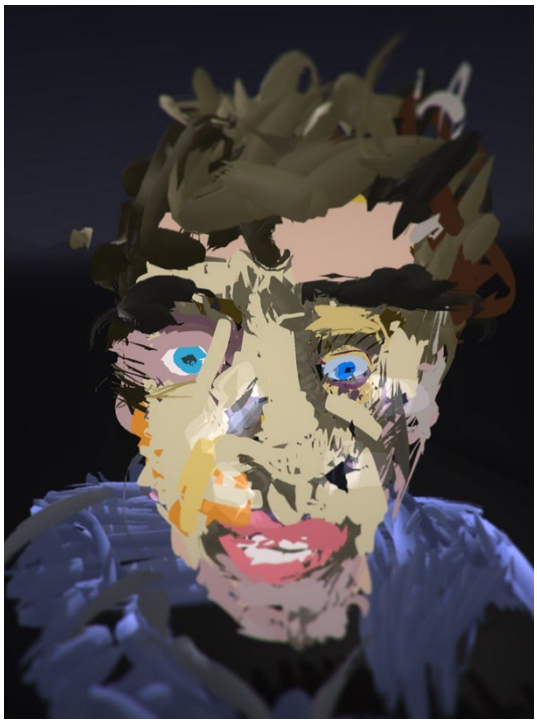


Figure 61: Masked Selfie taken in VR. B. Brodskis

A VR drawing application, called Tilt Brush, transforms methods of mark-making on a 2D surface to drawing in a 3D 'immersive' simulation of space. In this space you can create a drawing and move around in and around it. Once you put the VR headset on your head, masking your eyes, you can no longer see your body or the room you know that you are in. Instead, you can see, through two very strong lens, a

simulation of an environment that surrounds you. In this case it's a simulation of an empty dimly lit space.

Whilst you can't see your body you can feel your weighted presence through the movements that you make with and within your body, and the sense of the floor beneath you. Another aspect that relates material weight to simulated matter is the controllers that you hold in your hands. You can switch the simulated form of these controllers to a variety of tools, some for drawing and another a camera to take pictures within the simulated space. In this simulation of space the drawings you create are3-dimensional but being that they a computer simulation they are form without matter and are weightless. You can also use the controllers to move and rescale the drawings within the space.

Not being able to see myself but feeling my presence I have the idea of drawing a representation of myself in this space. To draw myself I have to recall my material self. As Henri Bergson understood it, an act of remembering like this could be understood to be an engagement between matter and memory {which produces a perception of what I look like}. I then transfer this to drawing a simulation of matter, as in my self-portrait.

This is not simply a reflexive habitual action of a past memory into simulated matter. The process of drawing is an action, drawing memory forth into a present relationship to the material. At its simplest this is akin to the relationship between matter and memory that Bergson describes as forming our individual perceptions.

The way that the process of drawing the masked selfie engaged with the technologies of simulation resonates with Brian Massumi's idea of tunnelling (Massumi,2021,p.156). A concept that he developed in order to discuss For Massumi, tunnelling involves being blinded to the actual material reality and pulling memories into the simulation. The drawing made in VR is shaped by memories of what I look like

but also engaged with present sensations of what I feel like. The form both represents notions of the real and the ideal.

The Masking

Aware that I am not visible in this space, I place the self-portrait over my head. I know through kinaesthetic sense where my head is. I now have the experience of looking out through the mask of my self-portrait, at the empty [are there corners/distance that tells you that there is space around you though??] simulation of space around me. This action, knowing where my head is, so that I could place the portrait over my head is a habitual reflexive action and not the kind of memory that Bergson is referring to when discussing a relationship with matter and perception.

It's also worth noting that the computer has also been tracking the movement of my head because the headset, masking my eyes, is also being tracked. Whilst my head is not visible in simulation of space, Its position is known. The computer has also tracked the movement of the self-portrait to the position where it knows where my head is.

Figure 62: B. Brodskis Drawing in VR.

Taking the Masked Selfie

In the position of where I can feel my hands, holding the controller, I switch the controller into a simulation of a camera. Now instead of a drawing tool I can see the simulation of a screen mirroring the drawing. The drawing that I am experiencing as a mask to my real face. A face that is actually absent in terms of being represented, from the simulated space.

I respond to this experience, perhaps connecting to the kinaesthetic memory of taking a selfieand take what I am calling a selfie, from within my point of view behind the mask. The selfie is in effect a screen grab of traces of the computer tracking my movements or actions. The drawing is created through the computer tracking the controllers, held in my hand. My hand moves in a material, real space, responding to my present perceptions. These perceptions, formed through engaging with the simulated material, created from traces of past actions, and present action of drawing, bring in current memories of what I look like.

Absence from the selfie

Back in the actual material room I look at the selfie, the mask that I drew, taken from a familiar angle of a selfie. Behind the mask the wearer, me, is not present. The selfie, at first, isa contradiction of my experience.

All I know for sure is that I went through the actions of drawing and relating memories of myself to the actions of drawing and wearing a mask. There is of course a problem in this image; the value of the image, as a diagram, depends on having had the experience.

Appendix 10: Enchanted Encounters / Bodmaxx

The following pages have been extracted from an evaluation report on the Enchanted Encounters project (Crutchlow, Radford & Mueller, 2022). Becalelis Brodskis was one of three lead Artists. The extracts included in this appendix are the projects he led on. The Project ran for over a year on a contract of 3 days a week to work with residents of the town in the co-creation of events and participatory art practices.

A link to the full document : https://liveplymouthac-my.sharepoint.com/:b:/r/personal/becalelis_brodskis_plymouth_ac_uk/Documents/Brodskis Thesis links for Upload for VIVA/Appendix 10 Enchanting Encounters_Bodmaxx report FINAL_compressed v3.pdf?csf=1&web=1&e=63Op8Z

Meet the Bodmaxx Creative Team

Becalelis Brodskis (Cornwall) A career spanning traditional stone carving, animation production, participatory arts and creative digital technologies. An innovative facilitator with extensive experience in education and community engagement.

Greg McLaren (London) An artist and theatre maker with a passion for bringing people together to highlight how we live and work with our voices, environment, and public space. A skilled theatre and event director, a compelling writer, and a strong leader with skills honed over years of directing theatre, opera and large scale events

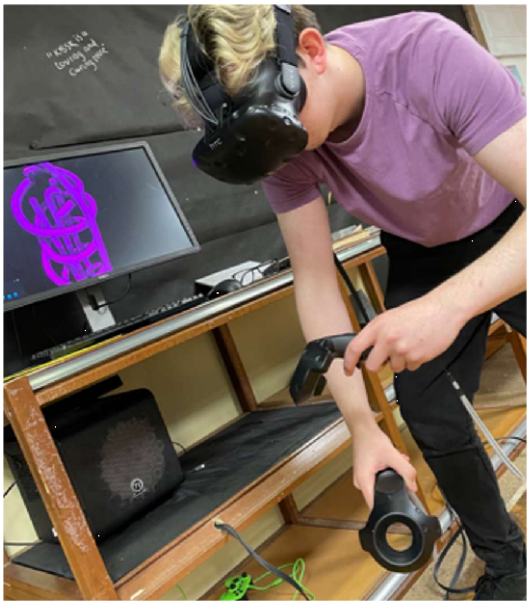
Project Fact File	
Project	Routes & Roots
Description	The aim of Routes & Roots was to create an augmented reality experience based on a participatory mapping project collecting collecting stories of the Routes people took throughout History to get to Bodmin, the ancestral Roots of people who live in Bodmin today, and where people from Bodmin have spread out to all over the world. In this first year the process has included use of a mobile sound and mapping studio collecting stories from people met on the streets of Bodmin, and an R&D process with a small community group. That core group will continue working independently until February 2023 and share the results of their work at an exhibition in the Old Library, whilst the lead artist seeks funding for continuation.
Project lead	Becalelis Brodskis
Partners	Bodmin Museum, Bodmin Library, Bodmin College, Bodmin's Portugese community, The Women's Centre Cornwall.
Participants	Approx 30 ad hoc 'drop ins' 10 attendees to organised sessions with the museum and Women's Centre. 5 – 10 attendees to regular Wednesday sessions.
Location	Bodmaxx space, 81b Fore Street, 'out and about' in Bodmin, audio walkabouts.
Dates	'Out and about' days August – December 2021 and July – November 2022. 13:00 -17:00 Wednesdays July 2022 – November 2022.

-

Project Fact File	
Project	Skate Culture
Description	Skaters of Bodmin were invited to use the Bodmaxx space for a month to explore ideas around the creativity and community of Skate Culture, supported by the project leads. The space was used as an indoor skate park, for workshops and an exhibition. A Skate Photography workshop with professional skate photographer Leo Sharp was held at Bodmin Skate Park. A Skate Culture film describing the project and the experiences of those who took part can be viewed on YouTube.
Project lead	Holly Lovelock and Becalelis Brodskis.
Partners	FdA Digital Media Course, Bodmin College, KBSK, Kinsman Hub, Skaters of Bodmin.
Participants	33 participants.
Location	Bodmaxx: 81b Fore Street and Bodmin Skate Park.
Dates	R&D process between 1st February – 30th March 2022 Two weekends of public facing events 19th - 20th and 26th – 27th March 2022.

Project Fact File	
Project	St Petroc's Drawing Group
Description	The group was established to share a joy of drawing and helping people overcome preconceived perceptions of being able to or not able to draw and to continue a drawing practice at home. The group were very receptive to the 'Routes and Roots' project, and regular attendance to drawing sessions created a forum for people to share life stories. Some of the students visited the Bodmaxx space and tried drawing in VR. Some participants continued on to join the Routes & Roots core group.
Project lead	Becalelis Brodskis
Partners	St Petroc's Church. Bodmin
Participants	6-7 regular attendees. Predominantly older people (70+)
Location	St Petroc's Church, Bodmin
Dates	10am – 12 noon every Wednesday September – December 2021.

Project Fact File	
Project	'Three Wise Being' Installation
Description	This collaboration between Bodmaxx, students from the FdA Digital Media course at Bodmin College and 3D Printing Cornwall created the multimedia installation 'The Three Wise Beings', building on the biblical story of the Three Wise Men. The installation involved creating a magical winter forest laden with mysterious fruits and multimedia projections. Ahead of the exhibition the fruits were 3D printed in the Bodmaxx window using plastic from recycled fishing nets. The installation invited people to contribute their own thoughts about current wise beings of the world and of Bodmin to be integrated into a wise beings video reel.
Project lead	Becalelis Brodskis
Partners	Bodmin College, 3D Printing Cornwall.
Participants	FdA Digital Media Students, Bodmin College. Approx 200 members of the public viewing the installation during 'Winter Wanderland'
Location	Bodmaxx space, 81b Fore Street
Dates	November – December 2021.



Project Fact File	
Project	Virtual Reality Drawing Studio
Description	Regular 'drop-in' opportunities to doodle, draw or scribble in Virtual Reality. Drawing in VR moves drawing from a 2D surface, like paper, into a 3D virtual space where the marks you make become 3D forms; lines that you can move around and in. Its an incredible experience for people of any age or ability. Sessions were offered to those who love to draw or people who have never drawn before. Several older people part of the St Petroc's drawing group and less experienced in using digital technology were introduced to introduced to experiencing VR
Project lead	Becalelis Brodskis
Partners	Home education group. Kinsman Estate Youth Club. Bodmin College.
Participants	Walk-in/ Drop in public: 50 at Bodmaxx space on Fore Street 20 at Kinsman Estate Youth Club
Location	Bodmaxx space, 81b Fore Street and Kinsman Estate Community Hub.
Dates	Kinsman Youth Club workshop 28th June 2021. Bodmin College A level student workshop 21st Sept. 2021 One day a week drop in September – December 2021 and June – November 2022.

Crutchlow, P. Radford, C & Mueller, V. (2022) *Enchanting Encounters Bodmax.* Available on request from IntoBodmin CIC or Arts Council England.

Appendix 11: Rynzine

Sample of Rynzine Issue 02 produced December 2023.

A full PDF of issues 1 and 2 can be downloaded from:

https://www.rynzine.org/issues

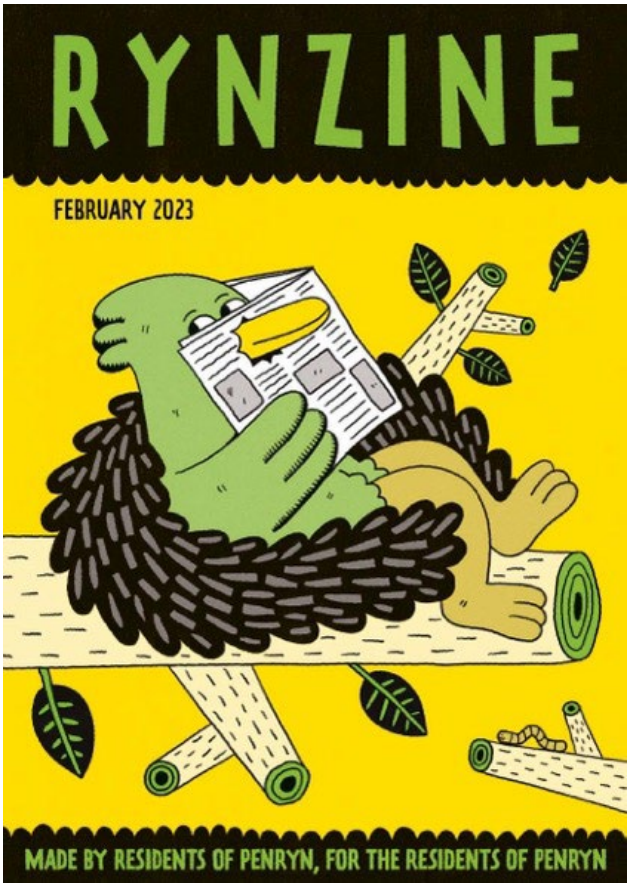


Figure 63: Front Cover of Rynzine Issue 2.

The Rynzine (Brodskis, 2023) is a cross between a Parish newsletter and a Zine. It is A5 in size and 3800 copies are printed. There have been two issues to date. the first in Dec 2016.

It is produced by Becalelis Brodskis who co-ordinates artists to run content creation workshops for residents of Penryn.

It is distributed to every household in Penryn by a team of volunteers. It is partly funded by FEAST and partly by local sponsorship.

Brodskis, B. (2023) 'Rynzine '. *Rynzine* 2),[Online]. Available at: https://www.rynzine.org/.

Neighbours

Martyn talks to Jo and Rose about West Street

Do I put how old you are, or don't you want me to say?

J. To be honest everyone in the town knows how old we are, so put it in.

R. I'm 79.

J. And I'm 82.

So, were you both born in West St?

J. Yes, born here and lived here for nearly 80 years.

R. I was born here in 1943 but not lived here all my life like Jo.

J. I was born next door in No. 33, got married at 21 and moved down the road for 3 years then came back to this house, No. 31, and have lived here ever since. When we moved back here my mum and dad still lived at No. 33 until mum died. My grandmother bought it for £100 in around 1932.

We're in No. 31 right now, so are we are talking about the late 1940's just after the war?

J. Yes, but during the war there were evacuees in this house, two children from London, and if there was an air raid I used to come in here from next door and go into the Morrison shelter under the dining table in the back room, I was showed in to the shelter with the evacuee children. But my grandmother would get dressed and then go across the road and sit on the Fifteen Balls pub window sill (now house No. 32), she would never go under the stairs or under the table, she always sat outside, right over there.

Why did she do that, do you think? Perhaps she felt safer outside than in?

J. I don't know, I suppose so. I was very young, I can't remember much else about the war.

R. I remember the ration books.

J. Yes, but they went on even till I started working, which was in 1955.

R. But with all the shops that there were in West St. if they knew you, they'd give you a little bit extra, marvellous really. It was community.

J. It certainly was, from where the accountants are (top of Truro Lane) up to where Calver Close is now, you could do all your shopping for everything.

R. The only thing you had to go further in to town for was a paper, the post office and the pharmacy.

So you mean there were a lot of shops just in this small part of West St? There aren't any at all now.

J. The accountants was the bread shop, Bellin's. Then there was Ida, Mrs Hodge the veg shop, she had that in her front room. Then the Three Tuns pub (now The Thirsty Scholar). If there was a row or trouble at the pub, then next morning Raymond would come over with a bottle of Sherry and a glass and say "sorry about the noise last night". Then there was Mr Hodge the Butchers (No. 26).

That's next door to me, when we dig in our garden we often find old animal bones.

J. Then the other side of you was the pub The Fifteen Balls. That was the Rugby pub.

R. The players all used to go there and shower after a game.

And have a number of beers too I imagine? Were you children allowed in the pub?

J. No, but sometimes Mr and Mrs Jago (landlords) would let us play in the pub garden. Next to the pub was the Welfare (St Stephens Memorial Hall), we'd play outside there throwing a ball up against the wall, play hopscotch and the like.

R. That's where we'd come to from school to see the Nit Nurse, Nurse Clark and Miss Truscott before that.

J. Nurse Clark would catch hold of your pig tails and pull them apart and check for nits, and boy did some of us have them! They'd be there one day a week. Mothers would take there babies over there to be weighed.

R. We'd also go in there for free orange juice. It was in small bottles and very thick and concentrated, it was lovely.

J. Next door to the Welfare, Anne Hill had a big orchard down behind the houses. The house down there caught fire in about 1948/49, something like that, afterwards when it was over Mr Sando used to come and sit on the Welfare steps for ages. His hands were scarred from the fire. Mrs Sando died in the fire. I think it was because a paraffin heater was knocked over. The house was there empty for years.

R. We used to go down there and collect fresh raspberries on a big cabbage leaf! And further on through the opeway between the houses we'd go to Mr Annear and get flowers for Sunday School.

J. Then there was Bishop's carpentry workshop where the footpath to St Giluvius Church Hall starts.

R. My grandad also had his carpentry workshop at the top of where Calver Close is now. He did general carpentry but also made coffins for Bennet's the undertaker. Then next to that there was a Co-Op.

So that was all on the other side of the street... what about this side?

J. We haven't finished yet! There was also Wood's Taxis, where you could also get fuel, oil and wood for the fires.

R. Now, crossing to this side of the road there was a chip shop, Mr Thomas, you'd go down there and get a penny bag of chips, and if you didn't have any money you could have 'screets', those left-over little bits of batter.

J. Mrs Thomas, I can see her now, she'd stand in the window putting potatoes in to the chip-chopping machine.

R. Then there was Mr and Mrs Hill and their daughters Nora and Pearl, they had the grocer's that had everything. He only had one arm.

J. Pearl was deaf wasn't she? After Mr Hill died they sold it, and Mr Dyer took it over, he only had one arm as well!

That's strange, perhaps they both lost them in the Great War?

J. Possibly? Mr Dyer always had beautiful ham, he used to boil it in a copper, an early type of washing machine. The ones you would load from the top. The same thing people would do their laundry in! That's all the shops, just the two on this side.

That's amazing, so many businesses in just a couple of hundred meters, all gone now. What was the traffic like?

R. It was two-way traffic not one-way like it is now.

J. You'd have buses, but there wasn't the same amount of traffic, although the street hasn't really altered in looks at all from the front.

R. My mum never liked net curtains, but if the buses got stuck, the people on the top could look right in to the bedroom.

It's still like that now! They can see right in.

J. Also, I don't think anyone in the street owned a car.

continues...

Appendix 12: The Full List of Nodes

Node 1: Photograph of a Shed

Descriptor: Photograph of a shed (node 1) printed on paper.

Technical process: This photograph was printed from a printer connected to a computer, both of which are in the shed. Two cables are connected to this computer, one for electricity, the other for digital data, and both run out of the shed into the house and out again to join a network of cables distributing electrical energy and digital data across the UK, and beyond. In effect, the shed has the potential, through the computer sitting on the desk, to connect to any hard drive on Earth that is also connected to the internet, and to whatever digital information is stored on these hard drives.

Technical contextual paradigm: The shed is the place where the majority of this research has been written up. The computer is on a desk that is placed so that, when I am sitting at it, I have a view of the garden and neighbouring houses.

In effect, the shed has become part of the meta interface for a network of computers. Within this meta interface a digital file stored on a Google drive somewhere on Earth was used to print the photograph of the shed (node 1). The file was taken using a mobile phone that was set to transfer any digital photographs to a Google drive. Embedded in the digital file along with the photographic data are the GPS coordinates corresponding to where and when the photograph was taken. Using the computer in the shed and the software applications provided by Google, the photograph of the shed is displayed alongside a Google map. On this map is a graphic icon, representing a pin on a pinboard, identifying the approximate location of where the photograph was taken and thus the location of the shed.

Golden thread: If we zoomed into the photograph and looked through the windows of the shed, we would see a pinboard and the same photograph of the shed. By looking or thinking about this photograph (node 1), I engage with memories of seeing it,

and also other memories that arose when I first saw it. At the time of incorporating these notes into the thesis, I no longer lived in the house with that shed, although my new house also has a shed.

Node 2: Correio

Descriptor: A photograph printed on paper, which includes the raised letters on the letterbox that spell the word, '*correio*', the Portuguese for 'post'.

Technical process: Like the photograph of the shed (node 1), this photograph was printed from a data file that has embedded in it the GPS coordinates of the position of the phone that captured it. From the GPS data, it is also possible to work out the time past between the photographs. Thus, we have a quantitative measurement of space and time that could be considered an objective relationship between data. This linear relationship applied to time and space can be reproduced on any computer accessing the same data points.

One action could be to retrieve these data files using a computer interface. For example, if the data of the letterbox (node 2) and the shed (node 1) are retrieved using a GIS interface, such as Google Maps, we can identify their location as two pins on a Google map by using the corresponding embedded GPS coordinates. One pin will be in Cornwall and the other, representing the letterbox, will be in Lisbon.

Technical contextual paradigm: Memories are sometimes conflated with photographs; however, they are distinctly different. A memory, unlike a photograph, is clearly not a material object. Through our actions, our memories engage with photographs to create a perception. Whichever interface is used, be it the blank canvas of JOSM, the Google Map underlay, or the pinboard, when two isolated points are identified, there is the potential to find a relationship between them. The relationship between the two points, one representing the shed (node 1) and the other the letterbox (node 2), is inferred rather than intrinsic, but from an objective point of view, following Euclid's first postulate, a straight line could be drawn between them. In contrast, the two nodes on the pinboard, which represent the same shed and letterbox with a golden

thread drawn (also applying Euclid's first postulate) between them, relates to a distinctly different perception of time and space: that of durée.

Golden thread: When looking at the relationship between the two nodes, memories of the letterbox (node 2) filter through the actions undertaken in the shed (node 1) – pinning material objects to the pinboard. Thus, the thought experiment uses the actions on the pinboard to project a perception of the letterbox.

Node 3: GPS Data Point – 'Untitled 01'

Descriptor: Node 3 identifies a point on a line. The point is on a printout of a section of 'Untitled 01': a line representing a GPS trace.

Technical process: This particular node identifies where the photograph of the *correio* described in node 2 was taken. The point, identified by the golden thread meeting node 3, is one of five other pins pushed through printed dots on the paper. Each dot represents a GPS node – in this case, the GPS of Lat 38:43 0.5830000. These are placed alongside the line of the GPS trace and identify the audio-visual media captured along the route of the trace.

Technical contextual paradigm: The pins identify a point on this line representing GPS points. Just as Euclid's first postulate is used to connect memories of the shed with the letterbox, a GPS trace is created by a network of nodes (GPS points) comprising a series of lines running from one point to another.

Golden thread: This will touch on all points; however, unlike the GPS trace which follows a network of nodes – 'absolute co-ordinates' – according to a linear model of time, the path the golden thread travels is dictated by the memories drawn into its coils as they come into contact though action with matter. As such, it is not an absolute path but an unfolding qualitative relationship with a multitude of impressions.

Node 4: Audio Letterbox

Descriptor: Node 4 is a dot printed on paper that represents a GPS point embedded in an audio file.

Technical process: If we regard the quantitative measurement of time and space as criteria for objectivity, the GPS coordinates document a relationship of spatial proximity between nodes 3 and 4. This is represented on the section of 'Untitled 01' where they can be calculated to be within 5 meters of each other. The information is embedded in their respective digital files, as well as the time, each documented within x[152] minutes of each other. Thus, the analysis of the audio data was cross referenced with the photograph.

152 The exact calculation has been lost however it can be recalculated by returning to the data files.

Node 5: Transcript – Experiment

Descriptor: A transcription of an audio file printed out on paper (see figure 30), a section of which has been broken down and inserted into the diagram.

Technical process: If viewing this data on a GIS interface, the transcribed audio can be heard by clicking on an icon identifying an audio recording. The audio recording embedded with GPS data is node 4 on the diagram. The recording's data provides a time and date.

Technical contextual paradigm: Most of the words in this transcript would be understood by anyone with a general comprehension of English. Other words, however, have a more nuanced nature, and depending on the context, could mean one thing or another. The first sentence has become particularly significant in terms of a documented relationship between matter and memory. Since recording over the course of this research, I have revisited the transcriptions countless times, and over this time, the first sentence has magnified in significance for me.

Golden thread: I remember speaking these words: 'So, I saw this letterbox, *Correio*. I walked past it. Then I thought, wait a minute. I would like to go back to that, and wondered why?' If this were to be a performance, I would speak this line with pauses between the different elements, and relate them to the digital documentation, the audio recording, the photograph, the GPS trace and then the action that invites memory into an engagement with perception.

Node 6: Letterbox

Descriptor: Letterbox: a word printed on paper.

Technical process: A letterbox, also known as a letterplate, can mean any number of objects through which letters are posted. What I was referring to at the time of recording was a metal flap in a doorway.

Technical contextual paradigm: The precise nature of this particular letterbox depends on memory. It raises a question of whether a letterbox is a technology?

Golden thread: I remember the texture of worn paint on the metal flap and its green colour, as well as imagining the hallway beyond the letterbox into which the letter would fall.

Node 7: Correio - Text

Descriptor: *Correio*: a word printed on paper.

Technical process: When first listening to the audio data, I assumed that, due to my lack of Portuguese, I was using my rudimentary Spanish as a stand-in to signify that I had seen a letterbox – *correo* (post in Spanish).

Technical contextual paradigm: I had forgotten, or perhaps had never noticed, that the word '*correio*' was cast on the flap of the letterbox. However, due to the proximity of where and when the photograph and the audio recording were created, the assumption could be made that at the time of recording I was reading out what was written on the letterbox.

Golden thread: The word returns me to the relationship between the letter, the letterbox and the pinboard.

Node 8: Letter

Descriptor: Letter: a word printed on paper

Technical contextual paradigm: This letter, referred to as my dad's letter, has been on this pinboard in different positions since I returned[153] from Lisbon over two-and-a-half years ago. The research was motivated by an interest in documenting different perceptions of matter – in this case, by an increasing awareness of the many ways that I could engage with this letter. Bergson calls this an awareness of 'zones of indeterminacy', which refers to a moment prior to any action being taken where different potential actions are considered. The address identifies the approximate location of where the letter is now pinned. In this moment of hesitation, however, there is an expansion of attention to the actions of pinning, writing and reading, involving both space and time.

What I know about this letter will become apparent as we proceed along the golden thread, through the nodes, each one a memory relating back and forth in an undetermined relationship with this letter and the network of nodes. When an action is taken, the network of nodes defines the memories that come into the present moment – that is, both the moment in which I write this description and the moment projected into the future in which I will perform this diagram.

Golden thread: On the pinboard, I see a white envelope with an address. I recognise the handwriting and picture my mother's hand and her face while writing the letters.

153 I returned from Lisbon in September 2018. The notes were written in April 2021.

Node 9: Journey

Descriptor: Journey: a word printed on paper.

Technical contextual paradigm: A journey can indicate a movement through space or a physiological transition. At the time of recording, the journey is referred to as 'leaving Cornwall and arriving in Lisbon, and all the points in between'. When I revisited the transcript, I found that the word 'journey' now also included points before and after the journey I took. Taking the first meaning of the word, a GIS interface could represent the departure point as the shed (node 1) and, at the point of recording, the destination could be the letterbox (node 2). In between certain choices were made – for example, flying from Newquay to Faro and then on to Lisbon, rather than flying from London to Lisbon. This had the effect of making the journey longer but, from my point of view, more enjoyable. It also meant that while both ways of travelling to Lisbon would mean arriving at the same destination, the qualities of the experience would be very different. This difference of where the start and end are defined would be reflected in the various shapes of the GPS trace; however, their qualitative difference would not be expressed.

Node 10: Kenneth

Descriptor: Kenneth: A word printed on paper. Associated with the name of a boy or man.

Technical contextual paradigm: Not all the following memories may appear to be significant, but I have included them simply to demonstrate how the slightest engagement with the matter of this letter is full of potential impressions. The way in which the decision is made as to which is relevant or not is a problem that is central to the politics of participation.

Golden thread: The letter was written by a man called Kenneth – in this case, it was my mother's father. Although I have not read the letter on any occasion, when I nearly did, I retained a memory – which I am not entirely certain of – that it is headed with the address of Kenneth's house in Rabat, Morocco, and written on paper that includes a graphic inspired by the same Arabic tent material that decorated his sitting room. His house in Rabat was in the old fort, with a garden leading to the city ramparts. Looking over and below you could see the estuary as it met the sea. A tortoise lived in the garden, which reminds me of a miniature jade tortoise given to me by the same girlfriend who gave me the pendulum.

Node 11: Grandmother

Descriptor: Grandmother: a word printed on paper.

Technical process: There is an audio recording that mentions more about my grandmother.

Golden thread: I have been told by my mother that my maternal grandmother was the recipient of this letter. My grandmother kept a diary and all her letters. When she died, my mother came into possession of this letter, read it and then sent it to me.

Node 12: With

Descriptor: With: a word printed on paper.

Technical contextual paradigm: This is a connection, a sensation, or a mental state that, in terms of absolute measurement, does not in itself define a relationship: you cannot trace the qualities of being 'with' through GPS tracking. And yet it is widely recognised as defining a relationship.

Golden thread: In this context, 'with' is a relationship: a romantic relationship, a love affair that turned into a marriage from which I was born. I am struck by what the statement, 'to be *with* someone', means. At times it will mean to be in the same physical space, and at others, 'to be with' even if not in the same space.

Node 13: Serge

Descriptor: Serge: a word printed on paper.

Technical process: Serge is the name that other people call my dad, or that I call my dad when I am talking to other people about him.

Technical contextual paradigm: This would have been unclear to anyone unfamiliar with the details of my lineage. With this information, the meaning of what is meant by the words, 'my dad's letter', begins to refocus on the fact that the letter is *about* my dad rather than *belonging to* my dad. The fact that there is a shift from using the word 'dad' to the name 'Serge' is because there is an attempt to represent a qualitative difference in the attitude of the person I imagine writing the letter: it is not a letter written from a son to a father but by Kenneth (node 9) about Serge.

Golden thread: I rarely see my dad, and may never see him again.

Node 14: Accident

Descriptor: Accident: a word printed on paper. A car crash my father was involved in.

Technical process: My father was a passenger in a car in Spain driving to or coming back from Morocco.

Technical contextual paradigm: Morocco is the country in which my father was born and grew up. Once, as a child, I remember seeing a shard of glass sparkle from a spot pushing out from his scarred neck. It is possible that this shard would have been part of the car window through which, moments before the impact of the collision, he may have seen the landscape pass by. Then, in the collision, the metal and glass crushed and cut his body. I was born after the accident.

Golden thread: I have grown up with stories, photographs and paintings reminding me of this accident. The driver left my dad for dead and fled. A fellow passenger stayed with him, and the Spanish emergency services extricated him from the crashed vehicle. The accident reminds me of his scarred neck. His scarred neck reminds me that his father had a scarred neck from being hung in the Lithuanian pogroms. His grandfather, my great grandfather, was also hung and left for dead.

Node 15: Mental

Descriptor: Mental: a word printed on paper.

Technical process: The precursor to defining a state of the brain. Used alone it usually signifies a quality of disturbance.

Technical contextual paradigm: I have still not read the letter, but it is a document that contains what may be distressing information of Kenneth's perception of my father's mental state while in hospital. My mother had previously told me that when Serge regained consciousness, he was angry because he thought people were tricking him when they reassured him that he was alive. It is possible that not only was his body crushed but the traumatic effect of the accident also changed his way of sensing, seeing, communicating and engaging with life. His mental state could be described as 'bipolar'. When a perceived connection between things brought meaning to a lived experience he would look up and say, 'Sky language'. Prior to these connections being applied to observance of Judaic religious ritual, it was applied to professional contexts of the 'new wave' of French and German filmmaking in the 1960s.

Golden thread: My mother left my father. As a child I was very close to him and his itinerant, anti-capitalist lifestyle, which was governed by his mood swings that ranged from deep depression to elation. People were often seduced by his charm and vivacity until they became the target of his anger, expressed in an endless diatribe of fury that left him literally foaming at the mouth.

Node 16: Photogrammetry

Descriptor: Photogrammetry: a word printed on paper.

Technical process: Photogrammetry is an increasingly widespread technique for creating 3D CGI models from the data of multiple photographs of the same subject. Generally, the aim is a photorealistic aesthetic – that is, a physical, plastic rendering of a subject that varies according to how much photographic information can be cross referenced.

Golden thread: When I engage with the word 'photogrammetry', a number of related experiences represented by three screen grabs of 3D models, portraits and self-portraits (nodes 16a, 16b and 46) come to mind.

Node 16a: 3D Portrait using app on smart phone

Descriptor: A screen grab printed on paper of a 3D portrait of myself.

Technical process: This 3D portrait was made using the technology on a smart phone. It comprises photographs captured by someone walking round me with a mobile phone, and hence is less precise than the studio portrait referred to above, due to the fact that the phone's algorithm found it difficult to accurately relate the different points in the different photograph to each other.

Technical contextual paradigm: The effect is a more fractured, exploded aesthetic, in contrast to the uncanny likeness of the 3D model made by the professional set up (node 16b).

Golden thread: I am trying to find an accordance between how I feel and the scattered surface I see in the model constructed from the mobile phone photographs. However, through its very imperfection it suggests a way out of the pseudo reality of the professional photographic record.

Node 16b: 3D Portrait using Professional Rig

Descriptor: A screen grab printed on paper of a 3D portrait of myself.

Technical process: The studio had a professional rig of multiple cameras set up in a circle which I was invited to stand inside. In one click, the cameras took multiple photographs at 360-degree angles, and these informed the automatic construction of a digital mesh. There was also a 3D printer in the studio that could print out 3D objects from the mesh.

Golden thread: When looking for a coffee shop in east London, I came across a 3D portrait studio. The owner invited me in and took my 3D portrait using photogrammetry.

It struck me that both the landscape I walk in, and the outer form of my body can now be represented using photogrammetry. Neither represents what I know of myself or the experience I have when walking in these landscapes.

Node 17: Cobbles

Descriptor: Cobbles: a word printed on paper.

Technical process: This photograph documents a discarded cigarette lying in the crack between some cobbles.

Technical contextual paradigm: I am not sure if I remember the cigarette or if I remember the photograph of the cigarette. Kneeling down to touch the cobbles was part of the action of wandering – you only kneel down to touch cobbles in a street if you are wandering along it, not walking with the (habitual motor) intention of getting somewhere. In another situation, in a street in Paris in 1968, the act of kneeling could indicate a very different purpose: to prise the cobbles up to throw at the police. The interconnection between the cobbles, memories of a revolution and the act of wandering as a conscious encounter with an alternative perception reminded me of Debord. Perhaps in his psychogeography, the cobbles would have been objectively observed, not only as the surface of a road but also as a revolutionary weapon. I took enough pictures of a cobble to create a 3D simulated representation using photogrammetry to bring to mind Debord's 'society of the spectacle' and whatever revolutionary purpose the cobble could have in a simulated space.

Golden thread: Kneeling down to touch a cobble in a narrow street, I also noticed bits of debris and a cigarette. As I touched the cobbles, I remembered a man with one eye. He used to come and visit my dad when I lived with him in Paris in the late 1970s. We lived in an old sewing factory above a cobbled yard by a roundabout near the Bastille, the location of an earlier revolutionary event. The man's other eye had been shot out by a plastic bullet in a street in Paris in 1968 – the year I was born.

Node 18: Cobble Photograph

Descriptor: Photograph of cobbles printed on paper.

Technical process: The GPS data embedded in the photograph of some cobbles identifies a location on the GPS trace. This is represented by a dot towards the beginning of the GPS trace, with a pin pushed through it.

Node 19: Audio GPD Data

Descriptor: A dot on a line printed on paper.

Technical process: According to the scale of the GPS trace, node 19 is approximately 20 metres away from where the photograph of the cobbles was taken. This GPS data is embedded in an audio file, node 19.

Node 20: Audio Transcript

Descriptor: Audio transcript: words printed on paper.

Technical process: A transcription made by listening and extracting from the audio recordings the words spoken and recorded at the time.

Technical contextual paradigm: 'I noticed the cobbles that were ripped up in the riots of '68 and the narrow streets. Thinking of other examples of social unrest. Walking down these thin back streets I got a little pang of Benhavis, the little town where my grandmother had the house "Trammores" that is now immensely, totally ruined, or what is ruined, no longer the small town, passing the orange trees. Another graffiti of pura poesia.'(node 22)

Golden thread: Thinking back to the time of recording, I remember the physical posture of my body holding the mobile phone, recording my voice. The phone is placed next to my mouth as if making a call. I do not remember the words I spoke but instead, as I walked past on the cobbled ground, I recall the little trees in terracotta pots with miniature oranges hanging from them.

Node 21: GPS Location of Pura Poesia Photograph

Descriptor: GPS of *pura poesia*: a dot on a printed sheet of paper.

Technical process: The GPS coordinate situates a photograph (node 22) near that of the cobbles and not near the photograph of the *correio*. It is the first audio-visual data point on the GPS trace selected for this diagram. The second is node 18 photograph of the cobbles.

Node 22: Pura Poesia Photograph

Descriptor: Photograph of doorway printed on paper. With the words '*pura poesia*' graffitied (tagged) on door.

Technical process: The GPS data embedded in the photograph of the door identifies a location on the GPS trace. This is represented by a dot, with a pin pushed through it. (node 21). The words '*pura poesia*' ('pure poetry') can be seen on the photograph of a door. It appears to be a wooden door painted green – a slightly darker green than the letterbox, perhaps the same shade as the peeling paint around the letterbox.

Technical contextual paradigm: I remember, when considering the requirement to limit the number of links that diverged from the focus of this thesis, hesitating over whether to include this photograph. At one point, I took the photograph off the pinboard, but I could not quite bring myself to erase the evidence of the GPS dot on the trace (node 21). This would have meant going into the hard drive, where the data for the GPS trace is stored, forging the evidence and printing out a GPS trace without this data point. And yet, why not? The action could be justified on the premise that all descriptions are a representation that, in a certain way, negates Bergson's concept of pure perception. It was in the action of listening back to the audio data of the GPS trace (nodes 19, 20), ending with the words '*pura poesia*', that I was reminded of the photograph and decided to re-pin it, as an example of one of these inscriptions, into the diagram and not erase the GPS point. The artist who writes this tag all over Lisbon is called Felipe Fernandes (Norval, 2023). He is of Brazilian descent, and he arrived in Lisbon in the 1980s. I found out from a blog that he wanders the streets in the early hours of the morning writing this tag, which has now become: '*Poesia Nao Basta*' ('Poetry Is Not Enough').[154]

154 See: https://www.compulsivecontents.com/detail-event/pura-poesia-pure-freedom/

Node 23: Phone

Descriptor: Phone: a word printed on paper.

Technical process: The word phone refers to a smartphone: that is, a mobile hybrid of technologies, including a GPS receiver, camera, audio recorder and data transmitter, weighing just 155 grams and easily fitting into a back pocket. As users, we are not so much determined by the technology, but perceiving the advantage the phone offers of allowing us to be light of foot and connected to a network, we quickly become dependent on it (Nye, 2006).

Technical contextual paradigm: When I accidentally broke this phone, my immediate response was panic, which then led me to question my apparent dependency on this technology, not only as a device for documenting a relationship between matter and memory, but also as a method of contacting people with whom I wanted to maintain a relationship.

Golden thread: The 'death' of this particular phone is documented in an unsent letter written in room 509 on the fifth floor of the Premier Inn on Borough High Street. I was there for a memorial of a best friend of my dad's. For the last fifteen years of his life he had (understandably) refused to see my father. For a brief time, I had returned to the use of a notebook to document events that I considered of interest.

Node 23b: Mobile Phone

Descriptor: A screen grab of a smart phone being held in a hand printed on paper.

Technical process: See node 23.

Technical contextual paradigm: It is now quite uncommon to meet someone, over the ages of 13 who does not carry, on their person, a mobile smart phone or equivalate device;_it is considered to be a way of communicating, documenting and accessing information.

Golden thread: A number of different mobile phones have been used during the period of this thesis sharing my location and uploading data to the 'cloud'.

Node 24: Sarah

Descriptor: Sarah: a word printed on paper. Sarah is the name of a woman I had met the night before.

Technical process: Sarah wanted a light for her cigarette and sat beside me talking about our wanderings.

Technical contextual paradigm: Meeting strangers at a bar in Lisbon.

Golden thread: Sarah was with a friend, Sorcha, who was a semi-professional harp player. The three of us ended up walking, talking and drinking until 5 am. Sarah gave me a kiss when I left them at their door. They both flew back to Dublin the next day.

Node 25: Letter

Descriptor: Letter: a word printed on paper.

Technical process: An icon for Google's email service, a graphic representation of an envelope, notified me that an email had been received.

Technical contextual paradigm: This is an example of how graphic design creates associations between things that are very different in order to imply certain qualities. I was waiting for a reply from Sarah. I was able to put her name into the Google search engine and deduce from the data compiled in the Google hard drive that she had not replied at the time the audio recording was made.

Node 25b: Email

Descriptor: Gmail logo: An illustration of an envelope printed on paper.

Technical process: Emails are a digital alternative to sending letters.

Technical contextual paradigm: I was also waiting for emails and sending them.

Golden thread: The letterbox reminded me of the emails I had sent and was waiting for.

Node 26: Number 35

Descriptor: Number 35: a word and numbers printed on paper. Number 35 is the number of the door in which I saw a letterbox.

Technical process: I did not notice, or rather register, until putting the GPS coordinates of the photograph of the *correio* in Google Street View (GSV), that the number 35 can be seen on an enamel plaque above the door that contains the letterbox.

Technical contextual paradigm: The street-view photographs were taken in September 2018 by a camera placed on a GSV car. My photograph was also, by chance, taken in September 2018. However, as I was not there at exactly the same time, the GSV car did not inadvertently capture me taking a photograph of the letterbox as it drove past.

Golden thread: If you look closely at the 360-degree street-view panorama, the GSV car is reflected in a window opposite number 35. See Appendix 7.

Node 27: Mind

Descriptor: Mind: a word printed on paper.

Technical process: I associate the word mind with thought and the brain, yet when I think it feels as if the thought extends to or sometimes begins from other parts of my body.

Technical contextual paradigm: The sensory experience of thinking is attributed to a process relating thoughts to one another. It locates a sense of energetic stimulation, which is sometimes tiring, in the space occupied by the organic matter of my brain, which Bergson likens to a telephone exchange. Theories on the relationship between thinking and feeling, between the body and the mind continue to be divided. Although I have not quite rejected the Cartesian division between mind and body, the attention this research has bought to bear on the relationship between matter and memory infers an extension of the mechanisms attributed to the brain to the body in its totality, and even beyond the membrane that defines the body.

Golden thread: I am more comfortable with the idea of thought as a function that extends throughout the body – and beyond it.

Node 28: Janetta

Descriptor: Janetta: a word printed on paper. Janetta was the name of my grandmother.

Technical process: Janetta died in her late nineties, a few months before I went to Lisbon.

Technical contextual paradigm: Janetta is a word entangled with memories of both her kindness and her hard, dismissive impatience. These perceptions of her have been influenced by photographs, archived in rows of curated albums, that document moments in her life when she was younger – thirty, forty, fifty. The photos also document my mother's childhood, as well my own during the times I visited her and lived with her in Spain.

Golden thread: The last time I had physical contact with my grandmother, she was dying in her bed in London. Her face no longer resembled the face I knew or remembered. When I say her name, these memories are projected onto the present moment.

Node 29: Benhavis

Descriptor: Benhavis: a word printed on paper.

Technical process: Benhavis is mentioned in two audio recordings that were made, according to the GPS data, within a few minutes of each other: one at 15:59 (node 4) and the other at 15:51 (node 19). The audio data documents that it was 'the little town where my grandmother had the house "Trammores"'.

Technical contextual paradigm: The first and last time I went to Benhavis was with my mother. We went to revisit our memories, to lay something to rest. My grandmother was packing up to return to die in London.

Golden thread: My memories were of small, white-washed houses, wrinkled sun-kissed old women standing in the shade of doorways, and the smell and taste of warm white bread wrapped in cloth; Miguel riding his mule, smiling, wearing his hat made of reeds; and the sounds of warmth – cicadas and goat bells in the surrounding red-ochre hills. But almost everything we remembered had changed, even our memories had changed.

Node 30: Walking

Descriptor: Walking: a word printed on paper.

Technical process: I began my wandering in a direction that took me away from the centre of town, where my hotel room had been booked, towards where I thought I would be likely to find a place I could imagine feeling more at home in. The walking responded to my feelings of being drawn towards or wanting to move away from whatever I encountered, be that external or internal (feelings).

Technical contextual paradigm: There is a paradox in the embodied experience of walking in that my memories may move towards that which I am walking away from. When the familiar action of walking is not a habitual impulse, it could be defined as wandering. When wandering, different internal responses adjust the pace and orientation of the body.

Golden thread: The whole mind/body partakes in walking; the body is not simply moved forward by the motion of the legs. The action of every step or movement, even standing still, about to move, or deciding not to move, encourages a relationship between matter and memory.

Node 31: Mapping

Descriptor: Mapping: a word printed on paper.

Technical process: I used my smart phone and an application called Osm And to document my perceived relationships between the matter I came across in the landscape and my memories. Unlike Google, OSM gives you the option of having no base layer: essentially, it presents you with a blank white canvas as your starting point, with the icon of a compass needle representing your position.

Technical contextual paradigm: I cannot remember what element of matter or memory I documented first; what I do remember is how, over the course of a week of wandering and documenting, the screen of my smart phone had become populated with icons. Instead of a representation of streets as points of reference, I had numerous icons representing my memories. Although I had not intended to use the phone for navigation, in a moment when I felt very tired and completely lost, I consulted the map of documentation I had made. My position, identified by a compass needle on the white canvas, guided me to a memory that I had recorded during my wandering.

Golden thread: Thus, I found my way back to the hotel through a relationship with memories, not of Lisbon, but with objects in Lisbon's landscape that reminded me of my original route.

Node 32: Open

Descriptor: Open: a word printed on paper.

Technical process: This word describes a certain mental attitude that does not take a fixed position.

Technical contextual paradigm: This attitude implies an observational quality, responding to occurrences rather than instigating them.

Node 33: Sign

Descriptor: Sign: a word printed on paper.

Technical process: The word 'sign' here refers to the writing on a surface that is attached to a wall at the beginning or end of a street.

Technical contextual paradigm: The writing signifies the name of a street and shows, at the same time, that this space is:

> [i]nhabited by a semiotic animal, a species whose individuals define themselves through their use of signs. In so doing, they constantly confront the classical problems of representation, intentionality and credibility. The paradoxical nature of these issues is indeed built into the sign itself, for even though both signifier and signified are possessed by a desire to be the same, that desire can never be satisfied. (Olsson, 1991, p.85).

Node 34: Google Screen Grab of Sign

Descriptor: Google screen grab of a sign: image of incised stone printed on paper.

Technical process: The street sign is a stone plaque bearing the words 'Traversa de Piera'.

Technical contextual paradigm: In Portuguese, these words literally refer to a road crossing marked by a pear tree (not, as I thought at first, 'the crossing of the father who has the weight of stone'). The surface of the stone had been prepared in such a way that it could be cut into at an angle to create incised letters.

Golden thread: It is an action I am familiar with as I have been a stone carver. The documentation of this sign extracted from GSV suggests that the sign was made of stone, and it is probably no accident that the word 'stone' became entangled for me with the word 'father'. The weight of my father is also entangled with the weight of the Judaic religion, whose rules were also incised onto a stone tablet.

Node 35: Traversa

Descriptor: *Traversa*: a word printed on paper.

Technical process: The first word written on this sign was *'traversa'*, which signified to me the word for crossing.

Technical contextual paradigm: The word conjures up the image of one line crossing another, or in the case of roads, a crossroads. It is a point of intersection or a junction.

Golden thread: This is the moment for a pause. It links to node 45.

Node 36: Pere

Descriptor: *Pere*: a word printed on paper.

Technical process: The third word following '*traversa de*' signified to me the words for either 'father' or 'stone'. This is not because the word in Portuguese inscribed on the sign, the signifier, meant either stone or father, but because I was using my knowledge of Spanish and French to try and interpret the word.

Technical contextual paradigm: With this interpretation, my thoughts returned to my father. It was as if the crossroads had bought me to a psychological experience at an intersection of points in the diagram: the letterbox, the letter about my father that I had still not read, and the alternative significance of the reading of this sign in the stone.

Golden thread: This overlapping created a familiar relationship, with my perception of my father bearing the metaphoric weight of a stone.

Node 37: Audio

Descriptor: Audio: data of *traversa*.

Technical process: Returning to some earlier audio data (node 20) enables me to describe how my reading of a word, which I interpreted to mean either 'stone' or 'father', links to the cobbles that I first documented in node 18.

Technical contextual paradigm: The perceived link lies in the fact that not only are cobbles a kind of stone, but they also contain my projected memories of my father. This audio data is an expression of this experience. I do not describe it using a 'classical phenomenological' method, of '*epoché*', or bracketing, which would in the first instance be to recognise my projection of memories and thus begin an act of "abstention of my experience of the cobbles 'making possible the discernment and description of their essential structure (Cerbone, 2006, p.22). I intentionally extend beyond the bracketing to the subjective attribution of memories. This engages in the depth of subjective experience, as did later existential phenomenologists such as Maurice Merleau-Ponty (Carman & Hansen, 2004). This audio recording could also be said to document a lived experience of Bergson's concept of durée (1991). Within this theoretical model, the actions taken in relation to *matter* or material objects, in this case the cobbles and the sign, both draw down memories of my father and the material potential of stone. In the case of the cobbles, this potential could be realised in the act of rioting; in the case of the sign, in the act of inscribing text; and in the actions of my father, in the psychological weight of his influence.

Golden thread: In this moment of durée, experience is an entanglement of both matter and memory.

Node 38: Re

Descriptor: Re: a word printed on paper.

Technical process: 'Re' is the beginning of the word 'repeat', without the following syllable 'peat'. Peat[155] also refers to the rich matter of decomposed vegetation.

Technical contextual paradigm: The composting vegetation in this case was my entangled thoughts, as though my father were lost on a moor or stuck in a bog. Yet, when dug out, the peat becomes fuel that is burnt to warm your home and nurture you.

155 'Peat: fuel consisting of spongy material formed by the partial decomposition of organic matter, primarily plant material, in wetlands such as swamps, muskegs, bogs, fens, and moors' (Encyclopaedia Britannica, at https://www.britannica.com/technology/peat)

Node 39: Envelope

Descriptor: Envelope: an envelope containing a letter about my dad.

Technical process: There is an envelope on my pinboard containing a letter about my dad, which at the time of documenting the letterbox, was in the backpack on my back.

Golden thread: I had not, at the time, read the letter contained inside the envelope. It has remained unread until the completion of this thesis.

Node 40: Map

Descriptor: Map: a printed-out screen grab taken from a selection of Google Earth's bird's eye views of Earth.

Technical process: The bird's eye view refers to the position of a camera on a satellite, and this section is composed of these digital photographs of Earth. The areas of blue signify the sea, whereas the green is land. They are taken from such a distance that the only details are the contours of the land, the changes in the density of green, indicating vegetation, and a sandy yellow, indicating the altitude changes of mountain ranges or deserts. Anyone familiar with maps of Europe would be able to recognise the contours of the land mass, although the way the screen grab has been pinned to the board means it not orientated with the north at the top as is usual but, perhaps accidentally, with the west at the top instead. Nevertheless, while there is no writing to identify the different countries, anyone familiar with this kind of geographical representation would be able to identify the contours as the coastlines of different countries, including the UK, France,[156] Spain and Portugal, as well as the northern edge of the continent of Africa.

Technical contextual paradigm: There are also six points, each identified by an X. I made these to identify particular locations that relate to the key memories referred to in this experiment. These points are by no means representative of all the locations related to these memories, they simply demonstrate a spatial quality of difference.

Golden thread: Whilst the GPS trace follows a sequence of identified coordinates in a linear order of time, a trace of durée might connect the nodes in a very different way. The trace might begin at the letterbox, move to a node in Cornwall where I am writing, then to Morocco from where the letter was sent, to Spain where the accident happened, to Suffolk, England, and return to the letterbox, then Paris.

156 It is worth noting that other countries such as Germany and Italy are also visible, but as they are not part of this narrative, I have left them out – a telling example of how something that has no place in a certain narrative is excluded from notice.

Node 41: Google Earth Photogrammetry

Descriptor: Google Earth photogrammetry: a printed screen grab from Google Earth. Node 41 is a 3D CGI representation of a street in Lisbon where the photograph of a letterbox, node 2, was taken.

Technical process: Some of the 3D representations of cities like Lisbon have been created using photogrammetry. I was able to locate where the letterbox is within the 3D CGI representation of Lisbon by dragging into Google Earth the data file of the photograph, embedded with the GPS coordinates of the letterbox. (See appendix 7)

Technical contextual paradigm: Initially, the interface presents a rendering of the street from an ariel point of view within the context of a surrounding city. An icon identifies the position of the GPS coordinate corresponding to the photograph of the letterbox. Viewed from a distance, the photogrammetry provides enough information for a photorealistic 3D representation of the street and surrounding area. The 'inaccuracy', or rather the lack of information, only becomes apparent if the viewer zooms into focus on a subject of interest, in this case the letterbox. The closer to the detail, the more the 3D representation loses its aesthetic qualities of photorealism and becomes instead simply abstracted forms. One of the reasons that photorealism depends on maintaining a certain distance, a bird's eye view, is because the photographs are shot by a plane flying above the city, and details of objects such as a letterbox have not been captured.

Using my 'freedom' to wander, I noticed glitches and cracks in the surface of the mesh. Using the computer and a Google Earth application, I could draw up from the Google hard drives a 3D simulation of the wall, and using the interactive interface, go through and behind to where the letterbox would be if Google had taken more photographs from that perspective.

Golden thread: I had never seen behind this letterbox, and nor has Google. Yet my attention was drawn there. Looking at what lies behind is an approach Ahmed (2006) quoting Husserl's statement of letting his attention 'wander from the writing-table' (2002, p.101) proposes that rather than seeing this as a wandering away from the subject it can be a moving towards. "A queer phenomenology, I wonder, might be one that faces the back, which looks ''behind'' phenomenology, which hesitates at the sight of the philosopher's back' (Ahmed, 2006, p.29).

In relation to the letterbox, I considered what lay behind it; imagining the familiar spectacle of household entrances where doors (with letterboxes in them) mark the threshold between the inside (home) and the outside. While doing so, I could imagine actions[157] that, if I were behind the door, I might take in relation to the back of this letterbox, including picking up the letters that come through the door, one of which could be the letter about my dad, the other, a reply from the woman I met the night before. Although the latter was an email, the intimacy of the content made me imagine it was a letter.

157 The phrase is '*je me souviens*'. I wonder if Derrida played with this word.

Node 42: Society of the Spectacle

Descriptor: A printed photograph of the cover of Debord's book, *Society of the Spectacle*, featuring a film audience wearing 3D glasses.

Technical process: Using a smart phone extends the network of the internet from multiple fixed points in the environment to wherever the smart phone is carried to. In this way, the person carrying the device becomes an integral part of the meta interface (Andersen, 2018). The flow of information through this interface is only interrupted by the network provider or by someone switching the device off.

Technical contextual paradigm: When the phone with which I had begun this method of documentation broke down, the realisation of my reliance on it made me acutely aware of how much my wanderings had become part of a 'society of the spectacle'. I was both contributing to a network of databases and entranced by observing the re-presentation of this data. As a result of this research, my wanderings began to incorporate not only the physical reality of the spaces I traversed but also the representations of them created by Google. Because the data captured by my phone located my position in relation to Google Earth's GPS coordinates, I was able to locate my physical wanderings within its representations of a landscape. To a certain extent, it appeared that my experience and the Google representation possess a factor in common. Yet, this factor is not the experience but the location, identified according to GPS coordinates. And while the representation of this location as a map or GSV abided by a certain realist interpretation, I am interested in why a huge corporation like Google decided to leave in place a 3D CGI landscape full of glitches that individuals can wander in?

Golden thread: Could it be that my deviations from a prescribed route into the glitches of the 3D photogrammetric model and amongst the nodes pinned to my pinboard were not a contribution to research into alternative participatory

representations of lived experience, but in accordance with an unspoken invitation from Google in order to fill the cracks of the photometric mesh and enrich its database?

Node 43: Google Screen Grab of a Door

Descriptor: A screen grab of the GSV location of the letterbox, printed on paper.

Technical process: Within the simulated landscape of Google Earth, the POV in relation to the letterbox is changed by the action of moving the cursor or keys.

Node 44: Animated Walking

Descriptor: A screen grab of a drawing of a man walking, taken from an animated film.

Technical process: In the (real) street, where the letterbox was located, the movements of my body changed my POV in the 3G simulation. In both actions, there is an experience that can be associated with wandering. I am not responding to a habitual relationship with either the interface of the screen or that of the physical street; rather, I am in a state of mind in which I am responsive to whatever occurs in the moment and where deviation is part of the practice. At the same time, although there is no straight line, there is a conscious effort to draw out the relationships between different points.

Technical contextual paradigm: If I were to draw an act of wandering, I would represent it as a drawing of a man walking with the attitude of an ambler rather than moving with haste in the direction of a point of interest. If I were to animate this action, I would create a series of drawings representing different stages in the physical motion of a walk. However, when viewed as a sequence of drawings, the movement would not actually be contained in each drawing but would comprise what the viewer projects into the spaces between the drawings.

Golden thread: If we consider the different nodes of this diagram through the lens of the craft of animation, the nodes can be seen as a way of structuring a perception that exists, not in the individual nodes, but in the connection between each of them. How we connect things, the relationships we see between them, affects our perceptions and our lived experience.

Node 45: Crossroads

Descriptor: When I set out on my walks in Lisbon, my state of mind could have been described as being in or seeking to be at a crossroads.

Technical process: The visual trope of the crossroads derives from an experience of a place where, in the moment of hesitation over the choice between different directions, a glimpse of a wider perspective may become apparent.

Technical contextual paradigm: I used the crossroads as a device to resist the notion of narrative as a linear structure and to instead bring the focus to bear on what should be a goal of participation: an intersection and consideration of different ideas, unconstrained by any 'objective' perception of relevance. The crossroads allows the idea that anything that happens could be of relevance. The simple fact that it is here – the 'it' being an idea or a physical object – makes it relevant.

To this end, my first seminar in the Transtechnology seminar series 'Tropes of Effect' used the crossroads to engage with Brian Masumi's idea of affect. He considers affect in terms of a way to engage with a 'margin of manoeuvrability, the "where we might be able to go and what we might be able to do" in every present situation' (2005, p.3). This is a different state to that born out of habit and one that appears both in narrative structure and my lived experience when conscious of arriving at a crossroads.

Golden thread: Only a virtual interface can avoid negating ideas because any structure predetermines what can and cannot be included.

Node 46: Masked Selfie

Descriptor: A screen grab of a self-portrait I drew in *VR*, printed on paper (see Appendix 9).

Technical process: A VR drawing application transforms the method of mark making on a 2D surface into drawing in a 3D 'simulation of space. Once you put the VR headset on your head, masking your eyes, you can no longer see your body or the room you are in. Instead, you can see, through two strong lenses, a simulated environment surrounding you and two controllers that you can feel in your hands. Selecting a drawing tool on the controllers I began drawing myself from memories of seeing myself in reflections, mirrors or photographs.

Once the self-portrait was completed, I placed it over my head. I knew through a kinaesthetic sense where my head was. Then I switched the controllers into a simulation of a camera. I could see the simulation of a screen mirroring the drawing, that I was experiencing as a mask over my real face. Yet my face was not represented, in the simulated space.

Technical contextual paradigm: I could, however, sense my body. This illustrates the isolation of the body as 'distinct from all other images, in that I do not know it only from without by perceptions, but from within by affections' (Bergson, 2011, p. 1). This is a sensation that could be experienced wearing any mask; however, by wearing a VR headset, your eyes are openly staring at the illusion of space. This contradictory knowledge in my experiment had two points of reference: one was the absence of my visual body within the simulation, the other was the presence of my body, which I knew 'from within by affections'.

Golden thread: When I took the VR headset off, back in the actual material room, I looked at the selfie. Behind the mask, I as the wearer was not present. The selfie

at first appeared to be a contradiction of my experience. In this image I perceive the absence of my experience of taking a selfie while wearing a self-portrait as a mask.

Node 47: Google Earth Screen Grab, November 2020

Descriptor: A screen grab of a GSV image of the letterbox location, printed on paper. (see Appendix 7)

Technical process: In November 2020, using the GPS coordinates associated with the photograph of the letterbox taken in September 2018, I uploaded a GSV of the street and doorway onto the screen of my laptop.

Technical contextual paradigm: When repeating an action that I had made many times before – using GSV to return to the letterbox – I was immediately struck by the difference between my memory (and the previous Google documentation) and the latest GSV. The doorway and surrounding walls had been repainted, all the graffiti tags and marks had been erased, and the letterbox appeared to have been removed. I took a screen grab, not only to document the change, but also to capture the approximate time when I became aware of it. This information is automatically encoded into the data of the photograph – March 26, 2021 at 16:29:38. This is a recent update of the photograph taken in November 2020.

Golden thread: I thought of the tags of the graffiti artist, and what the erasure of the tags might mean to them. This reminded me of the tag of *pura poesia* (node 22) written on a door in another Lisbon street. Using the GSV interface, I clicked through simulations of streets to reach the GPS reference to the photograph of '*pura poesia*'. The same door, in an updated photograph, appears to have been repainted and the tag erased. Where is this letterbox now?